NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

BEFORE THE EMERGENCY: A FRAMEWORK FOR EVALUATING EMERGENCY PREPAREDNESS ALTERNATIVES AT HIGHER EDUCATION INSTITUTIONS

by

Laura L. Wilson

September 2010

Thesis Co-Advisors: Richard Bergin
Robert Josefek

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** September 2010	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE Before the Emergency: A Framework for Evaluating Emergency Preparedness Alternatives at Higher Education Institutions		**5. FUNDING NUMBERS**	
6. AUTHOR(S) Lauren Wilson			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		**8. PERFORMING ORGANIZATION REPORT NUMBER**	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. government. IRB Protocol number NPS.2010.0046-IR-EP7-A.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited		**12b. DISTRIBUTION CODE** A	

13. ABSTRACT (maximum 200 words)

This research gathered information about the ways in which 10 higher education institutions (HEIs) in the U.S. are currently making decisions about which emergency preparedness activities to pursue and how those most familiar with emergency management at HEIs think that these decisions should be made. Using this information, in concert with principles from the field of decision analysis, a conceptual framework was developed to enable decision makers to evaluate proposed preparedness alternatives using a normative approach to decision making. A simplified version of the framework was then presented to demonstrate how a proposed preparedness activity could be evaluated using the model and how several proposed alternatives could be compared to one another. In addition to presenting an analytical framework for evaluating preparedness options, recommendations were offered for optimizing preparedness and preparedness decision making at HEIs. These recommendations centered on the organizational structure of an emergency management program, including roles and responsibilities; strategic planning efforts specific to emergency management; and innovative practices currently being utilized by the HEIs involved in this study.

14. SUBJECT TERMS Higher education institution, preparedness, emergency management, campus, decision analysis, Stanford University			**15. NUMBER OF PAGES** 193
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

BEFORE THE EMERGENCY: A FRAMEWORK FOR EVALUATING EMERGENCY PREPAREDNESS ALTERNATIVES AT HIGHER EDUCATION INSTITUTIONS

Laura L. Wilson
Director of Public Safety/Chief of Police, Stanford University Department of Public Safety, California
B.A., Stanford University, 1991

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
September 2010**

Author: Laura L. Wilson

Approved by: Richard Bergin
Thesis Co-Advisor

Robert Josefek
Thesis Co-Advisor

Harold A. Trinkunas, PhD
Chairman, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This research gathered information about the ways in which 10 higher education institutions (HEIs) in the U.S. are currently making decisions about which emergency preparedness activities to pursue and how those most familiar with emergency management at HEIs think that these decisions should be made. Using this information, in concert with principles from the field of decision analysis, a conceptual framework was developed to enable decision makers to evaluate proposed preparedness alternatives using a normative approach to decision making. A simplified version of the framework was then presented to demonstrate how a proposed preparedness activity could be evaluated using the model and how several proposed alternatives could be compared to one another. In addition to presenting an analytical framework for evaluating preparedness options, recommendations were offered for optimizing preparedness and preparedness decision making at HEIs. These recommendations centered on the organizational structure of an emergency management program, including roles and responsibilities; strategic planning efforts specific to emergency management; and innovative practices currently being utilized by the HEIs involved in this study.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I. INTRODUCTION 1
A. PROBLEM STATEMENT 1
B. RESEARCH QUESTIONS 2
C. ARGUMENT 3
D. SIGNIFICANCE OF RESEARCH 4

II. LITERATURE REVIEW 5
A. DEFINING TERMS 5
B. GUIDELINES 15
1. Overview 15
2. Campus Preparedness Assessment 16
3. Building a Disaster Resistant University 17
4. Using Benefit-Cost Review in Mitigation Planning 19
5. Target Capabilities List 22
6. Risk Management in Higher Education: A Guide to Good Practice 23
7. Summary 28
C. MEASURING PREPAREDNESS 28
D. BARRIERS TO PREPAREDNESS 30
E. THE VALUE OF PREPAREDNESS 35
F. STRATEGIC PLANNING 37
G. DECISION MAKING 41
H. DECISION ANALYSIS 45
1. Elements of a Decision 45
2. Decision Quality 47
3. Iterative Process of Analysis 49
a. Framing the Problem 49
b. Deterministic, Probabilistic and Information Analysis 52
4. Group Decision Making 52
5. Clarifying Values—The Value Diagram 54
6. Shortfalls of Decision Analysis 58
7. Summary 60
I. CHAPTER SUMMARY 60

III. METHODOLOGY 63
A. METHODOLOGY 63
B. SAMPLE POPULATION 63
C. DATA COLLECTION 64
D. DATA ANALYSIS PROCESS 65

IV. ANALYSIS AND FINDINGS 67
A. OVERVIEW 67
B. ORGANIZATIONAL STRUCTURE 68

1. Themes and Patterns 68
a. Formalization of the Emergency Management Function 68
b. Roles and Responsibilities 70
c. Geographic Span 72
2. Noteworthy Practices 75
3. Summary of Findings 79
C. STRATEGIC PLANS AND STRATEGIC PLANNING 82
1. Themes and Patterns 83
a. Existence of a Strategic Plan 83
b. Access and Availability 85
c. Plan Creation and Maintenance 86
d. Guiding Principles 86
e. Preparedness Measurements 88
2. Noteworthy Practices 90
3. Summary of Findings 95
D. DECISION PROCESSES 97
1. Themes and Patterns 97
a. How Does the Institution Decide Which Specific Emergency Preparedness Initiatives and Programs to Pursue? 97
b. Does the Institution Utilize Any Type of a Decision Support Tool to Determine Which Preparedness or Mitigation Programs or Initiatives to Pursue? Are You Aware of Any Decision Support Tools, Systems or Processes for Evaluating Preparedness or Mitigation Activities? 99
c. How Can the Decision-Making Process Be Improved? 100
2. Noteworthy Practices 103
3. Summary of Findings 104
E. DECISION-MAKING CRITERIA 106
1. What Criteria Do You Think Decision Makers Use When Deciding Which Preparedness Activities to Pursue? 107
2. What Criteria Do You Think Decision Makers *Should* Consider When Deciding Which Preparedness Activities to Pursue? 110
3. How Does the Institution Define Its Core Mission? And, What Are the Institution's Core Values? 111
F. BARRIERS TO PREPAREDNESS 114
G. CHAPTER SUMMARY 116

V. DECISION ANALYSIS 119
A. OVERVIEW 119
B. VALUE DIAGRAMS 119
C. BUILDING A DECISION DIAGRAM FROM A VALUE DIAGRAM .. 121

D. EVALUATING ALTERNATIVES 129
1. Framing the Decision 129
2. Analyzing the Decision 132
a. Analysis of a Single Intervention Decision 133
3. Comparing Alternatives 136
a. Comparing Alternatives—Example 1 136
b. Comparing Alternatives—Example 2 138
4. Making the Decision 139
5. Summary 139
VI. CONCLUSION 141
APPENDIX A. INTERVIEW QUESTIONS 151
APPENDIX B. INPUT VARIABLES FOR MODELING EXAMPLES 157
LIST OF REFERENCES 165
INITIAL DISTRIBUTION LIST 173

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

Figure 1. STAPLEE Evaluation Table (From Delaware River Basin Commission, 2007) 20
Figure 2. Figure 1. Elements of an Institution-Wide Risk Management Framework (From HEFCE, 2005) 24
Figure 3. The ABCs of Strategic Planning (From Bryson, 2007) 38
Figure 4. Planning Horizons (From CPG-101, 2009a) 39
Figure 5. Six Elements of Decision Making (After Howard, 2007) 46
Figure 6. The Elements of a Good Decision Analysis Process (From Celona & McNamee, 2008) 46
Figure 7. Spider Diagram (From Celona & McNamee, 2008) 48
Figure 8. Decision Quality Radar (From Skinner, 2001) 48
Figure 9. Decision Analysis Cycle (From Howard, 2007) 49
Figure 10. Decision Diagram of Scheduling Situation (From Raha, 2010) 51
Figure 11. Dialogue Decision Process (From Celona & McNamee, 2008) 53
Figure 12. Value Diagram of Stanford University's President (After Raha, 2010) 57
Figure 13. Implementation Table (From University of Washington, 2009) 94
Figure 14. University of Washington's Emergency Management Strategic Map (From University of Washington, 2009) 95
Figure 15. University Decision Maker's Value Diagram (After Raha, 2010) 120
Figure 16. Conceptual Value Diagram for HEI Emergency Management 120
Figure 17. Value Diagram to Decision Diagram—Prosperity of the University 121
Figure 18. Value Diagram to Decision Diagram—Expenditures 122
Figure 19. Value Diagram to Decision Diagram—Reputation and Perception 123
Figure 20. Value Diagram to Decision Diagram—Precipitating Emergency Event and Trauma Impact 124
Figure 21. Value Diagram to Decision Diagram—Impact of Intervention on System 126
Figure 22. Value Diagram to Decision Diagram—Impact of Intervention Tool 127
Figure 23. Value Diagram to Decision Diagram—Impact of Intervention on Value 128
Figure 24. Decision Diagram without Value Attributes 129
Figure 25. Emergency Management Intervention Decision Diagram without Value Attribute 131
Figure 26. Emergency Management Intervention Decision Diagram with Value Attribute 132
Figure 27. Valuation Results Example 1 134
Figure 28. Comparing Alternatives Example 1—Cumulative Value to Cost Comparison for Three Emergency Preparedness Activities 137
Figure 29. Comparing Alternatives Example 2—Cumulative Value to Cost Comparison for Three Alternative Emergency Preparedness Activities 138

Figure 30. Valuation Results Example 2—Risk Attitude 157
Figure 31. Valuation Results Example 3—Altering the Probability of the Event and the Success of Intervention 158
Figure 32. Valuation Results Example 4—Increasing the Trauma Disvalue 159
Figure 33. Valuation Results Example 5—Capped Trauma Disvalue 160
Figure 34. Valuation for CERT Program—Comparing Intervention Alternatives Examples 1 and 2 161
Figure 35. Valuation for Mass Emergency Notification System—Comparing Intervention Alternatives Examples 1 and 2 162
Figure 36. Valuation for Business Continuity Tool—Comparing Intervention Alternatives Example 1 163
Figure 37. Valuation for Business Continuity Tool—Comparing Intervention Alternatives Example 2 164

LIST OF TABLES

Table 1. Summary of Desirable Characteristics for a National Strategy from Conception to Implementation (From Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism)..... 40
Table 2. HEI Organizational Structure, Branch Campuses, and Off-Site Facilities..... 73

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

BAT	Building Assessment Team
BCA	Benefit-cost analysis
CEO	Chief Executive Officer
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CHDS	Center for Homeland Defense and Security
CPG 101	Comprehensive Preparedness Guidelines 101
CPP	Community Preparedness and Participation
CPW	Community Planning Workshop
CSC	Community Service Center
DHS	Department of Homeland Security
DMA2K	Disaster Mitigation Act of 2000
DOC	Department Operational Center
DOEd	Department of Education
DRU	Disaster Resistant University
ESF	Emergency Support Function
EOC	Emergency Operation Center
EMAP	Emergency Management Accreditation Program
EMI	Emergency Management Institute
FEMA	Federal Emergency Management Agency
FTE	Full-time equivalent
GAO	Government Accountability Office
GIS	Geographic Information System
HEA	Higher Education Act
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institution
HSPD	Homeland Security Presidential Directive
IACLEA	International Association of Campus Law Enforcement Administrators
IAEM	International Association of Emergency Managers

IBHS	Institute for Business and Home Safety
NFPA	National Fire Protection Association
NGA	National Governor's Association
NIPP	National Infrastructure Protection Plan
NOAA	National Oceanic Atmospheric Association
NPG	National Preparedness Guidelines
NPS	Naval Postgraduate School
OEM	Office of Emergency Management
OES	Office of Emergency Services
ONHW	Oregon Natural Hazards Workgroup
OPDR	Oregon Partnership for Disaster Resilience
SLGCP	State and Local Government Coordination and Preparedness
SUDPS	Stanford Department of Public Safety
TCL	Target Capabilities List
USC	U.S. Code
USMC	U.S. Marine Corps
UWEM	University of Washington Emergency Management
Y2K	Year 2000

ACKNOWLEDGMENTS

First and foremost, I owe a tremendous amount of gratitude to Somik Raha. Four years ago, Somik, then a Ph.D. student in Decision and Risk Analysis at Stanford University, contacted me and asked if he could study the Stanford Department of Public Safety (SUDPS) as part of his graduate work. I believe the SUDPS exists not only to provide a safe and secure environment in which people can live and learn but also to assist students in the pursuit of their academic goals. So, even though I did not fully comprehend Somik's explanation of systems engineering and decision analysis, I agreed that the department would help him with his research. Over time, the decision analysis concepts Somik explained to me began to make sense. As I began working on ideas for this thesis, I realized that his field of study, decision analysis, offered a possible solution to a problem I was interested in solving: how to evaluate emergency management preparedness programs in order to make optimal decisions about how to invest institutional resources. With the passage of time, I became the student and Somik became my teacher. Were it not for his ongoing guidance and support, this thesis would have been drastically different. Thank you for your patience and assistance and for igniting my passion for knowledge. You are a true teacher.

Another teacher to whom I owe my deep appreciation is Chris Bellavita. Over the course of the past 16 years, Chris has exposed me to new ideas while also challenging my thinking and my beliefs in a non-threatening way, which has allowed me to learn and grow and to appreciate the journey along the way. Chris is a gifted teacher, and I thank you for your on-going wisdom and support.

My thesis advisers, Richard Bergin and Robert Josefek, have been wonderful mentors. I greatly appreciate the support and guidance they offered to me throughout the process and for their incredible responsiveness which made the process as smooth as possible. Greta Marlatt is a gem whose skill at finding resources will continue to amaze me long after I have graduated. I also want to

extend a word of appreciation to the Pelfreys—Bill Pelfrey Sr. for recommending my admission to the program and to Bill Pelfrey Jr. for his words of wisdom that provided me with the key I needed to move forward with this thesis and finish it! And, finally, a word of appreciation to the wonderful support staff at CHDS who provided their ongoing support and assistance throughout the process.

To the staff at SUDPS who supported me through the years and particularly over the course of the past 18 months while I have immersed myself in this program, you rock! Your support made it possible for me to pursue this long-time personal and professional goal.

And, finally, to my friends and family, past and present, I am deeply touched and humbled by your on-going support and friendship. Thank you.

I. INTRODUCTION

A. PROBLEM STATEMENT

Homeland Security Presidential Directive 8 (HSPD-8), enacted December 17, 2003, directed the Secretary of Homeland Security to develop a national all-hazards preparedness goal. Specifically, HSPD-8 established:

> …policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to State and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities. (White House, 2003)

The ***National Preparedness Guidelines*** (NPG) and accompanying ***Target Capabilities List*** (TCL), updated in 2007, took the policies outlined in HSPD-8 and defined what it means for the nation to be prepared for all hazards (U.S. Department of Homeland Security [DHS], 2009, p. 2). The vision for preparedness put forth in the NPG is, "A NATION PREPARED with coordinated capabilities to prevent, protect against, respond to, and recover from all hazards in a way that balances risk with resources and need" (DHS, 2007, p. 1). The NPG identified 37 target capabilities as being important to enhancing the nation's preparedness. One of these capabilities, defined as a common mission capability, is Community Preparedness and Participation (CPP). The CPP's goal is that everyone in America become fully aware, trained, and practiced on how to prevent, protect, mitigate, prepare for, and respond to all threats and hazards (FEMA, 2009, p. 3).

Higher education institutions (HEIs) in the U.S. are uniquely positioned to contribute to the nation's preparedness. In 2007, over 18 million people enrolled in the over 4,300 degree granting, post-secondary educational institutions located throughout the U.S. (U.S. Department of Education, 2009). If every HEI modeled emergency management best practices like teaching and reinforcing

simple behaviors such as knowing what to do when a fire alarm sounds, HEIs could influence the preparedness behaviors of adults throughout the country. Additionally, and perhaps more importantly, if every HEI had a robust emergency management program, HEIs would collectively contribute to the nation's preparedness by being prepared organizations within their respective communities.

Like any business, a HEI will be concerned about protecting its assets, making sound financial decisions, and balancing its budget in order to remain solvent. Conventional wisdom asserts that individuals, organizations, and communities that are prepared to respond to and recover from critical incidents will recover more quickly and suffer fewer losses. Logic also supports investing in mitigation activities to either reduce the likelihood of a critical incident or the severity of the consequences should the risk materialize. Therefore, preventing or minimizing critical incidents and resuming business as quickly as possible with the least amount of disruption in the wake of a critical incident would be a fundamental business objective for a HEI. This objective might incent a HEI to invest in preparedness and mitigation activities, but how does a HEI determine which specific activities to pursue? In the absence of legislation mandating compliance, HEIs will decide which preparedness and mitigation activities to pursue predominantly based on the perceived value of that activity to the individual institution relative to the cost of that activity. A tool or framework specific to HEIs for making this type of assessment does not currently exist.

B. RESEARCH QUESTIONS

The fundamental question this thesis seeks to answer is "How can higher education institutions better evaluate emergency preparedness and mitigation alternatives intended to address identified risks in order to make optimal decisions about how to invest the institution's limited resources and funds?" It was assumed that several factors would influence the way in which preparedness and mitigation decisions are being made at HEIs, including: the

organizational structure of an emergency management program, the existence of a strategic planning process specific to emergency management, the use of a structured decision-making process, as well as individual and organizational preferences. Questions were developed to elicit information about:

- The ways in which emergency management programs at HEIs are currently organized and managed;
- The role of strategic planning in the decision-making process;
- Processes that are used to make preparedness and mitigation decisions;
- The criteria decision makers use to make preparedness and mitigation decisions;
- The criteria decisions makers should be using to make these decisions; and
- The relationship between institutional values and the decisions which are made about which preparedness and mitigation activities to pursue.

The specific research sub-questions that the responses were intended to inform are as follows:

- How does the organizational structure of a HEI emergency management program contribute to optimizing the decisions made about preparedness and mitigation activities?
- How does the strategic planning process contribute to optimizing the decisions made about preparedness and mitigation activities?
- What decision-making process or processes contribute to optimizing decisions that are made regarding which preparedness and mitigation activities to pursue?
- What criteria should be considered to optimize preparedness decisions?

C. ARGUMENT

Absent a substantive process for evaluating preparedness and mitigation activities, HEIs might not invest in voluntary mitigation and preparedness initiatives, preferring instead to focus on those requirements mandated by law. Or, HEIs could make sub-optimal decisions with respect to preparing for

emergencies and mitigating emergency management risk, which might have a negative impact on the HEI and the community in which the HEI is located. Given that there are over 4,300 HEIs spread out across the United States, a framework or tool for evaluating preparedness and mitigation activities has the potential to benefit the institution as well as the community where the HEI is located and the state where the HEI is located, and, potentially, the nation. Ideally, such a process would incorporate factors such as: the HEI's mission and values; the preferences of the decision maker(s); a decision maker's level of knowledge and experience with certain types of emergency situations, risk assessment results, budgetary constraints, competing interests, regulatory requirements; and an understanding of interdependencies that exist within the organization. This research will seek to uncover the factors specific to HEIs that should be incorporated into a tool or framework for evaluating pre-event emergency management activities in order to optimize decisions.

D. SIGNIFICANCE OF RESEARCH

The intended goal of this research is to provide decision makers at HEIs with a process for making informed and effective decisions about which emergency preparedness and mitigation initiatives to pursue. The practical significance of this research to homeland security efforts is that HEIs might be more apt to invest in mitigation and preparedness activities if they are able to determine the value of these initiatives to their campuses, which would, in turn, enhance the nation's level of preparedness. It is also possible that the outcome of this study could offer a process for evaluating pre-event emergency mitigation and preparedness initiatives outside the framework of HEIs. The most likely consumers of this research will be college and university emergency managers, those who are charged with protecting the safety of the campus, and individuals who are responsible for managing an institution's budget and its assets.

II. LITERATURE REVIEW

The topic of this research is narrow in scope and, as a result, existing research on the specific topic is limited. There is, however, a vast array of potentially transferrable information from the fields of emergency management, risk management, decision theory, psychology, and organizational management as well as other fields of study that could contribute to the development of a framework for informing the decision-making process at HEIs relative to pre-incident emergency management activities. Additionally, there are numerous "how to" guides, including a few guides developed specifically for colleges and universities, available on the topics of hazard mitigation, risk assessments, and preparedness. Developed for a broad audience, the information contained within most of these guides can be easily understood by individuals new to the concepts of emergency management. At the other end of the spectrum, there are exceedingly complex quantitative methodologies for evaluating risks, many of which are based on network analysis. Haimes (2009), for example, has compiled a broad array of engineering based approaches to modeling, assessing and managing risk in his book ***Risk Modeling, Assessment, and Management***. While insightful, the approaches presented in this book require an extensive understanding of mathematics and engineering, which makes their practical usefulness to the general population, even practitioners at HEIs, somewhat limited. The following sections review some of the existing literature relevant to this research.

A. DEFINING TERMS

The term "emergency management" has been mentioned several times in this document already. Despite its widespread usage, emergency management does not have a single definition. In fact, the word "emergency" has different meanings. The ***Guide To Emergency Management And Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance, Executive***

Orders & Legislation(Blanchard, 2008, pp. 222–223) captured a variety of emergency management definitions, including those for "emergency" which follow:

> **Emergency/Exigent Circumstances:** "Circumstances that may include the existence of a threat to public health or public safety, or other unique circumstances that warrant immediate action." (DHS, ***Procedural Manual…CVI***, June 2007, p. 7)
>
> **Emergency**: "An unexpected event which places life and/or property in danger and requires an immediate response through the use of routine community resources and procedures. Examples would be a multi-automobile wreck, especially involving injury or death, and a fire caused by lightning strike which spreads to other buildings." Emergencies can be handled with local resources. (Drabek 1996, Session 2, p. 3)
>
> **Emergency:** Any hurricane, tornado, storm, flood, highwater, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, nuclear accident, or other natural or manmade catastrophe in any part of the United States. Any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety or to lessen the threat of a catastrophe in any part of the United States. (FEMA, ***Definitions of Terms***, 1990)
>
> **Emergency**: "Any occasion or instance--such as a hurricane, tornado, storm, flood, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, fire, explosion, nuclear accident, or any other natural or man-made catastrophe--that warrants action to save lives and to protect property, public health, and safety." (FEMA, ***Guide For All-Hazard Emergency Operations Planning*** (SLG 101), 1996, p. GLO-2)
>
> **Emergency:** "Any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The Governor of a State, or the Acting Governor in his/her absence, may request that the President declare an emergency when an incident occurs or threatens to occur in a State which would not qualify under the definition of a major disaster. Assistance authorized by an

> emergency declaration is limited to immediate and short-term assistance, and may not exceed $5 million, except when authorized by the FEMA Associate Director for Response and Recovery under certain conditions." (FEMA ***Disaster Dictionary*** 2001, 39; cites Robert T Stafford Act 102; 44 CFR 206.2, 206.35; 206.63, 206.66, and 503)
>
> **Emergency:** "…an unexpected occurrence or sudden situation that requires immediate action…It may involve communities (as a disaster does) or individuals (which a disaster does not)…" (Porfiriev 1995, 291).

What is noteworthy about these definitions is the lack of distinction, in many cases, between an emergency and a disaster. The terms are often used interchangeably, although disasters are generally considered to be larger in scope than an emergency. Below are select definitions of "disaster" also taken from The ***Guide To Emergency Management And Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance, Executive Orders & Legislation*** (Blanchard, 2008, pp. 173–177):

> **Disaster**: "Disasters are fundamentally social phenomena; they involve the intersection of the physical processes of a hazard agent with the local characteristics of everyday life in a place and larger social and economic forces that structure that realm" (Bolin with Stanford 1998, 27).
>
> **Disaster:** "A sudden calamitous emergency event bringing great damage loss or destruction." (CA OES, ***SEMS Guidelines***, 2006, Glossary, p. 7)
>
> **Disaster:** "A disaster is…an event associated with the impact of a natural hazard, which leads to increased mortality, illness and/or injury, and destroys or disrupts livelihoods, affecting the people or an area such that they (and/or outsiders) perceive it as being exceptional and requiring external assistance for recovery" (Cannon 1994, 29, fn.2).
>
> **Disaster:** "A disaster is an emergency considered severe enough by local government to warrant the response and dedication of resources beyond the normal scope of a single jurisdiction or branch of local government." (Carroll 2001, 467)

> **Disaster:** "An event in which a community undergoes severe danger and incurs, or is threatened to incur, such losses to persons and/or property that the resources available within the community are exceeded. In disasters, resources from beyond the local jurisdiction, that is State or Federal level, are required to meet the disaster demands." (Drabek 1996, 2-4)
>
> **Disaster/Emergency:** "An event that causes, or threatens to cause, loss of life, human suffering, public and private property damage, and economic and social disruption. Disasters and emergencies require resources that are beyond the scope of local agencies in routine responses to day-to-day emergencies and accidents, and may be of such magnitude or unusual circumstances as to require response by several or all levels of government – Federal, State and local." (FEMA, ***Hazards Analysis for Emergency Management (Interim Guidance)***, September 1983, p. 5)
>
> **Disaster:** Any event "concentrated in time and space, in which a society of a relatively self-sufficient subdivision of society, undergoes severe danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented" (Fritz 1961, 655)

It is not imperative to decide upon a singular definition for "emergency" or "disaster" for the purposes of this research. What is relevant is to recognize that individuals attribute different meanings to words and that this attribution, in turn, influences their thinking, perceptions and actions.

To complete the examination of definitions, consider the following definitions of "emergency management" offered by the ***Guide To Emergency Management And Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance & Legislation*** (Blanchard, 2008, pp. 224-227):

> **Emergency Management:** "The coordination and integration of all activities necessary to build, sustain and improve the capabilities to prepare for, respond to, recover from, or mitigate against threatened or actual disasters or emergencies, regardless of cause." (DHS, ***Lexicon***, October 23, 2007, p. 9)."

> **Emergency Management:** "An ongoing process to prevent, mitigate, prepare for, respond to, and recover from an incident that threatens life, property, operations, or the environment (NFPA 1600, 2007, p. 7)."

> **Emergency Management:** "Activities that include prevention, preparedness, response, recovery, rehabilitation, advocacy, and legislation, of emergencies irrespective of their type, size, and location, and whose purpose is reduction in death, disability, damage, and destruction (Dykstra , 2003, 3)".

> **Emergency Management:** "…governmental function that coordinates and integrates all activities to build, sustain, and improve the capability to prepare for, protect against, respond to, recover from, or mitigate against threatened or actual natural disasters, acts of terrorism or other man-made disasters;...(Public Law 109-295 (120 Stat. 1394) October 4, 2006, ***Department of Homeland Security Appropriations Act, 2007*** (also referred to as Post-Katrina Emergency Management Reform Act of 2006), Title 6, p. 40)."

FEMA has used differing definitions of emergency management, including the following two similar definitions (Blanchard, 2008, p. 226):

> **Emergency Management:** "The process through which the Nation prepares for emergencies and disasters, mitigates their effects, and responds to and recovers from them (FEMA, ***A Nation Prepared—FEMA Strategic Plan—Fiscal Years 2003-2008***, 2002, p. 57)."

> **Emergency Management:** "The process through which America prepares for emergencies and disasters, responds to them, recovers from them, rebuilds, and mitigates their future effects." (FEMA, ***Disaster Dictionary*** 2001, 40, citing FEMA Strategic Plan)."

As was the case with "emergency" and "disaster," it is not critical to select a specific definition of "emergency management" for the purpose of this thesis. What is relevant is to understand that emergency management is generally considered to be a cyclical process for managing emergencies and disasters that includes no less than four components—preparedness, mitigation, response, and recovery. This paper is focused on the ***pre-incident*** decision-making process; thus, it is relevant to define what is meant by "preparedness" and "mitigation."

Not surprisingly, there are multiple definitions of “preparedness.” Training materials from FEMA’s Emergency Management Institute (EMI) IS-230 class titled “Fundamentals of Emergency Management” define preparedness as:

> The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. (FEMA, 2009b, pp. 3–4)

Preparedness has also been described as:

> A continuous cycle of (1) establishing policy and doctrine, (2) planning and allocating resources, (3) conducting training and exercises to gather lessons learned, and (4) assessing and reporting on the training and exercises to evaluate preparedness, including identifying any gaps in capabilities. The results of these assessments and reports are then used to inform decision makers on what improvements are needed in policies and plans and how to target finite resources to improve preparedness for disasters. (U.S. Government Accountability Office [GAO], 2009, p. 2)

Other definitions for preparedness taken from the Guide to Emergency Management and Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance and Legislation include (Blanchard, 2008, pp. 625–631):

> **Preparedness:** “Preparedness within the field of emergency management can best be defined as a state of readiness to respond to a disaster, crisis, or any other type of emergency situation. It includes that activities, programs, and systems that exist before an emergency that are used to support and enhance response to an emergency or disaster.” (Bullock & Haddow 2005, 181)

> **Preparedness:** [A]ctivities and measures designed or undertaken to prepare for or minimize the effects of a natural or man-made hazard upon the civilian population, to deal with the immediate emergency conditions that would be created by the hazard, and to effectuate emergency repairs to, or the emergency restoration of, vital utilities and facilities destroyed or damaged by the hazard; is a

> continuous operationally focused process for establishing guidelines, protocols, and standards for planning, training and exercises, personnel qualification and certification, equipment certification, and publication management. (DHS, ***Lexicon***, 2007, p. 19–20)
>
> **Preparedness:** "Preparedness activities are necessary to the extent that mitigation measures have not, or cannot, prevent disasters. In the preparedness phase, governments, organizations, and individuals develop plans to save lives and minimize disaster damage (for example, compiling state resource inventories, mounting training exercises, or installing warning systems). Preparedness measures also seek to enhance disaster response operations (for example, by stockpiling vital food and medical supplies, through training exercises, and by mobilizing emergency personnel on a standby basis)." (NGA, ***CEM Governors' Guide***, 1979, p. 13).

Similar to emergency management, preparedness is also viewed as being a cyclical process. According to the Department of Homeland Security (DHS), preparedness includes the following actions:

- Conduct Risk Assessment
- Conduct Capabilities Assessment
- Develop Strategy
- Plan and Resource Programs
- Identify/Purchase Equipment
- Develop Multi-year Training and Exercise Plan and Schedule
- Conduct Training
- Conduct Exercises to Validate Training and Plans
- Assign Corrective Actions resulting from Exercise Evaluation and Improvement Plans
- Track/Implement Corrective Actions
- Update Capabilities Assessment/Strategy/Multi-year Plans. (DHS, 2007b, p. 13)

Another way in which to view the concept of preparedness is by examining the preparedness capability as defined by the DHS in the ***National Preparedness Guidelines*** (NPG). The NPG breaks preparedness into the following capabilities:

planning; organization and leadership; personnel; equipment and systems; training; exercises, evaluations, and corrective actions (DHS, 2007a, p. 13). Specific explanations for each of these elements are as follows:

> ***Planning*:** Collection and analysis of intelligence and information, and development of policies, plans, procedures, mutual aid agreements, strategies, and other publications that comply with relevant laws, regulations, and guidance necessary to perform assigned missions and tasks.
>
> ***Organization and Leadership*:** Individual teams, an overall organizational structure, and leadership at each level in the structure that comply with relevant laws, regulations, and guidance necessary to perform assigned missions and tasks.
>
> ***Personnel:*** Paid and volunteer staff who meet relevant qualification and certification standards necessary to perform assigned missions and tasks.
>
> ***Equipment and Systems*:** Major items of equipment, supplies, facilities, and systems that comply with relevant standards necessary to perform assigned missions and tasks.
>
> ***Training*:** Content and methods of delivery that comply with relevant training standards necessary to perform assigned missions and tasks.
>
> ***Exercises, Evaluations, and Corrective Actions:*** Exercises, self-assessments, peer-assessments, outside reviews, compliance monitoring, and actual major events that provide opportunities to demonstrate, evaluate, and improve the combined capability and interoperability of the other elements to perform assigned missions and tasks to standards necessary to achieve successful outcomes. (DHS, 2007a, p. 5)

The reason it is important to examine the myriad definitions of preparedness is to emphasize that the seemingly simple word “preparedness” encompasses a broad range of possible actions. Irwin Redlener, M.D., Associate Dean and Director of the National Center for Disaster Preparedness at the Columbia University Mailman School of Public Health, aptly summarizes this point with the statement, “Whatever you think about being prepared as an individual or family, extrapolate that to a hospital CEO. They have no idea of

what the end point is because there are no satisfactory benchmarks to establish what we mean by '***prepared***'" (PricewaterhouseCoopers' Health Research Institute, 2007, p. 5). Redlener's comments could easily apply to any complex organization, including a HEI. In order to "be prepared," one must define what it means to "be prepared."

To complicate matters even further, consider the somewhat blurry distinction between "preparedness" and "mitigation". Again, drawing definitions from the ***Guide To Emergency Management And Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance, Executive Orders & Legislation*** (Blanchard, 2008, pp. 473–479), mitigation has been defined as follows:

> **Mitigation:** "Activities designed to reduce or eliminate risks to persons or property or to lessen the actual or potential effects or consequences of an incident. Mitigation measures may be implemented prior to, during, or after an incident. Mitigation measures are often developed in accordance with lessons learned from prior incidents. Mitigation involves ongoing actions to reduce exposure to, probability of, or potential loss from hazards. Measures may include zoning and building codes, floodplain buyouts, and analysis of hazard-related data to determine where it is safe to build or locate temporary facilities. Mitigation can include efforts to educate governments, businesses, and the public on measures they can take to reduce loss and injury." (DHS, ***NIPP***, 2006, p. 104)
>
> **Mitigation:** "Mitigation means sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Mitigation distinguishes actions that have a long-term impact from those that are more closely associated with preparedness for, immediate response to, and short-term recovery from a specific event" (FEMA, ***Multi Hazard Identification and Risk Assessment***, 1997**,** p. xxii)
>
> **Mitigation:** "Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Effective mitigation measures can break the cycle of disaster damage, reconstruction, and repeated damage….Effective mitigation is achieved through three critical components—analyzing risk, reducing risk, and insuring for flood risk.

> **Analyze Risk:** Determining the impact of natural hazards that lead to effective strategies for reducing risk.
>
> **Reduce Risk:** Reducing or eliminating long-term risk from hazards on the existing built environment and future construction.
>
> **Insure for Flood Risk:** Reducing the impact of floods on the Nation by providing affordable flood insurance." (FEMA, ***Fact Sheet, FEMA's Mitigation Directorate***, August 2007, p. 1)

The National Oceanic Atmospheric Association (NOAA) breaks mitigation into two broad strategies: hazard avoidance and hazard reduction. Hazard reduction focuses on strengthening structures and providing safeguards to reduce the amount of damage caused by natural hazards. Hazard avoidance strategies are designed to minimize the exposure to risks based on location (NOAA, 2007).

Another definition of mitigation can be found in ***Developing and Maintaining State, Territorial, Tribal and Local Government Emergency Plans: Comprehensive Preparedness Guidelines 101*** (CPG 101):

> Activities providing a critical foundation in the effort to reduce the loss of life and property from natural and/or manmade disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities. Mitigation seeks to fix the cycle of disaster damage, reconstruction, and repeated damage. These activities or actions, in most cases, will have a long-term sustained effect (FEMA, 2009a, p. B-6).

Mitigation and preparedness are generally considered to be distinct activities, but there are instances when it is difficult to distinguish between them. For example, obtaining and storing drinking water is generally viewed as being an activity associated with preparedness, but it could also be viewed as a mitigation activity because the person or institution that has water available during a critical incident should be in better shape compared to an individual or institution that does not have access to fresh drinking water. Conversely, the decision to reinforce a water storage tank in a part of the country known to experience earthquakes could be viewed as being a mitigation strategy; yet, it

could also be viewed as a step towards enhanced preparedness. CPG 101 states: "[M]itigation is part of the overall preparedness effort and must be considered when developing management strategies for each mission area" (FEMA, 2009a, p. 2-2). This quote illustrates the interconnectedness of preparedness and mitigation while also blurring the distinction between them. In the interest of ascertaining how the interviewees defined these concepts, preparedness and mitigation were purposefully not defined for the interviewees in this study. For the purposes of analyzing the information collected during the interviews, mitigation will be assumed to fall under the umbrella of preparedness.

B. GUIDELINES

1. Overview

The U.S. federal government has produced numerous publications about a vast array of emergency management topics. Examples of these documents include: ***Are You Ready? An In-depth Guide to Citizen Preparedness; Understanding Your Risks, Identifying Hazards and Estimating Losses*** (FEMA, 2004); ***Developing the Mitigation Plan, Identifying Mitigation Actions and Implementation Strategies*** (FEMA, 2003c); and ***Bringing the Plan to Life, Assuring the Success of the Hazard Mitigation Plan*** (FEMA, 2003b). Documents specifically directed at HEIs are limited, although there are some such as the ***Campus Preparedness Assessment***, produced by the State and Local Government Coordination and Preparedness (SLGCP) Division of the Department of Homeland Security (DHS), and ***Building a Disaster Resistant University,*** prepared by FEMA (FEMA, 2003a). This section will review several of these documents as well as a document from the United Kingdom, ***Risk Management in Higher Education: A Guide to Good Practice*** (Higher Education Funding Council for England [HEFCE], 2005), which contains several noteworthy ideas about how to assess and manage risk as well as ways to instill an ethos of preparedness within a HEI.

2. Campus Preparedness Assessment

The ***Campus Preparedness Assessment*** (DHS, 2005) provides guidance on conducting threat and vulnerability assessments, as well as a needs assessment, for determining the gap between an identified level of capability required to adequately prevent or respond to a likely terrorist attack and the current capability of emergency responders. The document provides tools for conducting threat and vulnerability assessments and a template for conducting physical security site assessments. The document's name is somewhat misleading—insofar as the content of this document is strictly focused on preparedness for terrorism and does not address preparedness for natural disasters. According to the document, the intended purpose of completing the assessment using the tools offered is:

> [T]o promote sharing of information about individuals or groups that may pose a threat to the safety and security of campus populations, personnel, facilities, infrastructure, and operations; to compile a list of campus assets and critical infrastructure, including those containing sensitive and/or potentially hazardous chemical, biological, radiological (including nuclear), or explosive material; to determine which campus assets or critical infrastructure components may be at greatest risk to be targeted by terrorists; and to develop strategies to both reduce risks to campus assets and to enhance capability to respond to and recover from an act of terrorism on campus (DHS, 2005, pp. 2–3).

Because the document was developed with colleges and universities as the intended audience, it highlights issues that are specific to HEIs. The document's strength is the risk assessment tools it offers; it does not offer guidance, however, on how to prioritize and evaluate preparedness alternatives. With respect to mitigation, the advice offered (in bold type) is "The Needs Assessment leads to steps in a mitigation plan and should be completed in conjunction with the local jurisdiction; the mitigation plan will not be addressed in detail in this book" (DHS, 2005, p. 3). In summary, the guidance and tools offered in this document could be modified to address preparedness for natural

disasters and, despite its specific focus on terrorism, several of the suggested tools are worth considering when developing a framework for evaluating preparedness and mitigation options for HEIs.

3. Building a Disaster Resistant University

One of the more comprehensive guidelines for informing emergency management decision making specific to universities is the document ***Building a Disaster Resistant University*** (FEMA, 2003a). According to FEMA, the Disaster Resistant University (DRU) project is:

> …both a how-to guide and a distillation of the experiences of six universities and colleges that have been working over the past several years to become more disaster-resistant…This guide provides basic information designed for institutions just getting started, as well as concrete ideas, suggestions, and practical experiences for institutions that have already begun to take steps to becoming more disaster-resistant. (FEMA, 2003a, p. iii)

In terms of evaluating mitigation and, by extension, preparedness alternatives, ***Building a Disaster Resistant University*** offers the following guidance: "rank the actions needed and develop a timeline for implementation. Possible criteria for ranking include life safety, operational criticality, time needed to complete the activity, effectiveness/ lifespan, or other hazard-specific considerations" (FEMA, 2003a, p. 32). The document does not offer any further guidance on how to go about structuring this ranking exercise. It does offer:

> [T]he most common basis for prioritization is benefit-cost analysis (BCA), which allows multiple projects to be compared across a range of hazards. The basic formula includes the following: the cost of the mitigation action; the dollar value of risk reduction (calculated from the potential loss of life, property, and function of the institution) each time the hazard occurs; the frequency with which the benefits of the action will be realized (frequency of hazard occurrence assumes that the action performs as expected); and the present value of aggregated future benefits (dollar value of risk reduction each time the hazard occurs multiplied by the probability of occurrence, multiplied by the life span of the action). (FEMA, 2003a, p. 32)

This formula seems to provide a tangible mechanism for evaluating activities; yet, some of the variables that would be significant to a HEI are not as simple to calculate as one might imagine. How does one calculate the loss of research? If the research dollars have already been allocated, then there is no direct financial loss, but the loss of knowledge can be immense. What variable calculates the loss of knowledge? Similarly, what dollar figure does a university apply to a person's life? Insurance companies use actuarial data to make this type of a calculation, but it seems unlikely that a university decision maker will make a decision about pursing a proposed preparedness or mitigation strategy using actuarial data.

Building a disaster resistant university in accordance with the guidelines offered by ***Building a Disaster Resistant University*** requires an extensive commitment from a broad selection of personnel from within the HEI—from the President's Office to the student body—as well as external stakeholders. Interestingly, the DRU program is no longer being funded by the federal government. Perhaps the costs of running the program outweighed the perceived benefits. Regardless of the reason, the vision of a collective body of knowledge specific to colleges and universities, as expressed in the following quote, did not materialize outside of the work that was done by the grant recipients:

> As larger numbers of higher education institutions work toward disaster resistance, a body of knowledge and best practices will emerge about how universities and colleges have adapted and created mitigation actions to meet their unique requirements. This is still a very new area for many institutions and it will be helpful to document what you do and to share your experiences with others whenever possible. (FEMA, 2003a, p. 31)

Despite the listed drawbacks, ***Building a Disaster Resistant University*** contains a wealth of valuable information worth considering when developing a framework for evaluating preparedness and mitigation alternatives even though it does not offer detailed guidance on how to structure this evaluation.

4. Using Benefit-Cost Review in Mitigation Planning

In terms of specific guidance, ***Building a Disaster Resistant University*** (FEMA, 2003a) recommends that college and universities refer to a number of other guidelines including: ***Getting Started: Building Support for Mitigation Planning*** (FEMA 386-1) (FEMA, 2002); ***Understanding Your Risks: Identifying Hazards and Estimating Losses*** (FEMA 386-2) (FEMA, 2001); ***Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies*** (FEMA 386-3) (FEMA, 2003c); ***Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*** (FEMA 386-4) (FEMA, 2003b); and ***Integrating Human-Caused Hazards Into Mitigation Planning*** (FEMA 386-7) (FEMA, 2003d). FEMA's ***Developing the Mitigation Plan*** (FEMA 386-4) (FEMA, 2003c) references another FEMA document, ***Using Benefit-Cost Review in Mitigation Planning*** (FEMA 386-5) (FEMA, 2007) for guidance in prioritizing actions by describing appropriate benefit-cost methodologies for evaluating the effectiveness of a range of potential mitigation actions. The tools offered in ***Using Benefit-Cost Review in Mitigation Planning*** (FEMA, 2007) include financial as well as non-financial criteria as part of the analysis. The tools are straightforward and easy to understand. ***Using Benefit-Cost Review in Mitigation Planning*** points out that a cost-benefit review differs from a cost-benefit analysis (BCA) as follows:

> BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action…The analysis determines whether a mitigation project is technically cost-effective. The principle behind the BCA is that the benefit of an action is a reduction in future damages. (FEMA, 2007, p. 2)

By comparison, a:

> …Benefit-Cost Review can be broad and need not be complex. It needs to be comprehensive so that it covers monetary as well as non-monetary costs and benefits associated with each action. Some projects can be extremely cost-effective but not as beneficial for the community at large. (FEMA, 2007, pp. 2–3)

One of the tools presented in ***Using Benefit-Cost Review in Mitigation Planning*** that could be utilized within the HEI arena is the social, technical,

political, legal, economic, and environmental (STAPLEE) evaluation criteria (FEMA, 2007). For each of the listed S-T-A-P-L-E-E categories, there is a subset of questions related to that specific area. For example, under the political category, the considerations are: political support, local champion, and public support. Raters then evaluate proposed actions under each of these sub-criteria with a "+" or a "-" sign to indicate the perceived level of support or lack of support (FEMA, 2003c, p. 2.21). Figure 1 provides an example of this tool. Once the proposed actions have been evaluated, the relative strengths and weaknesses of each alternative can be compared.

Sample STAPLEE ACTION EVALUATION TABLE: Town A

Alternative Actions	STAPLEE Criteria Considerations + Favorable - Less favorable N Not Applicable																							
	S (Social)		T (Technical)			A (Administrative)			P (Political)			L (Legal)			E (Economic)				E (Environmental)					
	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Staffing	Funding Allocation	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/ Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws
Action 2.1.1 - Bridge Replacement	+	N	+	+	+	+	+	-	+	+	+	+	+	N	+	+	+	N	-		-	-	-
Action 2.1.2 - Property Acquisition	-	-	+	+	+	-	-	-	-	-	+	+	+	+	+	-	-	-	+	+	+	+	+
Action 2.3.1 - Elevate critical facility (hospital)	+	+	-	+	-	-	-	+	+	+	+	+	+	+	+	-	+	-	+	+	N	+	+
Action 5.3.1 - Public awareness program on local TV channel	+	+	+	+	+	-	-	-	+	+	-	+	N	N	+	+	+	-	N	N	N	+	+
Action 1.4.1 - Code update	-		N	+	+	-	+	+	+	+	-	+	+	-	+	+	+	+	N	N	N	+	+

Figure 1. STAPLEE Evaluation Table (From Delaware River Basin Commission, 2007)

The strength of the STAPLEE evaluation criteria is that the proposed actions are evaluated across a spectrum of considerations, which helps to develop a more robust picture of the possible impacts and consequences of various proposed actions. The use of non-monetary criteria in the evaluation of mitigation and preparedness programs might be appealing to HEIs because HEIs generally consider themselves to be driven by a set of values that are not, as a

general rule, solely based on financial profit. Non-monetary criteria that might be important to a HEI could include concepts such as education, service, the furtherance of knowledge, and the emotional, spiritual and psychological development of students. The seven STAPLEE criteria (**s**ocial, **t**echnical, **p**olitical, **l**egal, **e**conomic and **e**nvironmental) are relevant to HEIs, but FEMA's methodology could be further customized to an individual HEI by altering the specific criteria to be considered. Any approach should not ignore the fact that HEIs must operate like businesses in so far as they must cover their expenses, but most HEIs would prefer to communicate that they evaluate their fundamental mission and contribution to society through measures that are not solely based upon economics. Thus, the STAPLEE criteria might resonate with HEI decision makers and provide an acceptable and motivating framework for evaluating mitigation activities, as well as other preparedness efforts.

A weakness of the STAPLEE evaluation criteria tool is that "+" and "-" signs do not fully convey relative importance. For example, the political implications of Action A may be totally and completely unacceptable, which would result in a "-" sign being affixed to that option. The political implications of Action B may also be undesirable, resulting in a "-" sign also being associated with that option. Compared to Action A, however, Action B would be tolerable. As presented, both Action A and Action B are being rated as being equally negative in terms of their impact. Similarly, the environmental impacts of Action A may be far more unacceptable relative to the social impacts of Action A but a simple "+" or "-" does not convey the relative weighting. One solution would be to weight the different criteria or give numerical scores rather than using "+" and "-" indicators. This approach makes the system a bit more complicated, but most decisions, especially complex decisions, are not so simple that they can be evaluated using "+" and "-" rankings. In essence, this methodology does not offer a mechanism for effectively evaluating trade-offs between options, nor does it address the interconnectedness of various options. Another weakness with this

rating mechanism is that it does not incorporate uncertainty, which a fundamental aspect of a real life decision, especially the types of decisions that are associated with emergencies and emergency management.

5. Target Capabilities List

Another document that contributes to the literature on preparedness is the ***Target Capabilities List*** (DHS, 2007b). As previously mentioned, Community Preparedness and Participation (CPP) is one of 37 target capabilities listed in the TCL. The CPP identifies the following as being desired outcomes: the education and training of the public in the four homeland security mission areas: prevention, protection, response, and recovery; the participation of individuals in volunteer programs; and the ability of the public to provide surge capacity support. More specifically, the goals have been defined as follows:

- Percent of residents within the jurisdiction who are alert to unusual behavior—indicative of potential terrorist activity—and who understand appropriate reporting procedures, until 80 percent of residents maintain knowledge.
- Percent of households that conduct pre-incident preparation to include creating and maintaining a communication plan, obtaining disaster supplies, and practicing evacuation/ shelter-in-place and additional maintenance skills, until 80 percent of households maintain pre-incident preparation.
- Percent of residents prepared to evacuate or relocate to designated shelter (to include residents with special needs), until 80 percent of the population is prepared.
- Percent of a jurisdiction's population that is knowledgeable of workplace, school, and community emergency plans, until 80 percent of population maintains knowledge.
- Percent of residents prepared to shelter-in-place and have emergency supplies on hand as advised by local authorities, until 80 percent of population is thus prepared (DHS, 2009, pp. 3–4).

Unlike most of the other documents that have been referenced thus far that do not provide distinct outcomes, the CPP provides clear, measurable and specific desired outcomes. The existence of measureable objectives provides direction and informs decision making.

6. Risk Management in Higher Education: A Guide to Good Practice

In addition to the "how to" guides produced by the United States federal government, the government of the United Kingdom has produced helpful guidance documents, which could have applicability to U.S. institutions. One of these documents—***Risk Management in Higher Education: A Guide to Good Practice***—provides numerous interesting and noteworthy insights specific to HEIs regarding risk management (HEFCE, 2005). Although focused on risk management, the best practices contained within this document could easily be applied to strategies and approaches for addressing emergency management, which is essentially a type of risk management.

One insight contained within ***Risk Management in Higher Education*** is the concept of embedding risk management programs into the organizational culture of a HEI in order to reduce risk (HEFCE, 2005). One of the offered strategies is to "marry top-down and bottom-up assessments to produce a comprehensive picture of risk to the institution (HEFCE, 2005, p. 2). Figure 2 depicts how this "top-down / bottom-up" strategy would be put into operational practice. Incorporating such a process would likely require a mandate from the HEI's board of trustees/overseers or the President/Chancellor. It is also possible that such a process could be driven by a department or school, especially if there were an incentive for participation or the benefit for the individual department or school of engaging in this process could be demonstrated.

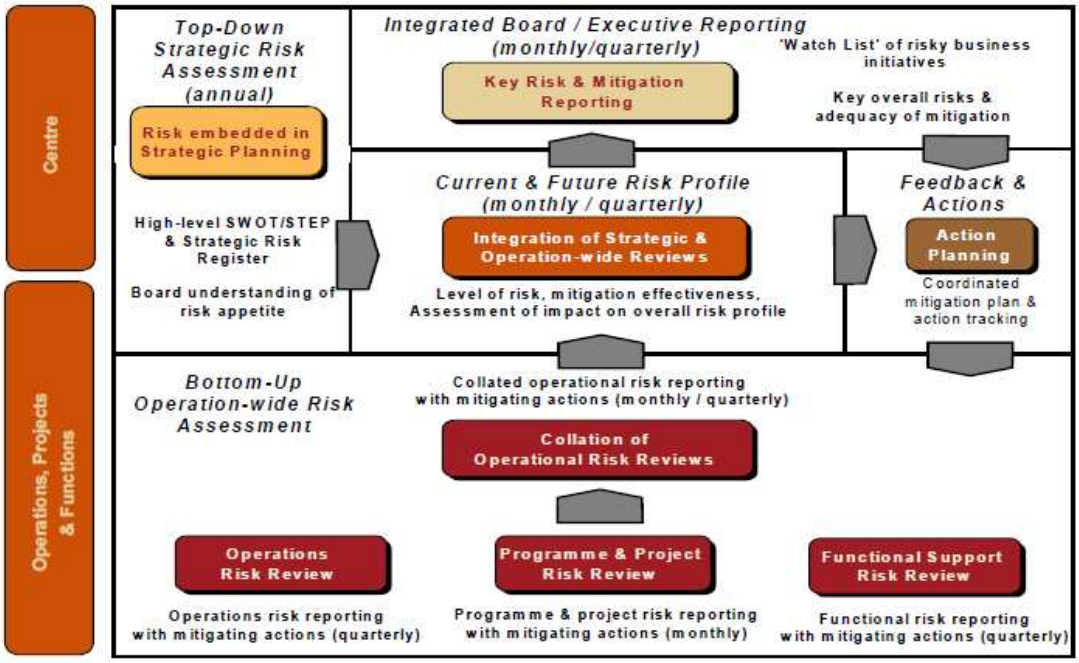

Figure 2. Figure 1. Elements of an Institution-Wide Risk Management Framework (From HEFCE, 2005)

In terms of support for embedding risk management into the operational and organizational culture of the HEI, ***Risk Management in Higher Education*** notes that at one institution in the U.K.:

> …all academic schools and service departments are required to complete and maintain local risk registers[1] as part of their annual planning process. This helps them play an active role in the risk management process… Academic deans at this institution commented on how risk management has added focus and a more commercial ethos to their areas of responsibility. (HEFCE, 2005, p. 29)

"Risk registers," as explained in the U.K. ***National Risk Register*** document, are:

> the starting point for emergency planning. The key to turning this into useful planning information is remembering that it is not the

[1] Risk registers are a tool for "[u]nderstanding the risks and determining their relative significance in terms of potential impact" (U.K. Cabinet Office, 2008, p. 4).

> risks themselves that people have to deal with when things go wrong, but their consequences. In an increasingly complex and interdependent society, emergencies can have increasingly complex knock-on effects. The Register identifies both direct and indirect consequences, many of which are common to several risks, and provides information on how to prepare for them. (U.K. Cabinet Office, 2008, p. 4)

At another institution, the:

> …risk register is built around the annual operating plan and shows the risks of the institutional objectives not being met. Members of the governing body receive the output document periodically, and have found that it has enhanced their understanding of the key operational issues being dealt with by management. (HEFCE, 2005, p. 28)

And, at another institution:

> For each academic department, staff are required to identify risks and underlying factors and to work through scenarios considering how the risk factors interact. This is an annual, forward-looking exercise and is used to feed messages up to the academic board. This has assisted in improving academic quality procedures which had previously been very bureaucratic." (HEFCE 2005, p. 15)

An important observation made in ***Risk Management in Higher Education*** is the distinction between a truly embedded process, and a process which gives the appearance of being embedded (HEFCE, 2005).The report notes:

> Smaller/less complex institutions have tended to adopt top-down risk management processes. This suggests that risk management processes are overlaid onto existing management processes rather than being truly embedded. Better practice would be to fully involve faculty and departmental management (academic and non-academic) in the risk management processes, to make it part of the institution's culture. (HEFCE, 2005, p. 14)

By comparison, the report states, "Larger and/or more complex institutions tend to have a wider group of individuals involved in the risk management process, and their processes are more devolved. However, for some this is still an overlaid process." (HEFCE, 2005, pp. 27–28).

Another best practice noted in ***Risk Management in Higher Education*** that could have applicability to emergency management practices to HEIs in the U.S. is the idea of tying emergency risk management assessments and pre-incident planning to the institution's budgeting process or annual planning cycle (HEFCE, 2005). Such an approach would most likely be regulatory in nature, as opposed to being incentive-based, although it is possible that an incentive-based program could be established. An example of an incentive-based approach might be to award university grants to schools or departments that engage in a risk evaluation process.

The idea of identifying risks and developing response plans is not unique, but the idea of embedding these actions into the operating culture of a HEI, especially through the budgeting process, is somewhat avant-garde, at least it would be in the U.S. Tying the process to the budgeting process would certainly telegraph that emergency management carries a high level of importance to the institution. Should an institution wish to embark on the path of embedding emergency management into the day-to-day operations of the institution, ***Risk Management in Higher Education*** provides some specific ways in which to accomplish the embedding process other than, or in addition to, connecting it to the budget cycle. These examples include: adopting common definitions of risk; evaluating both the short and longer-term impact of the key risks identified, such as reputational impact; including risk management as part of staff performance appraisals; aligning risk management with objectives at all levels of the institution; introducing incentives and rewards linked to risk management; recruiting on risk management ability as well as experience; building risk management into staff inductions; having managers 'champion' risk management; encouraging innovation, while providing guidance and assistance in situations that do not turn out favourably [sic] (HEFCE, 2005, pp. 28–30). These are all interesting ideas which, if adopted, would place emergency planning into the operating vernacular of the HEI and would inevitability enhance levels of preparedness for the HEI.

Another idea proposed in ***Risk Management in Higher Education*** is for an institution to determine its risk appetite (commonly referred to as risk tolerance in the U.S.) (HEFCE, 2005). The report found that "in many cases risk appetite was seen to be inherent in the way that the institution conducts itself, rather than something which needs to be periodically and formally reviewed and described" (HEFCE, 2005, p. 10). The document suggests, "An active contribution should be made in defining the institution's risk appetite…as this helps set the framework within which the strategic planning process should operate" (HEFCE, 2005, p. 5). With respect to defining risk tolerance, the ***Risk Management in Higher Education*** report states:

> There is wide recognition that risk management should not be about making an institution risk averse (and this point had been made at governing body level). However, some institutions may have moved straight from identifying risk to treating it, without proper consideration of risk appetite. This approach can ignore the context of the risk and can lead to the implementation of costly, ill-
>
> conceived and inadequate 'quick fixes'. Such dangers can be prevented through a proper understanding of risk appetite. (HEFCE, 2005, p. 10)

The concept of "risk appetite" or risk tolerance is a fundamental concept of decision analysis, which will be reviewed in a subsequent section.

One final practical tip offered in ***Risk Management in Higher Education*** related to risk tolerance was a recommendation that a HEI determine the type of solution that is being sought to address the identified risks. Specifically, what is the desired solution? Is it: a satisfactory (but not optimum) solution; the most cost-effective solution; the accepted practice (industry norm, good business practice); the best achievable result (given current technology), or the absolute minimum result that could be accepted (HEFCE, 2005, p. 21)? A framework or model that incorporates this type of analysis would be fairly sophisticated, but the general idea is well worth noting.

In summary, the guidance offered from the U.K. risk management best practices for HEIs is to be deliberate about the emergency management decision-making process, starting with the way in which risks are identified to determining the level of risk that is tolerable to the HEI to deciding the type of risk mitigation strategy to adopt (HEFCE, 2005). The various pieces of advice offered in the document could be implemented as independent pieces or, as suggested in the document, as an overall process for managing risk.

7. Summary

There is a vast amount of literature available from FEMA and other federal agencies about how to assess risks; processes for developing mitigation plans; information about how to prepare for a broad array of hazards; and, in some instances, specific desired outcomes. ***Risk Management in Higher Education*** from the U.K. offers practical and noteworthy guidance about managing risks at HEIs that could be applied to emergency management efforts in the U.S.

(HEFCE, 2005). These various guidelines provide the foundation upon which a framework for evaluating preparedness and mitigation activities could be developed.

C. MEASURING PREPAREDNESS

Research specifically focused on measuring the levels of preparedness at U.S. HEIs appears to be scarce. The Federal Emergency Management Agency's Community Preparedness Division, however, does conduct national surveys to measure the public's knowledge, attitudes, and behaviors relative to preparing for a range of hazards. The ***Personal Preparedness in America: Findings from the 2009 Citizen Corp National Survey*** reports on the nation's level of preparedness based upon a specific set of criteria, which are identified in the report (DHS, 2009). Level of education is one of the controlling variables the report uses to distinguish between levels of preparedness within the population.

This section will describe some of the results from this survey, including the impact of education on preparedness activities.

The following is not an exhaustive list, but it offers insights into some of the standards used to gauge preparedness as well as the state of preparedness in the U.S.:

- Just over one-half of individuals (53%) reported having supplies set aside in their home, to be used only in the case of a disaster.
- Only one-third of individuals (30%) said they had disaster supplies set aside in their car, a decline from the 2003 survey where 34 percent reported to have a kit in their car. However, the number of individuals who indicated they had set aside supplies in their workplace increased from 2003 (41% to 45%).
- Less than half of individuals (42%) reported having a household emergency plan that included instructions for household members about where to go and what to do in the event of a disaster.
- Fewer than half of respondents were familiar with the alert and warning systems in their communities (45%) and official sources of public safety information (34%).
- 4 in 10 individuals (41%) reported having participated in a workplace evacuation drill; only 27 percent had participated in a workplace shelter-in-place drill. Even fewer individuals had participated in school or home based shelter-in-place drills (14% and 10%, respectively). Only 13 percent reported having participated in a home evacuation drill, and just 10 percent stated they had taken part in a home shelter-in-place drill (DHS, 2009, pp. 7–13).

Compared to the desired levels of preparedness established by the federal government, these results indicate that as a nation we are only marginally prepared to deal with man-made and natural disasters.

Controlling for education, the report found the following:

- Individuals with some college education (36%) were significantly more likely than less educated individuals (29%) to have supplies set aside in their cars (Federal Emergency Management Agency, 2009, p. 8).
- Individuals with a high school degree or less (45%) were significantly more likely not to have prepared because of perceived

reliance on emergency responders such as fire, police, or emergency personnel, than more educated individuals (23%). Individuals with a high school degree or less (32%) were significantly more likely than higher educated individuals (21%) to state that a lack of knowledge was a primary reason for not preparing (Federal Emergency Management Agency, 2009, p. 20).

- Individuals with no college experience were significantly more likely than individuals with some college experience to expect to rely a great deal on state and federal government agencies (28% compared to 17%), nonprofit organizations (34% compared to 16%), people in their neighborhood (31% compared to 25%), their faith-based community (36% compared to 20%), and fire, police, and emergency personnel (48% compared to 34%) (DHS, 2009, p. 22).

Based upon this sampling of results, it appears that higher levels of education correlate with higher levels of preparedness. Assuming that these results reflect the level of preparedness at HEIs is probably not appropriate, especially for a residential-based HEI in which students rely upon the institution to provide room and board, but, given that well-educated individuals (e.g., faculty members) comprise a significant portion of the population of a HEI, these results could indicate the potential for higher levels of preparedness to be found among some portions of a HEI community compared to the national average. Regardless, the results indicate that significant portions of the U.S. population are not prepared to prevent, respond to, and recover from man-made and natural disasters. The following section offers some explanations as to why the desired levels of preparedness have not been achieved.

D. BARRIERS TO PREPAREDNESS

Despite the availability of information about how and why to prepare for and mitigate risks, research has shown that many individuals are not engaging in these activities. The ***Personal Preparedness in America: Findings from the 2009 Citizen Corp National Survey*** offers several explanations about why people are not as prepared as they could be to prevent, respond to, and recover from man-

made and natural disasters (DHS, 2009). The following paragraphs describe some of these findings along with the report's recommendations for ways in which to overcome these barriers.

One finding is that individuals have high expectations of assistance from emergency responders and that this mindset might inhibit individual preparedness. The study found that:

> From a list of possible reasons why individuals had not prepared, 29 percent of individuals indicated that a primary reason they had not prepared was because they believed that emergency personnel would help them in the event of a disaster. Further, 61 percent of participants indicated they expected to rely on emergency responders in the first 72 hours following a disaster. (DHS, 2009, p. 47)

The study recommends that "communication to the public must emphasize the importance of self-reliance and convey a more realistic understanding of emergency response capacity" (DHS, 2009, p. 47).

The study also found that "perceptions of the utility of preparedness and confidence in ability to respond varied significantly by type of hazard" (DHS, 2009, p. 49). More specifically, the report noted:

> [W]hile most individuals (66%) believed that preparing for a natural disaster would help them better handle the disaster, individuals had significantly lower response efficacy regarding acts of terrorism, with 35 percent of individuals indicating that preparing for a terrorist attack would not help them respond to that type of event. (DHS, 2009, p. 49)

The study asserts, "Because all-hazards messaging may dilute critical differences in preparedness and response protocols, preparedness and response education should include a focus on hazard-specific actions appropriate for each community" (DHS, 2009, p. 49). On the positive side, the study found that an awareness of vulnerabilities to natural disasters motivates individuals to prepare. But, the study found that "[o]nly 40 percent of individuals thought a natural disaster was likely ever to impact their communities, with even

less believing in the likelihood of an act of terrorism, hazardous materials accident, or severe disease outbreak…ever impacting their communities" (DHS, 2009, p. 49). The study concludes, "…educating individuals about their communities' vulnerabilities to natural disasters as well as concerns with utility outages, extreme heat or cold, and other disruptive circumstances should increase awareness of risks and, in turn, increase motivation to prepare" (DHS, 2009, p. 49).

In the article ***The Strategy of Terrorism and the Psychology of Mass-Mediated Fear***, Breckenridge and Zimbardo (2007) cite several research studies that indicate that psychological factors influence people's thoughts and behaviors related to preparedness. With respect to how people perceive threats, for example, they cite research that indicates, "Each of us tends to view our own prospects and circumstances as superior to that of others (Mezulis, Abramson, Hyde, & Hankin, 2004)" (Zimbardo, 2007, p. 119). The implication is that individuals will recognize that threats exist in the world but they will not perceive themselves as being vulnerable to a given threat and, thus, will not be inclined to prepare for it.

Kapucu and Wang draw similar assessments about risk perceptions and behavior in their article titled ***Public Complacency under Repeated Emergency Threats: Some Empirical Evidence:***

> It is widely acknowledged that an individual's risk assessment on expected damages for an incoming threat influences the person's level of complacency or willingness to prepare (Riad, Waugh, and Norris 2001). The literature suggests that people act to their expectation. Their emergency preparation efforts depend on their expected chance of impact by the emergency. For example, the most common reason people do not evacuate during natural disasters is the belief that they are not in immediate danger (Dunn, Lewandowsky, and Kirsner 2002; Lindell and Perry 2004; Mileti and O'Brien 1992; Perry 1985; Tierney, Lindell, and Perry 2001). Since disasters are such a rare experience for most people, the natural reaction to a threat warning is that it would not happen here. This

> effect is magnified when the warning is related to a type or severity of threat that is unlikely to occur in the recipient's area. (2007, p. 61)

In developing the framework for their research, Kapucu and Wang cite some of the seminal research studies related to preparedness behavior including:

> Public complacency can cause under or nonpreparedness for emergencies (Burby 1998; Coombs 1995, 1999; Davidson and Lambert 2001; Fischer 1998; Fitzpatrick 1999; Lerbinger 1997; Otway and Wynne 1989; Pielke and Pielke 1997; Smart and Vertinsky 1977; Tobin and Montz 1997; Witte 1994). The development of public complacency in ignoring the threat can lead to lack of actions and nonactions in preparing for the emergency. It can be argued that public complacency contributes to the lack of earthquake preparedness among San Francisco residents (Drabek 1985) and to the poor tornado preparation in Grand Island, Nebraska (Quarantelli 1982). In case the emergency does occur, the actual damage caused by public complacency and poor preparedness can be substantial (Burby 1998; Knight 2005; Partnership for Public Warning 2002; Williams and Olaniran 1998). (Kapucu & Wang, 2007, pp. 60–61)

Kapucu and Wang offer the following about the relationship between knowledge and behavior***:***

> Public complacency is different from poor public awareness in which the public does not possess necessary threat information to develop a threat ignoring / unwilling-to-prepare intention. On the other hand, a well-aware public can be a fully complacent one as well. Public complacency also differs from poor public preparedness. Public complacency may be one of many causes for poor preparedness. Other factors, such as lack of threat-dealing capability or poor awareness, may also cause poor public preparedness. (Kapucu & Wang, 2007, p. 58)

An informal poll of emergency management professionals from Center for Homeland Defense and Security (CHDS) cohort 0902 during a classroom discussion seems to lend support to the idea that complacency impacts preparedness behavior. The poll revealed that three people out of a class of 15

public safety professionals had placed emergency supplies in their homes or personal vehicles—a very basic and easy action to perform. Informal conversations with other first responders have yielded similar results. If the persons who are most knowledgeable about the value of being prepared—including knowledge about the impacts that not being prepared have on individuals, as well as organizations, communities, and even the efforts of first responders—are not taking steps to be personally prepared, increasing the educational messaging about the importance of being prepared and what to do during an emergency may not be sufficient to actually change behavior. Combined with the cited literature, the significance of this observation is that it might be worthwhile to consider factors such as expected outcomes, complacency, and risk behavior when evaluating the anticipated impact of a particular preparedness or mitigation activity.

In addition to perceptions about risks and the utility of preparedness efforts to mitigate risks, another barrier to preparedness programs is funding. HEIs, especially those that conduct research, are subject to myriad rules and regulations related to safety. A few examples include: the Animal Welfare Act governing the transportation, sale and handling of certain animals (07 USC, Chapter 54, 2131–2157); the Possession, Use and Transfer of Select Agents and Toxins (07 CFR 331); and the Emergency Planning and Community Right to Know Act (42 USC, Chapter 116, 11021–11023). Similarly, any HEI that receives federal aid, including student loan programs, must comply with the Higher Education Act (20 USC 1002). This federal law governs a broad range of activities including safety and security measures. The Higher Education Act (HEA) Sec 485(f)(1)(J), for example, requires an annual disclosure of campus security policies to include immediate emergency response and evacuation procedures, including the use of electronic and cellular communication. More specifically, this regulation requires:

> Campus policies shall include procedures to immediately notify the campus community upon the confirmation of a significant emergency, dangerous situation involving an immediate threat to

> the health or safety of students or staff occurring on the campus; publicize emergency response and evacuation procedures on an annual basis in a manner designed to reach students and staff; and test emergency response and evacuation procedures on an annual basis. (EdFund Government Relations and Regulatory Analysis Unit, 2009)

HEA Section 485(i)(1)(A) requires institutions of higher education that house students on campus to publish a fire safety report, including: statistics; fire safety procedures for each housing facility; policies regarding electronic appliances, smoking, and open flames; and plans for improvements. These laws are beneficial to the concept of preparedness from the standpoint that they mandate compliance with safety regulations, but there are possible downsides to mandates as well. One possible downside is that resources that must be dedicated to complying with the myriad regulatory mandates deplete funds and resources that might otherwise be dedicated to non-mandated or voluntary preparedness efforts. These non-regulatory activities could actually be more beneficial to the institution's overall preparedness compared to those which are required by law, but they might not be pursued because funding and resources must be dedicated to compliance efforts. Similarly, some decision makers may adopt the mindset that activities that are truly important to safety and preparedness will be regulated or legislatively mandated. The bottom line is that decision makers must be convinced that funding a voluntary, non-regulatory preparedness or mitigation activity will be more beneficial to the HEI than not funding the program or initiative. Thus, decision makers need a way to determine the value of preparedness activities and to evaluate these potential alternatives.

E. THE VALUE OF PREPAREDNESS

The document ***Building a Disaster Resistant University,*** produced by FEMA, offers the following insights about the value of preparedness for HEIs:

> In the last decade, disasters have affected university and college campuses with disturbing frequency, sometimes causing death and

> injury, but always imposing monetary losses and disruption of the institution's teaching, research, and public service. Damage to buildings and infrastructure and interruption to the institutional mission result in significant losses that can be measured by faculty and student departures, decreases in research funding, and increases in insurance premiums. These losses could have been substantially reduced or eliminated through comprehensive pre-disaster planning and mitigation actions. (FEMA, 2003a)

The document offers several other specific examples of the damage caused to HEIs by critical incidents. For example:

> In June 2001, Tropical Storm Allison inundated the Houston Area and its universities and colleges with 10 to 24 inches of rain. The total losses are estimated to be $745 million. The University of Texas at Houston Medical School Building had 22 ft. of water in it, causing the hospital to close for the first time in its history and
>
> seriously disrupting its research efforts. Damage to the Medical School has been estimated at more than $205 million. (FEMA, 2003a, p. iii)

Another example took place on January 19, 2000, when:

> a fire raced through an old residence hall at Seton Hall University in the middle of the night. Students leapt from windows, crawled out stairways, and a number were rescued by firefighters. The fire killed three students, and seriously injured 12 more. The residence hall did not have a sprinkler system. (FEMA, 2003a, p. 9)

As suggested by the results from the ***Personal Preparedness in America: Findings from the 2009 Citizen Corp National Survey***, if individuals perceive a threat as being likely, they are more apt to take action to prepare for or mitigate the hazard (DHS, 2009). Thus, the potential value of the aforementioned examples is that they could create the perception for a university decision maker that there is a potential threat to her institution, which might motivate her to make certain preparedness or mitigation decisions that she would not otherwise be apt to make. On the other hand, these threats might not be perceived by HEI decision makers as posing a risk, in which case their value is marginal. A more

compelling mechanism might be a tool that allows decision makers to evaluate preparedness alternatives based upon their own beliefs and knowledge regarding threats, consequences, and risks.

F. STRATEGIC PLANNING

Skinner describes strategic planning as "a set of coordinated decisions" (Skinner, 2001, p. 358). Bryson, the author of ***Strategic Planning for Public and Non-Profit Organizations*** states that strategic planning "is a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization (or other entity) is, what it does, and why it does it" (2004, p. 6). Bryson continues with the explanation as follows:

> At its best, strategic planning requires broad-scale yet effective information gathering, clarification of the mission to be pursued and issues to be addressed along the way, development and exploration of strategic alternatives, and an emphasis on the future implications of present decisions. Strategic planning can facilitate communication and participation, accommodate divergent interests and values, foster wise and reasonably analytical decision making, and promote successful implementation and accountability. (Bryson, 2004, p. 6)

Stated simply, strategic planning is about identifying the current state of affairs for an organization; deciding where the organization wants to be, and developing a plan for moving from the current state to the desired state (Bryson, 2004, p. 6). This process is depicted in Figure 3 (Bryson, 2004, p. 7).

Figure 3. The ABCs of Strategic Planning (From Bryson, 2007)

With respect to the benefits of strategic planning, Bryson offers the following as being reasons why strategic planning is a worthwhile endeavor:

> …the promotion of strategic thinking, acting, and learning, especially though dialogue and strategic conversation among key actors (Van der Heijden, 1996); improved decision making; enhanced organizational effectiveness; and enhanced effectiveness of broader societal systems. (Bryson, 2004, pp. 12–13)

Kaplan and Beinhocker offer a similar perspective in their article ***The Real Value of Strategic Planning***, "The goal of a strategic planning process should not be to make strategy but to build prepared minds that are capable of making sound strategic decisions" (Beinhocker, 2003, p. 71).

Focusing on strategic planning for emergency management, the CPG 101 defines a strategic-level plan as a blueprint for:

> …how a jurisdiction wants to go about meeting its emergency management or homeland security responsibilities in the long term.

> They identify policy objectives and provide overall, high-level guidance for planners. These plans have the widest scopes and are the least detailed in the planning hierarchy. (FEMA, 2009a, p. 1.4)

Figure 4 from CPG 101 (FEMA, 2009a, p. 1.8) provides a visual depiction of how strategic planning fits with other types of planning. As the figure indicates, strategic planning has a long-horizon while operational planning has a shorter time horizon.

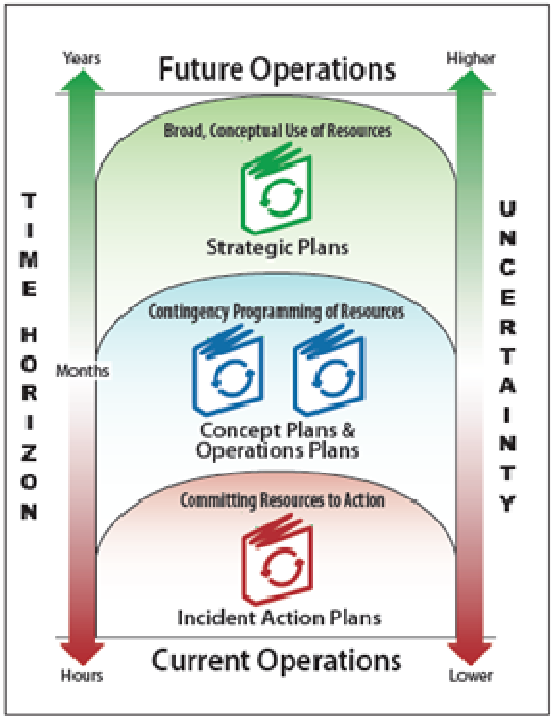

Figure 4. Planning Horizons (From CPG-101, 2009a)

The CPG 101 explains the distinction between a strategic plan and an operational plan as follows: "In the simplest terms, strategic planning sets the context and expectations for operations planning, while operational planning provides the framework for tactical-level plans and operations" (FEMA, 2009a, p. 1.4). The CPG 101 does not provide additional insights on how to develop a strategic plan, but there are numerous resources which could assist a HEI with

developing an emergency management strategic plan, including institutional resources such as a faculty member who teaches business or organizational management.

In terms of the specific elements a strategic plan should contain, the U.S. Government Accountability Office (GAO) has recommended specific elements. These elements, along with a brief description of each element, are contained in Table 1, which was taken from the report ***Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*** (U.S. Government Accountability Office [GAO], 2004, p. 11). Disregarding the references to national policies, the GAO's recommendations could be adapted to strategic planning for HEIs.

Table 1. Summary of Desirable Characteristics for a National Strategy from Conception to Implementation (From Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism)

Desirable Characteristic	Description
Purpose, scope, and methodology	Addresses why the strategy was produced, the scope of its coverage, and the process by which it was developed.
Problem definition and risk assessment	Addresses the particular national problems and threats the strategy is directed towards
Goals, subordinate objectives, activities, and performance measures	Addresses what the strategy is trying to achieve, steps to achieve those results, as well as the priorities, milestones, and performance measures to gauge results
Resources, investments, and risk management	Addresses what the strategy will cost, the sources and types of resources and investments needed, and where resources and investments should be targeted by balancing risk reductions and costs
Organizational roles, responsibilities, and coordination	Addresses who will be implementing the strategy, what the roles will be compared to others, and mechanisms for them to coordinate their efforts
Integration and implementation	Addresses how a national strategy relates to other strategies' goals, objectives and activities—and to subordinate levels of government and their plans to implement strategy

In summary, strategic planning is a process for determining an organization's current state of being, its desired state and a plan for reaching that desired state. The structure and content of a strategic plan are not absolute. The GAO recommends that a plan contain six basic elements, which can be found in Table 1. The strategic planning literature suggests that strategic planning benefits an organization by: creating a shared vision of the direction in which the organization is moving; developing a plan for accomplishing goals; and improving decision making. Based upon this information, engaging in a strategic planning process specific to emergency management should contribute to enhanced levels of preparedness or, at a minimum, to a better understanding of the current state of preparedness and a plan for achieving a desired level of preparedness. A HEI could utilize the literature on preparedness, including the myriad definitions of preparedness, to develop a strategic plan specific to the HEI.

G. DECISION MAKING

Developing a basic understanding of decision theory and how people make decisions would contribute to developing a more effective framework for evaluating pre-incident emergency management preparedness activities. Within the realm of decision making, there are vast amounts of research from a broad array of fields including but not limited to: psychology, business, engineering, business, and the social sciences. Differing fields of study examine the decision-making process using different frameworks. The following theoretical approaches will be reviewed in this section: normative, descriptive, and prescriptive decision making.

The distinction between a normative and a descriptive theory of decision making is that the normative theory describes how decisions should be made and the descriptive theory describes how decisions are actually made (Hansson, 1994). The normative approach to decision making focuses on using logic to make decisions. According to Edwards, "Normative models are built on basic

assumptions (or axioms) that people should consider to provide logical guidance for their decisions" (Edwards, Miles, & Winterfeldt, 2007, p. 5). The normative school of thought offers norms of thinking that need to be accepted before the theory can be used to arrive at the best decision for an individual decision maker.

The descriptive perspective of decision making, which focuses on how people actually make decisions, makes it clear that individuals make decisions that do not adhere to norms and logic. Research conducted by Tversky and Kahneman has shown, for example, that the way in which a problem is framed (presented) affects the decision-making process (2002). Specifically, research has shown that people tended to avoid taking risks when outcomes were framed as gains, and they tended to take risks when the outcomes were framed as losses, even when the outcomes were exactly the same (Beach, 1997, p. 20). Kahneman and Tversky's research showed that people use unconscious shortcuts, termed heuristics, to help them make complex decisions (1974). These heuristics, while generally useful, can lead to "severe and systematic errors" (Tversky & Kahneman, 1974, p. 1124). The heuristics lead to biases, which when looked at from the normative perspective, would be considered errors of judgment. Tversky and Kahneman identified several biases under three categories: the anchoring bias (initial exposure to numbers affecting our estimates), the availability bias (that which is easily available to our memory appears to be more numerous), and representative bias (balancing what the data says with how well the data represents what we know) (1974). Hammond, Keeney and Raiffa build on this foundation and present traps to our thinking:

> The ***anchoring trap*** leads us to give disproportionate weight to the first information we receive. The ***status quo*** trap biases us toward maintaining the current situation—even when better alternatives exist. The ***sunk-cost trap*** inclines us to perpetuate the mistakes of the past. The confirming ***trap*** leads us to seek out information supporting an existing prediction and to discount opposing information. The ***framing trap*** occurs when we misstate a problem, undermining the entire decision-making process. The ***overconfidence trap*** makes us overestimate the accuracy of our forecasts. The ***prudence trap*** leads us to be overcautious when we

> make estimates about uncertain events. And the ***reliability trap*** leads us to give undue weight to recent, dramatic events. (2001, pp. 143–144)

Knowing that these biases exist and that they can lead to less than optimal decision making is important when trying to develop a framework for evaluating preparedness decisions.

The field of descriptive decision making challenges the mainstream view in the field of economics that human beings are rational and choose actions that maximize their advantage, sometimes referred to as rational choice. Gary Becker, an economist who was awarded a Nobel Prize in 1992 (Nobel Foundation, 1992), for example, asserted that an "economic approach provides a valuable unified framework for understanding ***all*** human behavior…" (Becker, 1976, p. 14). He went on to state:

> The heart of my argument is that human behavior is not compartmentalized, sometimes based on maximizing, sometimes not, sometimes motivated by stable preferences, sometimes by volatile ones, sometimes resulting in an optimal accumulation of information, sometimes not. Rather, all human behavior can be viewed as involving participants who maximize their utility from a stable set of preferences and accumulate an optimal amount of information and other inputs from a variety of markets (Becker, 1976, p. 14).

Interestingly, 10 years after Becker received his Nobel, Kahneman received an Economics Nobel for his work (All Prizes, 2009).

Looking at preparedness from the perspective of "maximizing one's utility," one has to wonder why hundreds of thousands of people in the U.S. are not engaging in preparedness activities given the numerous espoused reasons why people ought to be prepared. Have these individuals made a conscious determination that the benefits of engaging in these activities do not outweigh the costs? If so, then perhaps the resources that are currently allocated to preparedness and pre-incident mitigation efforts should be re-directed towards other activities. Or, could it be that people are making sub-optimal decisions with

respect to preparedness decision making? The descriptive school of decision making offers compelling evidence that humans do not always make logical or optimal decisions and that there are a host of factors which have the potential to impact decision making and, ultimately, behavior. If people are making sub-optimal decisions with respect to preparedness, how could they be empowered to make better decisions? Perhaps a prescriptive approach to decision making offers a solution.

Prescriptive decision making, as explained by Edwards et al., "focuses on helping people make better decisions by using normative models, but with the awareness of the limitations of human judgment and of the practical problems of implementing a rational model in a complex world" (Edwards et al., 2007, p. 5). In other words, the prescriptive theory of decision making blends aspects of normative and descriptive decision theory. Decision analysis has been described as a prescriptive approach to decision making. Edwards characterizes decision analysis as "unabashedly normative in theory and thoroughly prescriptive in practice" (Edwards et al., 2007, p. 5). Howard, who is credited with coining the term "decision analysis" (1966), views decision analysis as being normative and offers a slightly different perspective from that offered by Edwards et al.: "It seems to me that what (other) authors refer to as prescriptive rules, I would refer to as approximations that are appropriate when applying the norms in practice. These approximations are not mistakes in the sense that they are violations of the norms of decision making, but are rather the interpretations that are required to apply the norms sensibly in the world" (Howard, 1992, pp. 51–52). Regardless of whether one views decision analysis as a normative or prescriptive approach to decision making, it is clear that it has roots in the normative approach and might offer a framework for assisting decision makers evaluate preparedness activities using logic so as to avoid or minimize some of the biases that can lead to less than optimal decision making. The following section will provide a brief overview of the field of decision analysis.

H. DECISION ANALYSIS

Practitioners of decision analysis describe it as a philosophy, a decision framework, a decision-making process and a methodology (Celona & McNamee, 2008). For a more in depth explanation of these different perspectives see ***Decision Analysis for the Professional*** by Celona and McNamee (2008). Decision analysis has been used to analyze a variety of problems. Within the homeland security arena, Paté-Cornell and Guikema designed a risk analysis model to assist decision makers to set priorities "among the possible measures that can be taken to reduce the probabilities of different types of attack, capture signals of a possible attack, and reinforce the potential targets" (2007, p. 320). Buede and Bresnick used decision analysis to define the requirements for the U.S. Marine Corps (USMC) mobile protected weapon system during the concept selection phase of the systems acquisition phase along with several other analyses of acquisitions (2007, p. 539). This section will provide a basic overview of the field of decision analysis, including some of its fundamental principles, and will describe in greater depth one of the fundamental methodological tools of decision analysis: the decision diagram.

1. Elements of a Decision

Howard teaches that a decision is "a choice among alternatives that will yield uncertain futures, for which we have preferences" (2007, p. 37). He asserts that decision making is comprised of six elements: information (what we know); alternatives (what we can do); preferences or values (what we want); the frame, which defines the decision and includes what is being considered and excludes what is not being considered; a commitment to action (as opposed to merely contemplating options); and logic, which helps arrive at clarity of action (Howard, 2007, p. 37). Figure 5 (Howard, 2007, p. 37) depicts this six elements of decision making. Alternatives, Information and Preferences form the three legs of the

decision-making stool and are called the decision basis. The seat of the stool is logic, on which sits the decision maker, who is committed to action. All of these elements rest on the frame of the decision.

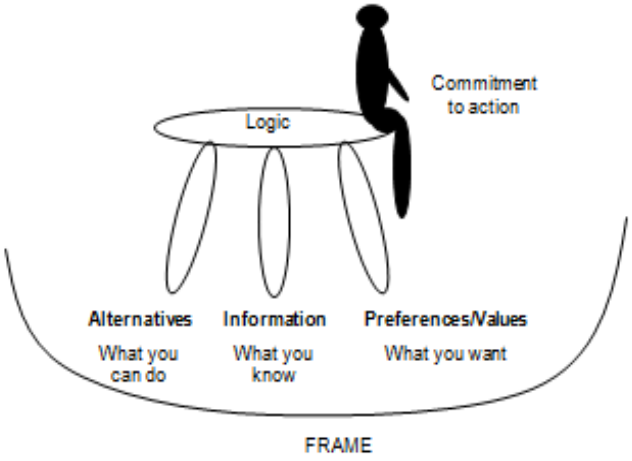

Figure 5. Six Elements of Decision Making (After Howard, 2007)

A similar model, Figure 6, depicts these same elements, minus the frame, as follows (Celona & McNamee, 2008, p. 42):

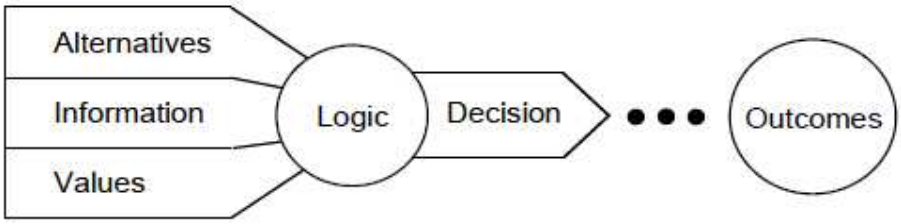

Figure 6. The Elements of a Good Decision Analysis Process (From Celona & McNamee, 2008)

It is the application of logic to the elements of alternatives, information, and values that places decision analysis into the realm of being a normative approach to decision making. As explained by Raha (2010), the logic represents:

> …the set of axioms known as the five rules of actional thought, which if accepted, allows us to use mathematics and come up with clarity of action. In brief, the rules are abbreviated as 'POE'S

> CHOICE,' and are: the Probability Rule, the Order Rule, the Equivalence Rule, the Substitution Rule and the Choice Rule. Once these rules are accepted, the rest of the normative foundation is an inevitable consequence." (Raha, 2010, p. 6)

2. Decision Quality

Most people judge decisions on the basis of the outcomes. Howard and others argue that decisions should be judged on the basis of what was known at the time the decision was made, and not after-the-fact when the uncertainty that was present when the decision was made has been resolved. The support for this argument comes from the fact that good decisions can result in bad outcomes just as bad decisions can have good outcomes. Figure 7, referred to as a spider diagram (Celona & McNamee, 2008, p. 255), is a tool for evaluating a decision to determine its quality. The criteria for evaluation correspond with the six elements that Howard (2007) teaches comprise a decision. Different practitioners of decision analysis use different end points for the radar (see Figure 8, referred to as a Decision Quality Radar Chart, (Skinner, 2001, p. 353)), but the general idea remains the same. Evaluating where a decision stands on the diagram enables the decision maker to determine where additional effort should be directed in order to improve decision quality. The closer all elements are to being 100 percent, the better the quality of the decision.

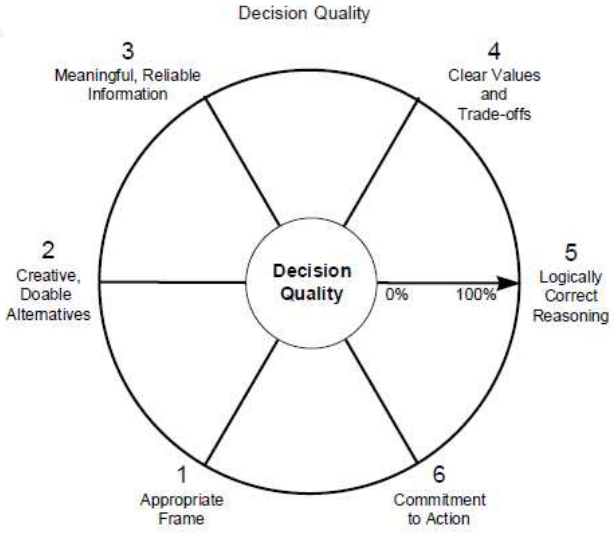

Figure 7. Spider Diagram (From Celona & McNamee, 2008)

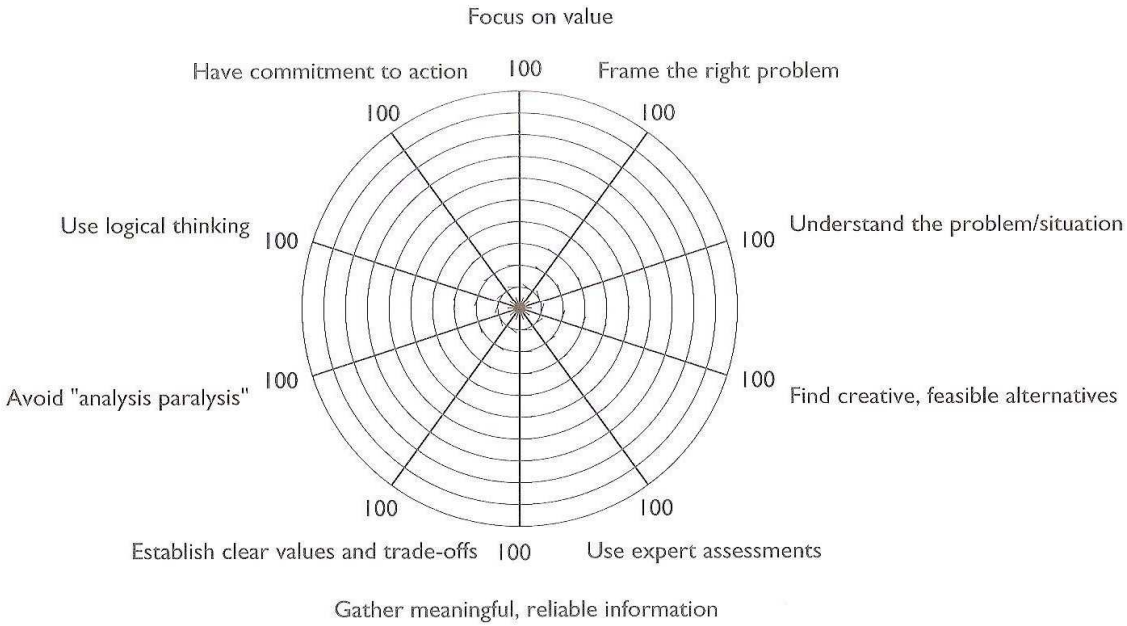

Figure 8. Decision Quality Radar (From Skinner, 2001)

3. Iterative Process of Analysis

Howard (2007) describes decision analysis as being an iterative process. The phases within the cycle have been referred to by different names, although the general concepts have remained the same over the years, merely being refined and clarified. The first step is to frame the decision. The next steps have been referred to as the: deterministic, probabilistic, and informational phases, which are then followed by the decision. Figure 9 depicts this process visually (Howard, 2007, p. 44).

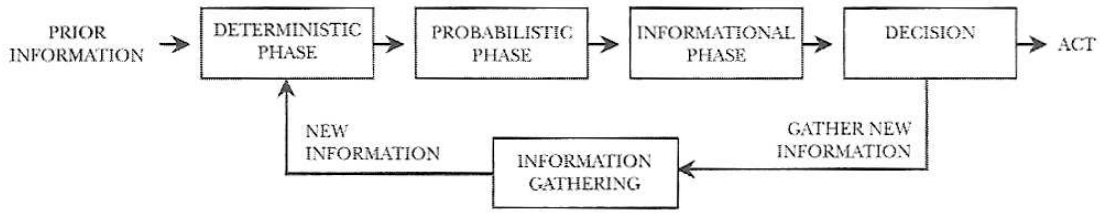

Figure 9. Decision Analysis Cycle (From Howard, 2007)

The following sections provide a brief, high level overview of framing and the phases of analysis.

a. Framing the Problem

Framing is a critical first step in the process as it establishes the problem that the rest of the process will analyze. A superb analysis is inconsequential if it turns out to have provided insights on the wrong problem. Howard writes:

> Framing deals with the phenomenon Freud called the 'presenting problem.' He noticed that when he asked new patients what was bothering them, their concerns seldom turned out to be their fundamental problems as revealed after the beginning of analysis. When you set out to help a decision-maker, it is only too easy to think that the opaqueness of his or her problem is correctly stated. You must often probe deep to make sure that the framing of the decision is really appropriate, that the underlying decision problem has really been uncovered. Framing is the most difficult part of the decision analysis process; it seems to require an understanding

> that is uniquely human. Framing poses the greatest challenge to the automation of decision analysis (Howard, 1988, p. 684).

One tool that can help frame the problem is the decision diagram (Howard, 2004; Matheson & Howard, 2005). Howard writes that decision diagrams are "very easy for people to understand, regardless of their mathematical facility" (Howard, 1988, p. 687). Skinner explains that a decision diagram "is a means of conveying the essence of the problem to others in [a] logical and understandable manner" (2001, p. 109). Howard and Matheson offer that a decision diagram "is at once both a formal description of the problem that can be treated by computers and a representation easily understood by people in all walks of life and degrees of technical proficiency" (2005, p. 127). They go on to state that decision diagrams serve as a "bridge between qualitative description and quantitative specification" (Matheson & Howard, 2005, p. 127).

Figure 10 is an example of a decision diagram (Raha, 2010, p. 29). This particular diagram was developed to depict a decision within the realm of public safety: shift scheduling. The elements that were determined to contribute to the problem included: the schedule, pending calls for service, and the amount of time spent at a call for service. The diagram depicts the standard diagrammatic symbols utilized by practitioners of decision analysis. The rectangular box containing the word "SCHEDULE" represents the decision. The hexagonal box containing the words "% of calls diverted" is the value node, which resolves the valuation of the prospects. In this case, the value attribute is the "% of calls diverted" and the goal is to minimize the number of calls diverted. The single-walled ovals represent uncertainties, such as when a call for service will occur. A double-walled oval, or node, is deterministic, meaning its value can be ascertained once all its inputs are known, whereas, even if all the inputs to the uncertainty node are known, its value would still be uncertain. The notations are significant because they convey to a decision analyst how to build a computational model, which is used to evaluate alternatives during the analysis phase.

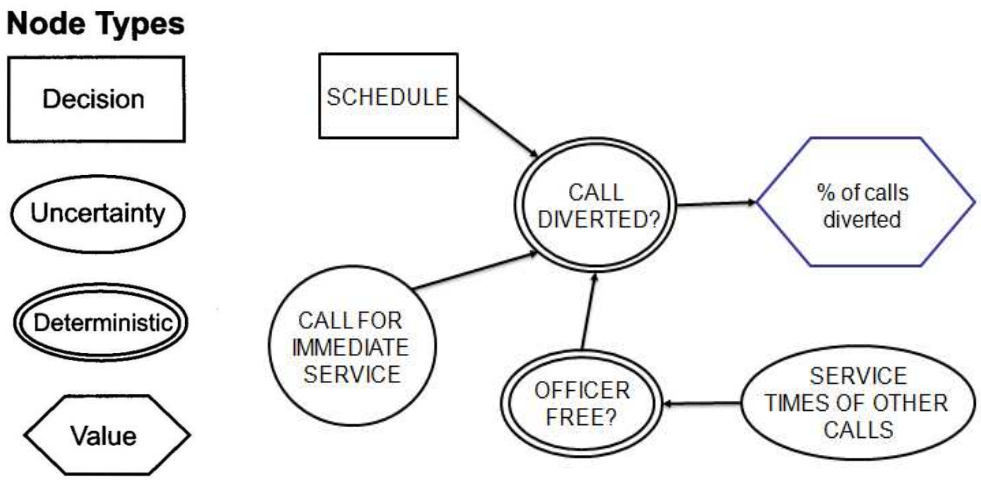

Figure 10. Decision Diagram of Scheduling Situation (From Raha, 2010)

Within the context of group decision making, framing has been described as accomplishing the following objectives: developing a shared understanding of the opportunity or challenge being addressed; creating an awareness of the different perspectives of the group members and expanding the thinking of each individual in the group; creating a respect for the legitimacy and importance of others' perspectives; surfacing unstated assumptions that could affect the project; and, explicitly formulating and communicating the problem to be solved (Celona & McNamee, 2008, p. 230).

Part of the framing process is developing alternatives that would potentially solve the problem. As explained by Celona and McNamee, "the framing dialog defines the dimensions of the problem; the alternatives dialog defines the dimensions of the solution to the problem" (2008, p. 234). In other words, the alternatives dialog proposes different approaches within the shared frame of the problem (Celona & McNamee, 2008, p. 234). There are a number of techniques for determining alternatives, such as brainstorming and building strategy tables. These techniques can be found in the literature on decision analysis.

b. Deterministic, Probabilistic and Information Analysis

Once the decision has been framed, the analysis takes place. Howard explains the phases of analysis as follows:

> After the problem is framed and alternatives are specified, the uncertainties that appear to have an effect on the decision are given nominal ranges. The deterministic phase explores the sensitivity of alternatives to these uncertainties to determine which alternatives are worthy of probabilistic analysis. The probabilistic phase encodes probability distributions on these uncertainties, including necessary conditional distributions. It also requires assessing the risk preference to be used for the decision. At this point the best alternative can be determined, but the process continues to the informational phase to find the value of eliminating or reducing any or all of the uncertainties. The result is not only the best decision up to this point, but also clear knowledge of the cost of ignorance. This may lead to new information gathering alternatives and a repeat of the cycle, or simply lead to action (Howard, 2007, p. 44).

Stated in layperson's terms, the analysis portion of the process helps a decision maker answer the following questions in order to obtain greater clarity:

1. What is the most I should be willing to spend on the best alternative?
2. What changes in my beliefs would justify a change in my decision?
3. If I could spend resources gathering some information, what information should I try to obtain, and what is the most I should spend?
4. If I could spend resources controlling an uncertainty, which uncertainty would I select and what is the most I should spend?

4. Group Decision Making

When more than one person is engaged in the decision-making process, Celona and McNamee suggest that a dialogue take place between the decision maker(s) and the project team. The process they recommend is depicted

visually in Figure 11 (Celona & McNamee, 2008, p. 228). Failure to engage in this interactive process could result in the following scenario:

> …a person or team goes away and gathers data, picks an alternative, performs an evaluation, and presents the recommendation back to the decision maker. If the results of the analysis agree with the decision maker's beliefs and preferences, the recommendation is approved and funded. If the recommendation does not match the decision maker's beliefs or preferences, the team is asked to rework the evaluation. This cycle can be repeated several times, as the decision maker may not agree with the person or team's analysis of the situation, their proposed decision, the assumptions, or the analysis which lead to the business case recommendation (Skinner, 2001, p. 5).

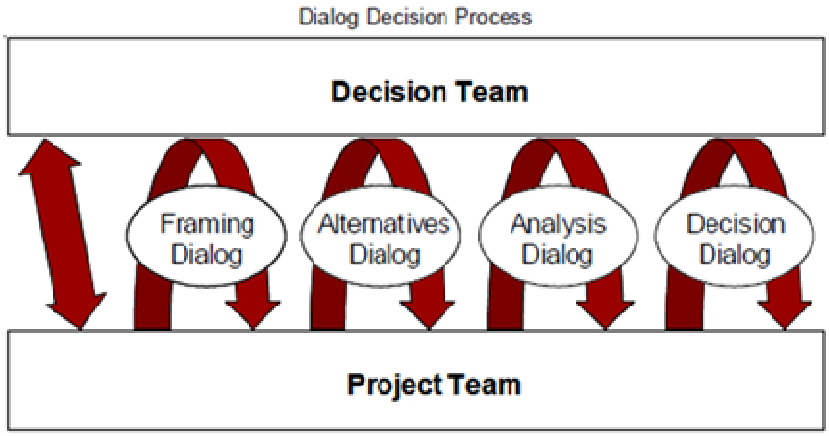

Figure 11. Dialogue Decision Process (From Celona & McNamee, 2008)

Celona and McNamee offer the following about traditional decision-making processes that fail to incorporate an interactive process:

> What can go wrong in this approach? Working on the wrong problem, choosing alternatives because they are not controversial, and proposing a solution that no one outside the team is committed to. The process encourages advocacy rather than collaboration—"the answer" needs to be right the first time, otherwise the project team has its work disapproved or sent back for repairs. This encourages developing conventional solutions and hiding any problems with the solution (2008, p. 227).

As these two examples illustrate, not touching base during the process can result in frustration, time being spent inefficiently, and the potential for suboptimal decisions to be made. In short, Celona and McNamee emphasize the importance of framing and the commitment to iterate on the decision analysis process, instead of encouraging advocacy for one's preferred alternative (2008, p. 227).

5. Clarifying Values—The Value Diagram

Work by Raha (2010) offers an intriguing twist on traditional decision-analysis modeling. Building upon the concept of decision diagrams, Raha introduces the concept of a value diagram. He explains that a value diagram "is a visual language to develop clarity in the decision-making body about value" (Raha, 2010, p. 80). Raha begins his thesis by distinguishing between two uses of the word "value." As explained by Raha, in the noun form, when decision analysts ask if a prospect has direct or indirect value for us, they are interested in "existential comprehension." In the verb form, when decision analysts ask how we value a prospect relative to other values, they are interested in "numerical tradeoffs." Raha focuses his work on the existential comprehension as an important step in clarifying sources of value ***prior*** to any numerical analysis of value (S. Raha, Achieving Clarity on Value: Personal CommunicationInterview, April 12, 2010). Raha (2010) proposes looking at three dimensions or types of value: intrinsic, prudential and systemic. Intrinsic values are ends in themselves. Prudential (or extrinsic) values are a means-to-an-end. Systemic values result from rule or construct fulfillment. Intrinsic values would be answered by the questions, "What about this prospect can affect our identity? How does this prospect relate to our fundamental reasons for being in this venture? How does this prospect relate to things we care about intrinsically?" (Raha, 2010, p. 29). Prudential (or extrinsic) values are answered by the questions, "What about this prospect helps us achieve our goals? Are their behavioral aspects or material assets related to this prospect?" (Raha, 2010, p. 30). Systemic values are

answered by the questions, “What are important constructs/regulations that help us do what we need to do? What is the penalty for breaking some of these constructs/regulations?” (Raha, 2010, p. 30).

To illustrate these distinctions and how they relate to making, Raha offers the example of President Obama considering the withdrawal of U.S. troops from Afghanistan. The possible prospects the President might consider include:

- Afghan women are treated badly
- Educational choices limited to religion
- Erosion of fundamental freedoms in Afghanistan, a return to the old Taliban regime
- More Buddha statues and cultural heritage sites will be under attack
- American soldiers are not dying anymore in Afghanistan
- Domestic pressure on Afghanistan eases up (Raha, 2010, p. 33)

Raha goes on to explain:

> The next step would be to perceive the experience of value in each of these prospects. Which of these prospects would affect the decision-maker's identity? As an example, the decision-maker might find that preservation of fundamental freedoms, equality of women and the right to choose our children's education are values that are a part of the US identity, and as a proxy for the US, the President should stand up for them. Will the US sleep easier with fewer of its children getting killed in combat? The President is answerable to the families of the soldiers, and this might be a prospect that affects him at the level of identity. At the level of assets and behaviors, the military is an asset of great value to the US, and diminishing this asset in Afghanistan may not be desirable. From the prospect of a stable Afghanistan, the President might want to focus the discourse on what assets or behaviors would the Afghans need to survive if the Americans pull out. As an example, the answer might include well-trained local police forces and armies under civilian command, to combat the Taliban, infrastructure for sanitation and education, etc. Finally, at the level of constructs, it would be worth thinking about the value of US promises in the future, should it break its promise to help Afghanistan. Another cause of concern might be respect for international law and the precedent set by the United States. For the prospect of Afghanistan's survival, what legal framework would help the country

> stabilize quickly without US presence? The axiological categories are helpful in identifying three kinds of value and we need to consider all three kinds to get a holistic view of the value in the prospects under discussion. (Raha, , 2010, pp. 33–34)

The way in which these concepts apply to the value diagram might best be explained through illustration. The value diagram shown in Figure 12 was developed by Raha, based upon an interview with the President of Stanford University, who was asked to clarify the fundamental values that guided his decision making relative to university matters (2010). The intrinsic values were distilled to: education, trauma to individuals, and coercion. The latter two values are really disvalues and are represented in the value diagram with a "-" sign. The intrinsic value of "coercion of others" means that the whenever the decision maker applies coercion on other people, he is going against a fundamental value that affects him at the core of his identity. The emergence of this concept from a former faculty member who operates in an academic environment is not completely surprising given that academic freedom is a fundamental tenet of academia. The notations Raha developed to distinguish between the different types of values are as follows: triple arrows indicate an intrinsic value; double arrows indicate a prudential value; and single arrows represent a systemic value. Raha further defines Figure 12 as a specific type of value diagram which he termed a "canonical value diagram". In a canonical value diagram, only intrinsic values can contribute to the "value" node, which is represented by the hexagon. All prudential values must connect with intrinsic values either directly or indirectly through other prudential values. All systemic values must connect to a prudential value. Raha's rationale for the canonical form of the value diagram is to facilitate deeper reflection on underlying values. His argument is that decision makers should try to identify the root intrinsic values and not stop at systemic or prudential values. To summarize, traditional decision diagrams are systemic in nature as they involve constructs with clear definitions. Raha proposes explicitly representing intrinsic and prudential values to create what he calls a "value diagram". He offers that "the value diagram helps us tell richer value stories

about our value frame" (Raha, 2010, p. 75). According to Raha, one of the uses of a value diagram is to check that the key sources of value in the value diagram have been incorporated in some way in a decision diagram.

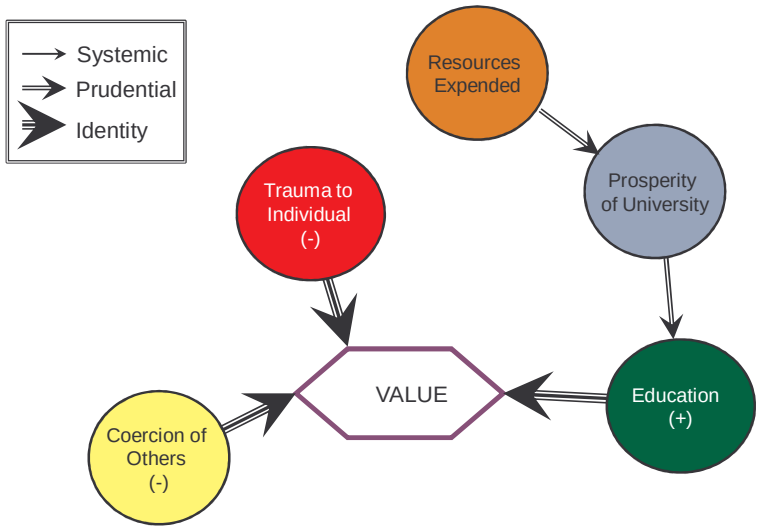

Figure 12. Value Diagram of Stanford University's President (After Raha, 2010)

Translating Figure 12, education was determined to be an intrinsic value, meaning there is no other underlying reason as to why education is valuable; it is valuable in and of itself. The arrow between education and the value node is, therefore, shown with a triple arrow to indicate its intrinsic nature. To facilitate education, these two decision makers believed that the university must prosper. Prosperity was not an intrinsic value for the decision maker who provided his input for the model, but a prudential value, as it contributes to the intrinsic value of education. Coercion and trauma were also considered to be intrinsic values for the decision makers in this example. The test that Raha (2010) suggests for determining an intrinsic value is to continue to ask the question, "Why is this important?" The inability to answer the question signals that an intrinsic value has been reached.

Raha's proposed process warrants further analysis and study, but it seems to offer several significant potential benefits (2010). One, as intended, it

assists decision makers develop greater clarity about what matters to them at a fundamental level. Achieving greater clarity about one's fundamental values should contribute to a higher quality decision-making process. Two, the value diagram can facilitate conversations and understanding between individuals who work together in an organization or group setting. For example, if an employee understands what is important to her supervisor or to the company (what her supervisor or the organization values), she can tailor her actions to be in accordance with those values. Distilling a person's or an institution's fundamental values into a conceptual model allows individuals to see where their values diverge, and perhaps discover areas where their values might not be so widely divergent. It is conceivable that business decisions could be made more readily and with fewer lengthy discussions about strategy if the decision-making group were to invest the time in developing a shared value diagram at the onset of a working relationship and use the value diagram to guide the decision-making process.

Anecdotally, it seems that many of the conflicts that arise about the direction to pursue or an action in which to engage can be traced back to a conflict of values; thus, getting to the heart of the value frame would be of great help in any decision or strategy conversation. Extrapolating this line of thought to the higher education environment, most universities and colleges have a set of espoused values. If those values were shown in a value diagram and decisions made with those values in mind, it is more likely that espoused values and actions would be consistent.

6. Shortfalls of Decision Analysis

Decision analysis is not without detractors. There are those who state that complex problems, especially those involving human beings, cannot be adequately modeled. There is an element of truth to this assertion. Decision analysts will even admit that it is possible to miss important factors when modeling a decision or to model the wrong problem altogether. Model a decision

incorrectly, and it does not matter if the answer is correct because the wrong problem was examined. Burke Robinson, a practitioner of decision analysis, stated, “eighty percent of the value of decision analysis comes from framing and structuring the decision” (personal communication, August 22, 2010). Paraphrasing the CEO of an oil company for whom Robinson conducted an analysis of a decision, Robinson recalled the CEO stating, “Although we greatly appreciate all of the decision and risk analysis that you did, more than 80% of the value we gained from your assistance was delivered in the first month of framing and structuring of our decision. In particular, the process of developing a decision diagram helped us to see on one page all of the key uncertainties and decisions that we faced” (2010).

In terms of detractors, Nassim Nicholas Taleb, who authored ***The Black Swan: The Impact of the Highly Improbable*** (2007), introduces the concept that highly improbable events (black swans)—those which would likely be discounted in a mathematical model due to low probabilities—often have huge impacts. He cites the terrorist attacks perpetrated on September 11, 2001 as an example of his point and argues that if the probability of such an attack had been “deemed worthy of attention, fighter planes would have circled the sky above the twin towers, airplanes would have had locked bulletproof doors, and the attack would not have taken place, period” (Taleb, 2007). Taleb is critical of mathematical approaches to risk as evidenced in the following quote:

> For the applications of the sciences of uncertainty to real-world problems has had ridiculous effects; I have been privileged to see it in finance and economics. Go ask your portfolio manager for his definition of ‘risk,’ and odds are that he will supply you with a ***measure*** that ***excludes*** the possibility of the Black Swan—hence one that has no better predictive value for assessing the total risks than astrology (we will see how they dress up the intellectual fraud with mathematics). (Taleb, 2007)

His point is that “Black Swan logic makes ***what you don't know*** far more relevant than what you do know” (Taleb, 2007). Taleb’s argument about the impact of the improbable and the unlikely is compelling, but he does not

distinguish adequately between trying to predict the future and making good decisions based on our best information in the present time. Indeed, one of the foundational pillars of decision analysis is the distinction between decisions and outcomes. We cannot judge decision quality from outcome quality. Additionally, while he is critical of these models of decision making, he does not offer an alternative for how decisions should be made; thus, the value of Taleb's contribution rests not in what he offers in terms of how to make decisions but more as a reminder not to ignore that which might seem unlikely when conducting an analysis.

7. Summary

The significance of decision analysis to this thesis is that it offers a framework that could be used to assist decision makers at HEIs analyze emergency preparedness alternatives. Even if a full computational analysis were not conducted, a partial analysis consisting of framing the problem, identifying alternatives, and building a decision diagram would contribute to greater clarity around preparedness decisions. Raha's idea of developing a value diagram as a starting point for the decision-making process is an intriguing prospect that seems to offer the advantage of assisting decision makers uncover sources of value that might not otherwise be apparent. Clarifying intrinsic values could prove to be particularly beneficial when multiple decision makers are involved because the process can enable individuals to have a better understanding of what values might be driving or motivating an individual to propose different alternatives and make certain choices. Additionally, the value diagram can serve as a tool for reminding decision makers of the institution's fundamental values so that those values can be considered when making institutional decisions.

I. CHAPTER SUMMARY

HEIs are uniquely positioned in the U.S. to contribute to the nation's preparedness by being "prepared" organizations within their own communities as well as by modeling preparedness behaviors to students, faculty, and staff. The

civic appeal of contributing the betterment of one's community might motivate a HEI to engage in certain preparedness activities, but a HEI, like any business, must make sound business decisions. If engaging in mitigation and preparedness activities reduces the likelihood of a threat or the consequences of a threat to the HEI itself or the amount of time to recover from a threat, then it would be in the HEI's best interest to engage in these activities, but HEI decision makers are faced with making difficult choices about how to allocate limited funds. How does a decision maker choose between investing in an academic program for which the outcome is fairly certain and committing resources to preparing for a critical emergency event that may never take place? Developing a process or a model to evaluate preparedness and mitigation programs specific to HEIs would contribute to the discussion by demonstrating the potential value to the HEI of these types of activities.

There are numerous documents and tools currently available that provide guidance in identifying risks, preparing for a wide variety of hazards, developing mitigation plans, and comparing cost and benefits. A few of these documents were developed with HEIs as the target audience, although the vast majority were developed for the general population. The most comprehensive document addressing HEI-specific issues, ***Building a Disaster Resistant University***, is seven years old and does not contain references to newer materials that have been developed (FEMA, 2003). Additionally, the approach recommended in this document is so comprehensive that absent a clear mechanism for determining the benefits, it is unlikely that an institution will dedicate the resources to follow the guidance offered, even if it the approach would develop a disaster resistant university.

Furthermore, despite all of the information on how to prepare for and mitigate the effects of critical incidents, research indicates that individuals in the U.S. are not engaging in many of these recommended activities, even simple behaviors like storing drinking water and having an emergency medical supply kit. One explanation offered for this failure is that individuals do not anticipate

being affected by an emergency or disaster. Additionally, there is a perception that first responders will provide the support in the wake of a disaster. Research associated with the fields of psychology and descriptive decision making provide additional explanations as to why individuals do not invest time or resources into preparing for critical incidents. The field of decision analysis claims to provide a mechanism for mitigating some of these decision-making biases while also taking into account one of the most fundamental challenges of emergency management decision making: uncertainty. This thesis is not intended to extol the virtues of decision analysis nor argue its merits over other decision-making models and strategies. Rather, this thesis endeavors to draw upon some of the generalized concepts from decision analysis, including Raha's (2010) proposed value diagram, to help in the development of a model specific to HEIs that might assist decision makers understand the value of investing in preparedness and mitigation activities. In order to develop this model, it will be necessary to understand the current landscape of emergency management programs at HEIs in the U.S.; determine how HEIs are currently making decisions about which preparedness and mitigation programs to pursue; and identify criteria and values that impact decision making at U.S. HEIs.

III. METHODOLOGY

A. METHODOLOGY

An extensive review of the literature on preparedness, including guidelines developed specifically for HEIs, as well as more general guidelines, was performed to develop a conceptual understanding of the ways in which preparedness is defined, measured, and evaluated as well as possible reasons why people do not engage in preparedness activities. Additionally, a review of literature on the topic of decision making and decision analysis was conducted in order to develop an understanding of the ways in which people make decisions, especially under conditions of uncertainty, and the ways in which a normative approach to decision making might enable decision makers to make optimal preparedness decisions. A set of follow-on interviews with individuals familiar with emergency management at HEIs were used to further understanding about how preparedness decisions are currently being made at HEIs and how that decision-making process might be improved. The information gathered from the interviews was used to support the development of a conceptual framework for evaluating preparedness alternatives.

B. SAMPLE POPULATION

Ten HEIs from different parts of the country were selected to provide information about how HEIs are currently managing emergency management programs, including how decisions are being made regarding which preparedness activities to pursue. The selection criteria included: representation from private and public institutions, representation from different parts of the country, and student populations of various sizes. As the project progressed, the preponderance of the individuals who had been interviewed were employed by four-year degree granting institutions, so the sample population was restricted to this population. Because HEIs share common characteristics, it is assumed that the results of this study could apply to HEIs other than four-year degree granting

institutions. At the same time, it is recognized that there are different types of HEIs with different characteristics and attributes. HEIs have different student demographics (working adults versus full-time students), funding sources (private versus public), motivations (non-profit versus for-profit), educational models (residential versus commuter) as well as a host of other distinguishing characteristics. The focus of this study was not to uncover how HEIs differ in their approaches to emergency management based upon their unique characteristics but rather to discover how a select group of HEIs are managing their emergency management programs and making decisions about preparedness in order to identify possible ideas and best practices that could inform the emergency management decision-making processes at other HEIs. For simplicity, the term HEI will be used throughout this thesis rather than the longer and more descriptive phrase "four-year degree granting institution."

The interviewees included representatives from the fields of law enforcement, risk management, and emergency management who were familiar with their respective HEI's emergency management practices. The individuals who were interviewed for this project were either known by the researcher prior to the study or were introduced to the researcher through known contacts. The emergency managers who were interviewed as part of this study were identified by an emergency manager as being leaders in the field of emergency management in the HEI arena.

C. DATA COLLECTION

Telephone interviews were the primary mechanism of data collection. Interviewees were asked a series of prepared questions and their responses were documented in writing by the researcher. The specific questions are included in Appendix A. Interviews were the preferred data collection methodology because they provided the researcher with the flexibility to explore any unique characteristics about a given four-year institution that could be significant to understanding how decisions are made at that institution. There

were several instances when interviewees provided unsolicited information that sparked further questions and dialogue. Due to time constraints, there were a couple of interviews in which the full array of questions were either not asked or not answered. The questions that were eliminated tended to be about mitigation. As explained in the Literature Review section, people often generalize preparedness and mitigation as being the same type of activity, which is why the question was eliminated when interviews needed to be shortened due to time constraints. In addition to interviews, the websites for the various institutions were examined, including documents related to emergency management from the institutions in the sample.

D. DATA ANALYSIS PROCESS

The responses to the posed questions were placed into a spreadsheet so that the responses to each of the questions from each of the different institutions could be compared. Perhaps due to open nature of many of the questions, respondents frequently provided responses to questions that had not yet been asked or offered information that was not related to a specific question but was insightful nonetheless. When this happened, the miscellaneous response was assigned to the question that it seemed to answer. The responses were then grouped into four categories: organizational structure, strategy, processes, and decision-making criteria. The responses were then examined for themes and patterns as well as for noteworthy practices. The intent of this research was not to determine causal relationships. Rather, the goal of this research was to gather information from a variety of sources in order to develop a robust and comprehensive picture of current emergency management practices at HEIs, especially decision-making processes. Thus, common themes, individual responses, and unique practices were all of interest.

Respondents indicated a desire to be candid in their responses in the interest of furthering emergency management, but several also expressed, either directly or indirectly, their desire not to have the respective institutions portrayed

in a way that might be perceived as casting a negative light on the institution or specific individuals. It was agreed that information in this thesis would not be attributed to a specific individual or HEI without the interviewee's permission.

IV. ANALYSIS AND FINDINGS

A. OVERVIEW

The fundamental question this project sought to answer is: How can higher education institutions better evaluate emergency preparedness alternatives in order to make optimal decisions about how to invest the institution's limited resources and funds? It was assumed that organizational structure, strategy, processes, and criteria would influence the way in which these decisions are made, so this research also sought to identify how different HEIs structure their emergency management programs; how they are making or have made decisions about which preparedness activities to pursue; and the underlying values that influence preparedness decision making at HEIs. The specific questions these considerations are intended to answer are:

- In what ways does the organizational structure of a HEI emergency management program contribute to optimizing the decisions that are made about preparedness and mitigation activities?
- How does the strategic planning process contribute to optimizing the decisions that are made about preparedness and mitigation activities?
- What decision-making process or processes can contribute to optimizing decisions that are made regarding preparedness and mitigation activities?
- What criteria should be considered to optimize preparedness decisions?

The interconnected nature of organizational structure, strategic planning, processes, and decision criteria made it difficult, at times, to separate the findings into these distinct categories. As a result, there are some instances in the following sections in which a process activity, for example, has been included in the emergency management organizational structure section or a strategy has been included in the decision-making section in order to keep the flow of an idea intact. In addition to the sections on organizational structure, strategy, processes and criteria, there is a final section that contains the responses to the question:

What do you consider to be the barriers to greater preparedness? The responses to this question could have been parsed out and incorporated into one of the four identified categories as applicable, but they are being kept in their own section in order to show how the interviewees answered this specific question.

B. ORGANIZATIONAL STRUCTURE

In order to answer the question of how the organizational structure of a HEI emergency management program contributes to optimizing the decisions that are made about preparedness and mitigation activities, questions were asked about the student and employee populations, the ways in which HEI emergency management programs are structured and managed, and staffing levels. This section will be divided into three subsections: themes and patterns; noteworthy practices; and the summary of findings.

1. Themes and Patterns

All of the HEIs interviewed for this study had an emergency management program, and they employed a variety of organizational structures to address the emergency management function. The aspects of organizational structure that will be examined in this section are as follows: formalization of the emergency management function; roles and responsibilities; and geographical span.

a. Formalization of the Emergency Management Function

Seven of the 10 HEIs in this study had dedicated emergency management departments. The three institutions that did not have a formal or designated emergency management department had the smallest student populations of the 10 HEIs in the study: one institution had a student population of 13,000 and the daytime population ranged from 16,000 to 20,000 people; the second institution had a student population of 6,000 and a daytime population of 8,000; and the third HEI had a student enrollment of 1,400 and a daytime population of approximately 3,000.

The three institutions that did not have recognized emergency management departments did have someone assigned to perform emergency management planning for the institution. In the first case, someone from the President's Office had been assigned to address emergency management. Significant resources had been dedicated to emergency management planning efforts, primarily through the use of outside consultants. The interviewee noted that the person who had been assigned to oversee the institution's emergency management program had been promoted, but no one has been assigned to assume the emergency management responsibilities that she had performed. The interviewee also noted that an emergency management committee comprised of senior level administrators had established the broad policy guidelines for emergency management at the institution. First responders, such as the Chief of Police, were not represented on this policy making committee. Because the interviewee is not on the policy level committee, he did not know how frequently the policy group met, if they met at all. This HEI also has an operational level emergency management group that met when there was a major event for which planning was needed.

At the second HEI that did not have a designated emergency management department, someone has been assigned to a three year position to address emergency management. The interviewee, the Chief of Police, commented that because the school was so small and everyone knew one another, decisions were made without the need for the emergency management committee to meet on a formal and on-going basis. There was an emergency management committee, and it met primarily during exercises or an actual incident.

At the school with a student population of 1,400 and a day time population of 3,000, the person who is responsible for emergency management is the Director of Facilities as well as the Chief of Police. When describing the way the institution where she works manages emergency management, she stated that the key decision makers gather once a month to discuss emergency

management planning. During the meetings in the past, the group members have identified gaps in their preparedness efforts based upon the collective wisdom of the group and developed plans to address those gaps. Similar to the interviewee at the second school, this interviewee commented that the small size of the school and the regular contact between key decision makers, including those who control funding, around a variety of topics other than emergency management made the emergency management decision-making process relatively straightforward and uncomplicated.

For the seven institutions in this study that did have dedicated emergency management departments, the student populations ranged from a low of just over 14,000 to a high of just over 41,000. The student populations of the other schools were approximately: 17,000, 20,000 for two schools, 24,000, and 32,000. The emergency management staffing ranged from one person to three and one-half full-time equivalent (FTE) positions at one HEI (and one of these three positions had a fixed term). The institution with the highest student enrollment was also the institution with the highest number of dedicated emergency management employees (3.5 FTEs). The institution with the second highest enrollment (32,000 students) had an emergency management FTE headcount of one.

b. Roles and Responsibilities

All of the institutions in this study utilized some form of an emergency management committee. In some cases, these committees functioned as the decision-making body; in other cases they served as advisors to the decision maker(s); and sometimes it was not clear what role the committee was supposed to perform. It several instances, the purpose of the emergency management committee or group seemed to be centered on preparing to function as effectively as possible during the response to an emergency but not on discussing or evaluating preparedness decisions or determining strategic direction.

The individuals who chaired the emergency management committees varied. At six of the seven HEIs that had emergency management departments, the university's emergency manager chaired the emergency management committee. At one of these seven HEIs, the Chief of Police technically chaired the committee, but, in reality, the emergency manager prepared for and managed the meetings. At another of the HEIs, the emergency manager was the de facto chair of the committee, but she indicated the group only met to conduct exercises or during real incidents. This emergency manager had made a conscious decision not to have regular meetings because she felt the work that needed to be done could be done via email. At the seventh HEI that had an emergency management department, the emergency manager position had not been filled pending the hiring of the person to whom the emergency manager would report. The interviewee, the Chief of Police, indicated there was an operational gap in emergency management planning as a result of the vacancy. The three HEIs that did not have emergency management departments were chaired by individuals who held the positions of Vice President, Assistant Vice President, and Assistant to the President.

When an institution had a designated emergency manager, that person seemed to bear the primary responsibility for recommending preparedness programs; promoting emergency management within the institution; garnering support from others within the institution to focus their attention on emergency management; and essentially "carrying the torch" for emergency management.

With the exception of one nursing school at one institution and the law school at another institution, none of the institutions had dedicated emergency managers at the departmental or school level. The HEIs that had emergency managers at the school level were geographically separated from the main campus. Several institutions mentioned having established points of contact for emergency management related matters within the schools or departments of the institution. An institution with a student body of over 14,000

and a daily population of close to 30,000, for example, had a fairly robust and formalized network of voluntary emergency management contacts throughout the institution. Many of these individuals were responsible for managing the facilities and buildings on campus. The Emergency Management Department held monthly meetings with these points of contacts in order to keep them informed about and to maintain their interest in emergency management issues.

c. Geographic Span

Institutional clarity around emergency management planning at branch campuses, off-site programs, and off-site facilities appeared to be lacking. The term "branch campus" has been defined by the Code of Federal Regulations, section 34 CFR 600.2, to mean:

> A location of an institution that is geographically apart and independent of the main campus of the institution. A location of an institution is considered independent of the main campus if the location is permanent in nature, offers courses in educational programs leading to a degree or other recognized educational credential, has its own faculty and administrative or supervisory organization, and has its own budgetary and hiring authority (Office of Postsecondary Education, U.S. Department of Education, 2005, p. 19).

For purposes of this analysis, a branch campus will be defined as a location that is geographically separated from the main campus, permanent in nature, relatively independent from the main campus, and where academic instruction takes place.

Based upon the definition for a branch campus as defined in this thesis, all but one of the HEIs had at least one branch campus located either domestically or internationally. Seven institutions had domestic branch campuses; four HEIs reported having overseas branch campuses; and two reported having at least one overseas and one domestic branch campus. Table 2 presents the information about branch campuses as well as whether the HEI has a dedicated emergency management program or not.

Table 2. HEI Organizational Structure, Branch Campuses, and Off-Site Facilities

HEI	EM DEPT	DOMESTIC BRANCH CAMPUS	OVERSEAS BRANCH CAMPUS	OFF-SITE DOMESTIC FACILITY
1	Yes	Yes	No	No
2	No	No	No	No
3	Yes	Yes	Yes	Yes
4	Yes	Yes	No	Yes
5	No	No	Yes	Yes
6	No	No	Yes	Yes
7	Yes	Yes	Yes	Yes
8	Yes	Yes	No	Yes
9	Yes	Yes	No	No
10	Yes	Yes	No	No

To illustrate the lack of clarity with respect to emergency management planning for branch campuses, one emergency manager stated that she had assumed responsibility for emergency management planning at the domestic branch campuses even though it was not specifically spelled out in her job description. Another emergency manager stated that the domestic branch campuses were included as annexes in the institution's overall emergency management plan. It was not clear from the interview who was responsible for the actual planning. Another emergency manager stated that the domestic branch campuses were "independently minded" and maintained their own emergency plans. A fourth emergency manager echoed this response.

In terms of responsibility for emergency management planning at overseas campuses, one emergency manager stated she assumed that the Overseas Studies program was responsible for emergency management planning at the international branch campuses. A second emergency manager noted that he also assumed that the Overseas Studies Office was responsible for emergency management planning. He noted that any plans that did exist were not incorporated into the university's overall emergency plan nor had the plans

been sent to the university's Office of Emergency Management, so the emergency manager was not certain if planning had been done or not. A Police Chief indicated that he assumed that the individual who oversees the overseas programs was responsible for emergency planning. He noted that the institution's Office of Risk Management and the General Counsel's Office had informed the overseas office how to strategically plan for handling the risks faced at the various overseas locations.

All of the institutions offered opportunities for overseas studies through programs (as opposed to an overseas branch campus managed by the educational institution). The locations where programs are held are not, by definition, directly under the institution's control. None of the respondents indicated responsibility for or knowledge of the planning that was being done for overseas programs. There were no respondents in this study representing overseas studies offices, so it is possible that the institutions in this study do have emergency management plans for overseas programs.

Six HEIs indicated that the HEI maintained off-site facilities that did not fall under the definition of a branch campus. For clarity, the simplest distinction between branch campuses and off-campus facilities is whether students directly receive educational instruction at the location. An off-site library storage area where students do not receive academic instruction would be considered to be an off-site facility not a branch campus. Emergency management planning for "off-campus" sites seemed to be non-existent or left to someone outside the institution to perform. One police chief stated that emergency management would be done by the entity from which the institution leased the space. An emergency manager and a risk manager echoed this sentiment for their respective institutions. Another emergency manager noted that he had only recently found out about a sensitive operation that was housed at an off-site domestic facility. As the institution's emergency manager, he felt he should have known about the operation. He commented that despite the lack of formalized systems for integrating the emergency management efforts at these

off-site areas, the university would become aware of incidents because there is a central office of university safety that houses the various first responder departments. Someone within the safety organization would inevitably be contacted in the wake of an incident at an off-site facility and would then alert others. He said this notification would take place as a result of pre-existing relationships rather than any formalized process. His main point was the institution would become involved in the response, but it was not necessarily involved in the pre-incident planning process. It is possible that emergency management planning had been conducted at the site cited in the example above and that the gap was not in the emergency management planning process but in the communication between the entity conducting the planning and the university's centralized emergency management program.

2. Noteworthy Practices

With respect to the actual management of an emergency management program, the University of Oregon has developed a somewhat unique approach. The University of Oregon program is managed by a faculty member, which is in itself unusual since all of the other emergency management programs in this study were managed by individuals holding staff positions. Faculty management of the university's emergency management program has several benefits. By virtue of the mere fact that faculty members interact with other faculty as well as with students, the program receives a level of exposure that it might not otherwise receive. Additionally, as a result of being managed by a faculty member, a perception is created that the program is academically sound, which gives the program a certain level of credibility that might not otherwise exist. What was particularly intriguing about the University of Oregon model is that the director funds much of the program the way a faculty member would fund his research. The director seeks grants to fund any positions or programs that are not funded by the university. He commented that funding positions and programs through grants means that there is a high level of accountability and a continual push to be innovative. The University of Oregon program is also

unique from the standpoint that the director has tied the program to the educational mission of the institution by offering service-learning internships. Despite the fact that the university does not offer a degree in emergency management, five to 15 students perform internships in the community each year under the auspices of the program. Not only do the students receive an education, but the community benefits from their work.

Due to the unique organizational structure of the University of Oregon emergency management program, it is worth noting how the evolution took place. The Web site for the Oregon Partnership for Disaster Resilience provides an overview of the way in which this partnership with the community, and the state of Oregon, evolved:

- In the summer of 2000, the University of Oregon's Community Service Center (CSC) establishes the Oregon Natural Hazards Workgroup (ONHW) specifically to work on identified natural hazards issues in Oregon. The role of the ONHW is to link the skills, expertise, and innovation of higher education with the natural hazard risk reduction needs of communities and regions in Oregon, thereby providing a service to the state and learning opportunities for students.
- On October 30, 2000, the President signs into law the ***Disaster Mitigation Act of 2000*** (DMA2K). The act establishes a national pre-disaster mitigation program and creates new requirements for the National Post-Disaster Mitigation Program.
- On December 12, 2000, Oregon Governor John Kitzhaber signs an Executive Order designating Oregon a "Showcase State for Natural Disaster Resistance & Resilience." This Executive Order follows a model developed and tested in Rhode Island by the Institute for Business and Home Safety (IBHS), an initiative of the insurance industry engaged in communication, education, engineering, and research of natural hazards.
- In early 2001, the Showcase State program becomes know as the Oregon Partnership for Disaster Resistance and Resilience; ONHW takes a lead role in coordinating the group's risk reduction and mitigation activities throughout the state.
- In 2002, ONHW develops a comprehensive five-year strategic plan for the Oregon Partnership for Disaster Resistance and Resilience organized around five distinct working groups: state hazard

planning; businesses/economic recovery; pre-disaster mitigation; public awareness, education and outreach; and public/private partnerships.

- In 2002, ONHW embarks on a regional capacity building initiative to develop and implement local natural hazard mitigation plans utilizing federal funds made available by the passage of DMA2K.
- Cumulatively, events such as 9-11, the Indian Ocean tsunami, Hurricane Katrina, and Virginia Tech change the priorities, focus and demands of local emergency management programs.
- In 2005/2006 ONHW/CPW assist the University of Oregon in developing a natural hazard mitigation plan for campus that opens the door to establishing a Disaster Resilient University program.
- In late 2006/early 2007 the Partnership Advisory Committee begins to discuss an organizational restructuring to better serve the needs of the communities within the state.
- In June 2007, ONHW and the Partnership for Disaster Resistance & Resilience merge under one name and management structure at the University of Oregon: The Oregon Partnership for Disaster Resilience (OPDR) is born.
- Beginning in 2007, the Partnership's activities look beyond the scope of natural hazards only, to a more integrated, enterprise-wide emergency management capacity building program.
- In the Fall of 2007, the Partnership works with the University of Oregon administration to implement an enterprise wide emergency management program for campus. (Community Service Center, University of Oregon, 2010)

This history demonstrates the idea of innovation, to which the director the University of Oregon's emergency management alluded.

Another noteworthy practice emerged from Georgetown University. Georgetown has organized its emergency management structure on the Emergency Support Function (ESF) concept outlined in the National Response Framework (NRF). The ESFs "group federal resources and capabilities into functional areas to serve as the primary mechanisms for providing assistance at the operational level" (DHS, 2008, p. 1). The NRF identifies 15 ESFs (DHS, 2008):

- ESF 1-Transportation
- ESF 2-Communications
- ESF 3-Public Works
- ESF 4-Firefighting
- ESF 5-Information and Planning
- ESF 6-Mass Care
- ESF 7-Resource Support
- ESF 8-Health and Medical
- ESF 9-Search and Rescue
- ESF 10-Hazardous Materials
- ESF 11-Food and Water
- ESF 12-Energy
- ESF 13-Military Support
- ESF 14-Public Information
- ESF 15-Volunteers and Donations

In order to address the fact that some services are provided by organizations affiliated with the university that are not under the direct control of the HEI, such as the Georgetown Hospital, Georgetown placed them into their own independent ESFs rather than incorporating them into an existing and applicable ESF. The specific way in which this organizational model functioned operationally was not explored.

A third noteworthy practice emerged from Stanford University. Stanford has created department level operational centers (DOCs) that function as mini-emergency operations center (EOCs) for their respective areas. There are currently 26 DOCs. Each month, under the auspices of the Environmental Health and Safety Department, representatives from the various DOCs attend a monthly meeting where information about university emergency management practices is discussed. Participation in the program is voluntary. Many of these individuals elect to participate in several of the emergency management related training programs offered by the university to members of the university

community such as the Building Assessment Teams (BATS) and the Community Emergency Response Teams (CERT). Over 600 people have taken BAT training, which provides participants with very basic skills to assess the structural damage to buildings and determine if the building should be closed in the aftermath of an earthquake, and over 200 people have enrolled in the CERT program. Combined, these programs serve to bolster the institution's preparedness and response capabilities. Stanford is certainly not unique in offering this type of training, but the organizational concepts are worth noting.

3. Summary of Findings

All of the institutions in this study engaged in some form of emergency management planning. Three institutions did not have dedicated emergency management departments. Those HEIs that did not have dedicated emergency management departments had the lowest student populations of the HEIs involved this study. This finding suggests that the development of a formalized emergency management department might be associated with the size of the institution. For those HEIs with emergency management departments, staffing ranged from one to 3.5 FTEs. Student population did not appear to be related to the number of personnel employed by the emergency management department.

All of the institutions in this study utilized some type of an emergency management committee, although the purpose of these committees varied from institution to institution as did the frequency with which the groups met, who was represented on the committee, and who chaired the committee. The chairperson was generally the emergency manager when the institution had an assigned emergency manager. As a general rule, HEIs did not have emergency managers at the school or department level, although several had developed points of contacts within the schools and departments. Clarity around the emergency management planning for branch campuses, off-campus facilities, and off-campus programs—both domestically and internationally—seemed to be lacking.

Inevitably, the people who are included in the decision-making process—whether as part of a formalized advisory committee or some other collection of people into a group—will impact the way in which a problem is framed, how the group understands the problem, and type of solutions that are generated. Consider the HEI in this study that did not include first responders in the policy level advisory committee that determined the HEI's guiding principles with respect to emergency management. It is likely that first responders would have a higher level of expertise about responding to and managing critical incidents as compared to senior administrators; thus, it is possible that the quality of the decisions that were made without this expertise might have been less than optimal. Conversely, senior administrators have a broader and deeper understanding of the HEI's overall mission and direction than those tasked with specific operational areas. An organizational structure that includes both perspectives—those who deal primarily with operations and those who primarily deal with policy level decisions—might lead to "better" decisions. Additionally, the structure allows for a shared or mutual understanding of the problem, the alternatives and the solutions.

The HEIs in this study indicated that senior level administrators were engaged with emergency management planning efforts, although to varying degrees. As noted, compared to senior officials at the larger HEIs, individuals who held senior level positions at smaller HEIs seemed to be more involved with the emergency management planning efforts as a result of their responsibilities over multiple areas. According to the literature, the active involvement of someone representing the most senior levels of the institution helps to ensure that preparedness concerns receive adequate institutional attention, which can, in turn, facilitate optimal decision making.

Another observation related to organizational structure relates to the role of the emergency manager. When an institution had a designated emergency manager, that person seemed to bear the primary responsibility for recommending preparedness programs; promoting emergency management

within the institution; garnering support from others within the institution to focus their attention on emergency management; and essentially "carrying the torch" for emergency management. These responsibilities sound like the performance expectations for an emergency manager, so this perception is not surprising. The fact that most of the HEIs did not have a dedicated emergency manager at the departmental or school level means that an institution's emergency management efforts are essentially being spearheaded by the one to three staff persons without any formalized expectation of assistance from designated individuals representing the various departments and schools within the institution. The question that emerges from this organizational structure is: If an institution's planning efforts for a full spectrum of hazards are being managed by one to three staff persons, how successful can an institution's emergency management efforts truly be? To deal with this reality, several emergency managers indicated that they relied upon the skill of persuasion to involve individuals throughout the institution to participate in emergency management efforts.

With respect to decision making, the organizational structure of a HEI's emergency management program did not seem to be associated with any specific type of decision-making process. Some of the HEIs with dedicated emergency management departments utilized advisory committees to make decisions about which preparedness activities in which to engage, and some did not utilize advisory committees to make decisions about which preparedness activities in which to engage. A similar finding was present for the three HEIs that did not have emergency management departments. Furthermore, some advisory committees used a consensus model to make decisions; some advisory committees generated recommendations to present to a decision maker; and some advisory committees did not develop or make recommendations about which preparedness activities in which to engage. At least one interviewee representing each of these organizational models questioned whether the way in which decisions were made resulted in optimal decisions being made.

Interestingly, the interviewees from the two HEIs in this study that had the smallest student enrollment seemed to have the most positive outlooks about the institution's decision-making process with respect to preparedness activities. This observation could be a reflection of the individuals' outlooks in general and have nothing to do with the size of the student population whatsoever, but both interviewees commented that because their respective HEIs were small, individuals interacted with one another on a regular basis. It would not be unreasonable to believe that someone who was part of the decision-making process regarding preparedness and mitigation activities would feel a level of satisfaction with the decision-making process. It is important to note that perceived and expressed satisfaction with decisions and the decision-making process do not necessarily equate to optimal decision making, but it does indicate that there is a perception that the decisions were adequate, appropriate, and reasonable.

In summary, there was no clear indication from the responses that a specific type of organizational structure was associated with a decision-making process that produced optimal decisions or even a specific type of a decision-making process at all. Some of the literature suggests that support from senior level personnel enhances the success of emergency management efforts as does a collaborative process that draws upon the expertise of those most knowledge about the HEI and emergency management. The results from this study suggest that while organizational structure will undoubtedly influence the decision-making process, even if only to determine who might be involved with making decisions, organizational structure does not preclude different decision-making processes and strategies from being employed.

C. STRATEGIC PLANS AND STRATEGIC PLANNING

In order to answer the question of how the strategic planning process contributes to optimizing the decisions that are made about preparedness and mitigation activities, the responses to the following questions were examined:

- Does the institution have an emergency management strategic plan? If yes, is this plan documented?
- How is the plan shared with others? Which entity or entities developed the strategic plan?
- What process was used to develop the strategic plan?
- How long ago was the plan developed?
- How often is the plan updated?

This study did not define for the interviewees what was meant by a strategic plan in order to not restrict the nature of the responses.

Interviewees were also asked, “What are the institution’s guiding principles with respect to emergency management?” And, lastly, in an effort to solicit information about the goals, objectives and performance measures that might be included in an emergency management strategic plan, interviewees were asked how their respective institutions defined and measured preparedness. For purposes of clarity, this section will be divided into three subsections: themes and patterns, noteworthy practices, and, summary of findings.

1. Themes and Patterns

The aspects of strategic planning that will be examined in this section are as follows: existence of a strategic plan, plan availability and access, plan creation and maintenance, guiding principles of the emergency management program, and preparedness measures.

a. Existence of a Strategic Plan

Four of the 10 institutions reported having an emergency management strategic plan. The interviewees stated that their institution’s strategic plans were available on the Internet, which was also the way in which the plans were made available to others within the HEI. If other institutions had strategic plans, their existence was not known by those who were interviewed as

part of this project or the plans were not recognized by the interviewees as being strategic plans. Three of the four HEIs which indicated they had strategic plans had designated emergency management departments.

In reviewing the strategic plans of the four institutions that indicated that they had strategic plans, two of the four HEIs contained elements one might expect to see in a well developed strategic plan including: mission and vision statements, specific objectives, and benchmarks. The two HEIs that had well developed strategic plans were the University of Oregon and the University of Washington. Highlights from these plans will be discussed in the next subsection. The plans from the other two HEIs that reported having strategic plans appeared to be more closely aligned with operational plans. In fact, in both cases, the plans were titled "Emergency Management Plan." Both of these plans did contain high-level guiding principles and policy statements about the emergency management program, which is why they might have been viewed by the interviewees as being strategic plans. Based upon a quick review of the emergency management plans from the HEIs in this study that could be located on the Internet, most of these plans contained a high-level policy statement and a statement of what could be considered to be operational priorities. If guiding principles and high level policy statements were the criteria for defining an emergency management plan as a strategic plan, then most of the other institutions in this study would be counted as having strategic plans. But, using the strategic plans themselves as the benchmarks, only two of the four plans are truly strategic plans.

Comparing the emergency management strategic plans from the University of Washington and the University of Oregon with the U.S. Government Accountability Office (GAO) recommendations for the elements a strategic plan should contain as found in the report ***Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*** (GAO, 2004, p. 11), and taking into account that these plans were not developed with national security as a focus, these two plans contain most of the recommended elements.

The one notable exception to this observation is that neither plan specifically addresses what various strategies will cost, the sources and types of resources and investments needed, and where resources and investments should be targeted by balancing risk reductions and costs.

b. Access and Availability

With respect to the access and availability of strategic plans, the emergency management strategic plans for the University of Washington and the University of Oregon are publicly accessible via the Internet. One of the interviewees who stated that the HEI did not have a strategic plan indicated that the institution had engaged an outside consulting firm to create a management plan that identified the institution's greatest risks and made recommendations for mitigating those risks. He was not certain if that document would be considered a strategic plan or not, but since the plan was not accessible to others, he stated that the institution did not have a strategic plan. One of the four HEIs which reported having a strategic plan had also engaged the services of a consulting firm to develop a risk assessment plan and make recommendations for how to address identified risks and develop an emergency management program. If this plan were strategic in nature, it is not being counted as being a strategic plan for purposes of this analysis because it is not available to the public, including university staff who might be charged with carrying our preparedness activities.

It is worth noting that both of the HEIs that mentioned having confidential reports, which may or may not have been strategic in nature, were private institutions. It is not uncommon for private institutions to conduct risk assessments under an attorney-client privilege. Thus, while these confidential reports might be strategic in nature in so far as they outline specific objectives and recommendations to achieve those objectives, confidential reports are not being considered to be strategic plans for purposes of this thesis because they

are not transparent to the rest of the HEI or the surrounding communities and, thus, cannot be used to inform decision making except by those who are aware of the contents.

c. Plan Creation and Maintenance

Focusing only on the strategic plans from the University of Oregon and the University of Washington, the University of Oregon's plan is dated November 2007 and has a five-year horizon. The emergency manager developed the plan, which was vetted through the institution's emergency management advisory committee. The foundation of the plan was built upon elements outlined in the NFPA 1600, the Standard on Disaster/Emergency Management and Business Continuity Programs produced by the National Fire Protection Association, as well as standards established by the Emergency Managers the Emergency Managers Accreditation Program (EMAP). The plan is reviewed annually and was last updated in October 2008. The University of Washington's plan, which is updated every two years, was revised in 2009 and has a 2014 horizon-target date. The plan was developed by the staff of the emergency management department with input from the institution's emergency management advisory committee members and other key stakeholders. Like the University of Oregon's plan, the University of Washington's plan is based upon EMAP accreditation standards and NFPA1600 standards as well as the recommendations found in ***Building a Disaster Resistant University*** (FEMA, 2003a). Although not specifically asked, it came out during the interviews that both the University of Oregon and the University of Washington had received federal "Disaster Resistant University" grants.

d. Guiding Principles

With respect to guiding principles, two types of responses were given to the question, "What are your institution's guiding principles with respect to emergency management?" One type of response focused on the guiding principles of the emergency management program or of emergency management

in general. The response provided by the University of Oregon, which can also be found on the Web site, illustrates this type of response:

> **Comprehensive**—consider and take into account all hazards, all phases, all stakeholders and all impacts relevant to disasters.
>
> **Progressive**—anticipate future disasters and take preventive and preparatory measures to build disaster-resilient campus.
>
> **Risk-driven**—use sound risk management principles (hazard identification, risk analysis, and impact analysis) in assigning priorities and resources.
>
> **Integrated**—ensure unity of effort among all levels of administration and all elements of the campus community.
>
> **Collaborative**—create and sustain broad and sincere relationships among individuals and organizations to encourage trust, advocate a team atmosphere, build consensus, and facilitate communication.
>
> **Coordinated**—synchronize the activities of all relevant stakeholders to achieve a common purpose.
>
> **Flexible**—use creative and innovative approaches in solving disaster challenges. (University of Oregon, 2009, p. 1)

The other type of response, which was given by the majority of the HEIs, reflected the actual or perceived mission of emergency management—such as saving lives, protecting property, and restoring business operations. One emergency manager stated that she focused on the four phases of emergency management. She then specified: prepare the university to respond to and recover from any type of emergency incident; protect life, protect property and the environment. In response to the question, another emergency manager asked, “How’s that different from mission and vision; can you expound?” He then explained that his institution would consider the existing emergency management vision statement to reflect the guiding principles of the emergency management program. The vision for this institution was to work collaboratively to save lives and to be a global model for other HEI emergency management departments. A risk manager stated the guiding principles for her institution were outcomes

based, meaning the university focused on planning for certain outcomes such as providing medical care to the faculty, staff and students of the HEI as well as to the broader community. Thus, planning was focused on how to perform certain functions, especially in the absence of key critical infrastructures.

A police chief stated that his institution had clearly defined the guiding principles to be: life safety, operation of critical facilities, restoring campus operations, and protecting the institution's credibility. During planning sessions, these four principles are used to guide decision making.

An emergency manager stated the guiding principles were not written down, but she assumed they would be to make sure that the campus is prepared to respond to and recover from a disruption caused by an emergency and to ensure mission continuity.

e. Preparedness Measurements

In an effort to solicit information about goals, objectives, and performance measures related to preparedness, interviewees were asked how their respective institutions defined and measured preparedness. The question regarding defining preparedness seemed to catch many people off guard, as evidenced by responses such as, "Hmmmm, that's a good question," and "I don't know that we have defined it." A couple of respondents were puzzled by the question and asked for clarification about what type of information was being sought. After the initial momentary pause, several individuals proceeded to provide responses to the question. One interviewee thought that the guiding principles which his senior administration had developed might be a starting point for defining preparedness. These principles were: to protect life, critical facilities and the institution's reputation, and to restore campus operations. In terms of measuring preparedness, he was not certain, but he thought that perhaps preparedness was measured by university-wide exercises, planning and execution of actual events and responses to actual emergencies.

Another respondent also stated he was not certain how the institution defined preparedness but thought that the institution would define preparedness as falling into three parts: being prepared to deal with an event; dealing with the event when it occurs; and recovering back to normal as quickly as possible. In terms of measuring preparedness, this interviewee stated that testing elements of the emergency management plan—such as making sure the emergency notification system and the public address system were in working order; determining bulk food capacity; and checking pumps and generators to make sure they were operational—was one way of measuring the institution's preparedness.

A third interviewee stated that the institution had not defined what it meant to be prepared, but her personal definition was that everyone knows the hazards that exist and what to do to mitigate the damage that might come from those hazards. Another interviewee's response to the question of how the institution measures preparedness was "That's a tough one. Metrics are few and far between for emergency management and disaster management. We figured out just how difficult when we were required to develop a dashboard score card." He went on to say that there really are no national standards other than counting things like the number of people trained, and the number of activities, workshops, seminars and training sessions presented. In terms of defining preparedness, this respondent stated, "I guess in the traditional manner: actions and activities and events that get the university ready for the hazards we can most likely expect; planning training and exercising; all of the activities involved in implementing those."

Another emergency manager's response to the question of how the institution defines preparedness was "We don't isolate one word. We take a holistic approach and that is our ability to respond and continue operations and recover from defined risks or peril." To measure preparedness, he referenced

the institution's emergency management strategic planning process along with the benchmarks established in the NFPA 1600 and the EMAP accreditation standards.

One interviewee stated that the existence of an emergency response and business continuity plan served as the measurements of preparedness for her institution. She pointed out that many departments did not have plans and those that did have plans often had not read them and were not familiar with the contents of the plan; nor had they exercised their plans. An emergency manager added that universities were not alone in terms of having not defined preparedness or how to measure it. She said she had worked at a place where plans were prepared, but never tested, which meant there was no way of knowing if what had been in place would work or not. Conversely, she had also worked at a place where exercises were conducted "ad nausea," but plans were never changed as a result of what was learned during the exercise.

Another emergency manager noted that he was still looking for a gauge. He added that continuous improvement was a fundamental tenant of emergency management and preparedness, in particular. If the goal is to continually improve, he stated, how does one measure when the institution has done enough to be prepared?

2. Noteworthy Practices

As mentioned, the strategic plans for the University of Oregon and the University of Washington contained the elements one might expect to see in a strategic plan, such as vision and mission statements as well as specific objectives. The following excerpt from the University of Oregon's strategic plan contains the vision and mission statements for this HEI:

> **Vision:** Create a disaster resilient university
>
> **Mission:** To protect the University by facilitating the coordination and integration of all activities necessary to build, sustain, and improve the University's ability to mitigate against, prepare for,

> respond to, continue operations during, and recover from natural disasters, acts of terrorism, or other human-caused crises or disasters. (University of Oregon, 2009, p. 3)

The vision and mission statements from the University of Washington's strategic plan are:

> **Vision:** A Disaster Resistant University as a global model for other institutions of higher learning.
>
> **Mission:** To administer a campus-based comprehensive emergency management program in partnership with UW academic departments, operating units, staff, administration and neighboring jurisdictions to save lives, protect property and safeguard the environment. (University of Washington , 2009, p. 4)

The existence of mission and vision statements is not uncommon. What sets these two plans apart from others in this study is the level of specificity regarding goals and objectives included in the plans. For example, the seven objectives in the University of Oregon's strategic plan are as follows:

1. Provide oversight, communication, and coordination of a broad and diverse group of campus partners.
2. Employ an integrated all-hazards risk based approach for mitigation, response, continuity of operations, recovery, and preparedness planning for campus.
3. Build local, higher education, state, and national partnerships and coalitions.
4. Support campus understanding and utilization of the Incident Command System/National Incident Management System principles.
5. Enhance disaster preparedness capabilities through preparing, training, and exercising.
6. Strive for multi-dimensional communications (e.g., redundancy to ensure multiple modes of communications) and enhance education, awareness, and understanding of what to do before, during, and after crisis and disaster events among students, staff, and faculty.
7. Address sustainability considerations in all endeavors and ensure that strategies are measurable. (University of Oregon, 2009, p. 3)

For each objective, specific behaviors or outcomes have been established. An example of the level of detail in this institution's strategic plan is shown in the following objective and measurement criteria for objective number six that is listed above:

> Core Functions:
>
> Implement a reliable emergency communications process to contact members of the campus community in the event of a pending or immediate campus emergency.
>
> Analyze means and methods of communicating with City, County, and State OEM partners (interoperability) and recommend improvements to current systems.
>
> Update and distribute EOC Call-up list (every 6-months).
>
> Test EOC communications including phones, computers, and wireless (***every 6-months once we have the new EOC location determined and response coordinator/trainer in place***). (University of Oregon, 2009, p. 6)

The University of Oregon's emergency management strategic plan is clear, concise, and explicit. Anyone within the university, or external to the university, would be able to understand what activities are being pursued. Furthermore, because the expectations are measureable, there is a way to evaluate progress against the desired outcomes.

The University of Washington's strategic plan contains 17 goals. Under each goal there are specific objectives and implementation plans. The 17 broad goals are categorized under the following headings:

- Program Management
- Hazard Identification, Risk Assessment and Impact Analysis
- Hazard Mitigation
- Resource Management
- Mutual Aid
- Planning
- Direction, Control and Coordination

- Communications and Warning
- Operations and Procedures
- Logistics and Facilities
- Training
- Exercises, Evaluation and Corrective Actions
- Crisis Communications, Campus and Public Information
- Finance and Administration
- Change Management and Technology (2 goals in this category)
- UWEM Employee Development. (University of Washington, 2009, p. 2)

The report clearly indicates that the first 14 goals reflect the standards identified in the NFPA1600 (NFPA, 2010). The last two categories, which contain three goals in total, are UWEM specific goals that are not identified by NFPA1600 as standards. To illustrate the level of specificity of the UWEM strategic plan, the follow excerpt shows the way in which the University of Washington's strategic plan is organized under the goal of Program Management (University of Washington , 2009, p. 8):

> **Goal 1:**
>
> ***Ensure strong and ongoing program management through the development, review and update of written program policies, regulation and authorities. Included in this goal is the support of an overall program coordinator, advisory committee and periodic program evaluation.***
>
> Objective 1.1 Use and Promote the UWEM Vision, Mission and Balanced Scorecard concepts by all UWEM employees and its partners.
>
> The following excerpt shows the implementation plan for this objective:

Implementation Step	Status	Timeframe (notes)
1.1.A: Include program Mission and Vision on all employee business cards and key communications materials.	COMPLETED	2007
1.1.B: Update all UW policies and procedures (e.g., Administrative Policy Statements) as they relate to continual changes to emergency management practices and situations.	Ongoing	2009-2014
1.1.C: Revise the UW UWEM's Balanced Scorecard annually to reflect changes in priorities, assignments and environmental shifts in responsibilities.	Ongoing	2009-2014 (Annual Review, quarterly updates)

Figure 13. Implementation Table (From University of Washington, 2009)

One additional noteworthy practice from the University of Washington is the UWEM strategy map, as shown in Figure 14 (University of Washington Emergency Management, 2009). This one-page document encapsulates the elements of the UWEM's overall emergency management strategic plan.

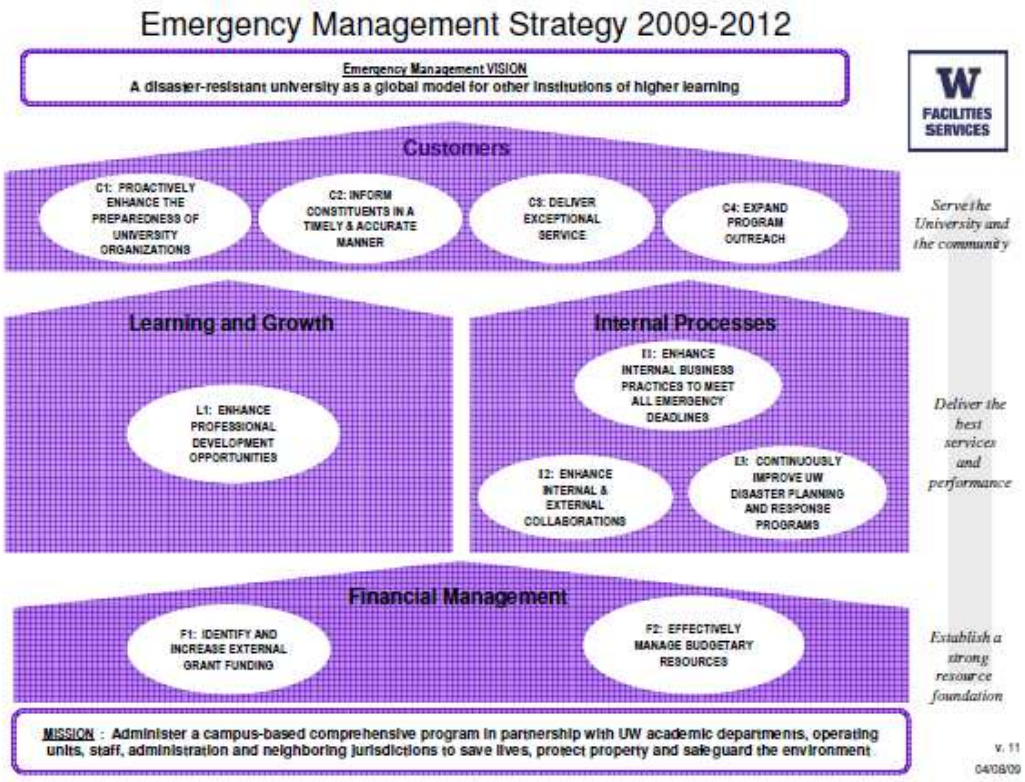

Figure 14. University of Washington's Emergency Management Strategic Map (From University of Washington, 2009)

3. Summary of Findings

Of the 10 HEIs interviewed, two of the HEIs—the University of Washington and the University of Oregon—had well developed and clearly defined emergency management strategic plans. The content of these plans was heavily influenced by existing standards, specifically NFPA1600 and EMAP accreditation standards. Both HEIs had received federal grants under the "Disaster Resistant University" program. Based upon the responses from the interviewees, it sounded as though the grants had influenced the refinement of the institutions' emergency management programs, including their strategic plans.

Most of the interviewees, including the representatives from the University of Washington and the University of Oregon, responded that their institutions had not defined preparedness or what it meant to be prepared beyond generalized responses such as protecting life, keeping critical facilities operational, protecting

the institution's reputation, and restoring campus operations. With the exception of the University of Washington and the University of Oregon, none of the other HEIs had institutionally defined measurements of preparedness. Despite having not defined how to measure preparedness, responses to the question of how to measure preparedness included: having an operational plan, conducting training, exercising, and reviewing lessons learned from exercises and actual events.

Given that the University of Washington and the University of Oregon both have strategic plans that contain clearly defined goals and objectives that could be considered to constitute a definition of preparedness, a better question to have asked might have been: "What goals, objectives and benchmarks does your institution use to measure preparedness or guide the emergency management process at your HEI?" The responses to this new question might not have changed substantially, except perhaps from the two HEIs that have well-developed strategic plans, but the question would have been clearer and created less confusion for the respondents.

In summary, despite the apparent espoused benefits of strategic planning, only two of the 10 HEIs in this study—the University of Washington and the University of Oregon—had publicly accessible, formalized emergency management strategic plans that included clearly delineated goals and objectives to accomplish those goals. If the existence of a strategic plan is indicative of strategic planning, then most of the HEIs in this study did not appear to have engaged in a strategic planning process specific to emergency management. Thus, gleaning insights as to how strategic planning at HEIs can contribute to optimizing decisions that are made about preparedness from the results of this study is limited other than to conclude that since strategic planning does not appear to be guiding the decision-making process for most of these institutions, then strategic planning is not contributing to optimizing decisions either.

D. DECISION PROCESSES

Decisions about which preparedness and mitigation activities to pursue are inevitably going to be made regardless of whether an institution has engaged in an emergency management strategic planning process; created a written strategic plan; defined what it means to be prepared; or established benchmarks to measure preparedness. Developing an understanding of how these decisions are currently being made can help to develop the framework for optimizing these types of decisions in the future. The questions interviewees were asked to elicit information about how decisions are currently being made included:

- How does the institution decide which specific emergency preparedness initiatives and programs to pursue?
- Does the institution utilize any type of decision support tool to determine which preparedness or mitigation programs or initiatives to pursue?
- Are you aware of any decision support tools, systems or processes for evaluating preparedness or mitigation activities?
- How can the decision-making process be improved?

In addition to the responses to these questions, insights obtained from interviewees' responses to other questions that are relevant to "process" will be included in this section as well. Organizationally, this section will be divided into sections: themes and patterns; noteworthy practices; and summary of findings. Themes and patterns will be further subdivided according to the aforementioned questions. Each question will be presented followed by the responses.

1. Themes and Patterns

a. How Does the Institution Decide Which Specific Emergency Preparedness Initiatives and Programs to Pursue?

Several respondents stated that decisions were made based upon the consensus opinion of those involved with the emergency management program. Another stated that decisions were based upon the risks that were perceived to be the most important as determined by a committee consensus

process. This interviewee acknowledged that he was not sure if the process was sound, if any benchmarks were actually utilized, or if the informal process resulted in a fair assessment of the actual risks. Another respondent also mentioned that the institution based its decisions on the results of a risk assessment and focused attention on preparing for and mitigating the threats that had been identified as the most likely to take place.

Two emergency managers stated it was their responsibility to advise the decision makers about which programs to pursue. Another stated that in the absence of input from senior administrators, she worked on projects that she could accomplish with existing resources. She also noted that constrained resources had forced her department, as well as the HEI, to realign its priorities and to be more creative, which sometimes led to changes in business practices. She cited the example of reducing the size of the EOC from a group of 60–70 people to a group of 15 people, which reduced the training burden on the emergency management office as well the number of people who needed to make time for training.

One emergency manager stated she intentionally focused on initiatives that were meaningful to local and state government and worked to integrate the HEI's plans into these planning efforts. Her approach was to focus on what would make her HEI a better partner with state and local government. Three HEIs specifically cited grants as influencing the decision-making process.

A police chief's perspective was that the proverbial "squeaky wheel" tended to receive the attention and funding. An emergency manager stated, "It is a combination of funding and the hot topic of the day." Another emergency manager stated that the prevailing attitude toward emergency management preparedness was that little could be done to prepare for or mitigate the effects of "acts of God." This mindset was one of his greatest frustrations given the advances in the field of emergency management, policy development, and the decision sciences.

The involvement of senior level administrators has been identified in the literature as being a factor that impacts the potential effectiveness of an emergency management program. Most of the respondents in this study indicated that senior level administrators were involved with emergency management planning, although the level of involvement varied.

In summary, the institutions in this study did not appear to employ a structured process or processes for deciding which emergency management activities to pursue. Consensus among those involved with emergency management program, solo decision making by an emergency manager and recommendations from the emergency manager or emergency management group were all mentioned as processes that were being employed. Some institutions referenced using risk assessments as a tool for informing these decisions. The exact way in which these risk assessments were utilized was not examined.

b. Does the Institution Utilize Any Type of a Decision Support Tool to Determine Which Preparedness or Mitigation Programs or Initiatives to Pursue? Are You Aware of Any Decision Support Tools, Systems or Processes for Evaluating Preparedness or Mitigation Activities?

Only one interviewee mentioned using any type of a decision support tool to help make decisions about which preparedness or mitigation strategies to pursue. This interviewee mentioned several tools including: Geographic Information System (GIS) mapping, a modification to FEMA's cost-benefit analysis tool for evaluating mitigation strategies, and a business continuity planning tool that was in the form of an Excel spreadsheet as well as a business continuity tool called UC Ready that had been developed at UC Berkeley. The use of GIS will be examined in greater detail later.

One emergency manager commented that he was a fan of standards and noted that several members of the college and university section of the International Association of Emergency Managers (IEAM) were

considering creating a set of standards specific for colleges and universities based on the EMAP accreditation standards. He also referred to NFPA1600. Other than utilizing these standards, his institution did not use any type of a decision support tool. The remaining seven HEIs stated that their respective institutions did not use any type of a decision support tool.

With respect to decision support tools, one emergency manager made the following observation, “Here’s the problem with evaluating tools, there’s no way to go to a city council and say, ‘If we spend X, then we will save this much…and be able to prove it.’” She offered the example that if 100 percent of the students are enrolled in the mass notification system and the institution uses the system to send out a warning to shelter in place and no one is injured, there is no way to compare that outcome to what might have happened if the system had not been in place. She went on to add that people want “solid things” and this type of argument is not solid. At that point, she posed the question of whether we are better off simply using common sense and good judgment as opposed to trying to prove something.

In summary, most of the HEIs in this study did not use any decision support tools to make preparedness decisions with the exception of the use of GIS mapping, risk assessments, standards adapted from other sources such as the NFPA1600 and the EMAP accreditation standards, and business continuity tools. In reviewing the NFPA1600, it does not prescribe a decision-making process, but it does provide a framework for designing an emergency management and business continuity program which could, in turn, facilitate decision making. The tools which were mentioned do not independently provide a decision-making framework, but they could be included in or contribute to a framework.

c. How Can the Decision-Making Process Be Improved?

Responses to this question were varied. Some of the responses mirrored activities that are already being done at some of the other HEIs in this

study and some responses included suggestions about the criteria that decision makers should consider, which will be covered in the next section.

Doing more exercises on a wider variety of threats was mentioned several times as a way to enhance decision making. Getting the right decision makers with the political will and authority to make decisions together "in one room" was another response. Developing relationships and building trust among response units and decision makers was also highlighted as an important consideration.

An emergency manager responded by telling a story about a recent event that took place on her campus. She commented that the senior administration was reluctant to use the institution's emergency notification system during a recent riot. She felt the senior administrators, who were all new to their positions, had never encountered a situation of the magnitude facing them and were not prepared to make the types of decisions that need to be made during a critical incident. Furthermore, she did not perceive that they knew what resources and tools were available to them. She believed training and familiarity were the solutions to improving decision making because they would allow decisions to be made instinctively.

Another emergency manager brought up organizational culture as an impediment to decision making. She explained that the previous president of the university "ruled with an iron fist." Those who made decisions made themselves vulnerable to criticism, and even to being fired, so people adapted by not making decisions unless forced to do so. Thus, this respondent felt that decision making would be improved if people could overcome the past and start speaking out and offering their opinions. She noted that the university has had a new president for several years, but it is taking time to change the organizational culture that had been prevalent for over a decade. She also commented that having people work together on the day-to-day stuff would develop relationships and build trust. She thought this was important to do within the university as well

as with external first responders. She commented that she sits on emergency management related committees in the city where her institution is located and vice versa.

An interviewee from a school that did not have a dedicated emergency manager stated that he thought the university would benefit from having a dedicated emergency management manager. He said the university was doing a lot of good work around emergency management, but it was not transparent.

A risk manager stated that decision making would be improved by stepping back and looking at the “bigger picture”. She felt that attention needed to be given to determining what would interfere with core services, like police and fire response, and critical infrastructure, such as water and power supplies. An emergency manager echoed a similar response. He believed a more systematic approach to decision making would produce better justifications. When asked how to make the process more systematic, he said by comparing the impacts of risks and the benefits of preparedness programs. He then admitted that the proverbial “elephant in the room” was how to measure these things. Specifically, he questioned, how does one measure losing less than what was actually lost? Another emergency manager shared this perspective. She pointed out that it is difficult to prove or to demonstrate that a specific preparedness activity had an impact or would have an impact if implemented.

Although not made in response to this specific question, one of the interviewees told a story about his institution’s recent evacuation efforts of researchers from Haiti. He said his department, the police department, was not consulted when the planning was being discussed. He was not critical of the decisions that were made but offered that he thought his office might have been able to assist the university with their evacuation planning efforts given the established professional relationships his department has with the State Department. Because he was unaware of the planning, that potential resource was not utilized.

As previously discussed, one of the more innovative ideas for informing the decision-making process was the use of GIS. Citing the oft quoted expression, "A picture is worth a thousand words," the emergency manager noted that the use of GIS was very effective in convincing decision makers to invest in certain projects because they were able to see the anticipated impacts a hurricane or an earthquake would have on the campus. His message was to use technology to show key decision makers how their decisions will impact the mission and core values of the institution using real, quantifiable data so that the decision makers can make optimal decisions. This same emergency manager noted that there are well-versed scholars within HEIs whose knowledge and experience could be leveraged to inform the emergency management decision-making process, as well as tackle some of the issues plaguing emergency management, but someone needs to bring the issues to the scholars so they could work on them. This response highlights a key benefit that HEI emergency management programs have over many towns, cities and states: resources that could apply academic knowledge and expertise to real-world problems to benefit the HEI, as well as the greater community. The other implied lesson in this example is that leadership is required to bring together entities that might not normally work together.

2. Noteworthy Practices

One emergency manager mentioned research being conducted by Professor Robin Dillon-Merrill,[2] at the Georgetown Business School, who is using decision analytics to examine decision making during critical incidents from a systems engineering approach. He thought that one of her projects was examining why people chose to evacuate, or not, during Hurricane Katrina and the relationship of this decision to the person's past experiences with hurricanes. The exact nature of Dillon-Merrill's research is not the significant aspect of his

[2] Professor Dillon-Merrill obtained her PhD in Industrial Engineering and Engineering Management from Stanford University, the same program from which Raha obtained his PhD.

point; rather, it is the idea of using a system engineering approach to emergency management decision making. His opinion was the field of emergency management has not matured to the point of using quantitative approaches to decision analysis.

The other interesting program comes from the University of Oregon which has a robust GIS mapping system. The Director of the Emergency Management program illustrated the power of GIS mapping for decision making with the example of plotting on a single overlaid map the location of research, the assessed value of the grant on which a given researcher was working, and building types. This integrated map showed visually where the greatest risk potential existed for the institution. This knowledge could be used to make mitigation decisions before a critical incident—such as reinforcing infrastructure or moving research to a different location. Or, this information could be used to inform preparedness decisions—such as making certain locations the priority for developing business continuity plans or training people in the buildings how to respond to certain situations. The other way in which this technology could be used is to allocate resources during an actual incident based upon pre-identified criteria—such as delivering a generator to a building where the value or criticality of the research being conducted is higher than at other places. The interviewee gave a specific example in which he had mapped out the location, diameter, and the types of trees on campus. When a high-wind advisory was issued, he was able to advise public safety officials ***prior to the incident*** that trees on campus were the ones that might be uprooted or have limbs break, thus creating a potential public safety hazard. Public safety was able to restrict access to those identified areas during the high wind event.

3. Summary of Findings

Of all of the questions asked during the interview process, this one generated the most interesting and diverse set of responses. The responses addressed the impact of experience on decision making; the need to educate

decision makers about available tools and resources; the need to expose decision makers to emergency situations and teach them how to make decisions during conditions of uncertainty; overcoming organizational culture and learned coping behaviors in order to make better decisions; collaboration as a tool for decision making; the importance of developing and using relationships to aid in decision making; the use of technology; using a systematic approach to decision making; understanding interdependencies; and the impact of organizational structure on decision making, specifically the need for an emergency management department.

Based upon the responses from the interviewees in this study, HEIs did not utilize any type of a structured decision-making process to determine which preparedness activities to pursue. Several of the interviewees indicated that their respective HEIs used risk assessment methodology to identify threats, hazards, and consequences and that these assessments informed decisions about which risks to address, but the specific ways in which risk assessments were used to inform decision making—including which risks to address or how to address them—were not explored in any detail. Other than risk assessment methodology, the majority of the HEIs did not report utilizing any type of an analytical tool for evaluating the preparedness alternatives that might address the identified risks. Why? No one was aware of a tool that performed this function. There were two exceptions to the blanket statement: cost-benefit analysis and GIS mapping. Neither of these alternatives completely addresses the issue of how to evaluate preparedness alternatives, but they do represent a more structured approach to decision making compared to decisions being made based upon conversation and consensus. No one mentioned the STAPLEE cost-benefit ***review*** tool, which incorporates non-monetary criteria such as political and environmental impacts into the evaluation.

Opinions about the practicability of using, not to mention developing, an analytical tool for evaluating preparedness activities were less than optimistic. The opinions which were offered were unsolicited, so it is possible that others

might have had more optimistic opinions if they had been asked. The downside of not endeavoring to create such a tool is that individuals will resort to using judgment and intuition to make these decisions. Decision research has shown the individuals do not necessarily make optimal decisions. Group-think and individual biases, such as the status-quo bias and the anchoring bias, are among the numerous ways in which psychological factors contribute to less than optimal decisions being made.

In summary, the research questions did not illuminate a process for optimizing preparedness decision making. What the research did reveal was a broad array of opinions about the way in which decisions can and should be made. Some interviewees advocated for standards and a systematic approach to decision making and others believed the decisions about preparedness should be made on the basis of what seems reasonable or logical without the need for tools.

E. DECISION-MAKING CRITERIA

Two questions were posed to interviewees to determine the criteria being used to make pre-incident emergency management decisions: What criteria do you think decision makers use when deciding which preparedness activities to pursue? What criteria do you think decision makers ***should*** consider when deciding which preparedness activities to pursue? Additionally, the question about institutional values will be included in this section. The specific two-pronged question that was asked was: “How does the institution define its core mission? And, what are the institution’s core values? The format for this section will be to list the question followed by the associated responses. Included in the analysis are responses made to previously asked questions if the responses seemed relevant.

1. What Criteria Do You Think Decision Makers Use When Deciding Which Preparedness Activities to Pursue?

One emergency manager stated, “Honestly, they rely upon my recommendations.” Another stated, “I have no idea.” Another interviewee offered that there is a tendency to respond to a sense of urgency brought on by a crisis or event, even external to the institution, that points to a vulnerability. This sentiment was shared by several interviewees. Although not in response to this question, one interviewee noted that she keeps prepared proposals in her desk drawer and presents them within two months of a significant incident because decision makers tend to be more receptive and more apt to allocate resources (spend money) in the wake of an incident, even if that incident did not take place at the given institution. Although not expressed directly, the unspoken criterion illustrated by this example is the idea that a perception of vulnerability, often brought about by a recent activity, impacts decision making.

More than half of the respondents mentioned institutional reputation and branding as being factors in the decision-making process. Money was also mentioned as a deciding factor by most of the respondents. One person pointed out that local, state, and national politics influenced the decision-making process as did the “disaster of the day.” She added that sometimes her boss was the gatekeeper about what was pursued, and sometimes she was the person who decided what was a reasonable use of her time and efforts. One Chief of Police noted that priorities are not the same for academicians and police, which leads to conflict and a lack of mutual understanding.

A risk manager offered that decision makers took into consideration the expectations that would be needed to manage a minimal program (in the broad sense of the word) as well as generally accepted norms. She also mentioned that the expectations that emerge from high-profile public events impact decision making. She cited that in the post-Virginia Tech world, the expectation has become that a HEI will have a mass notification system. Like other interviewees, she mentioned money as a determining factor, but she specified that decisions

were made based upon an individual's perception of how much a program could be advanced with a given amount of money as opposed to any calculated return on investment.

A couple of respondents stated that decision makers focused on preparing for the most likely incidents. One of the schools in this study was located in a hurricane-prone zone, and it was clear from the interviewee's responses that the likelihood of hurricanes and flooding were viewed as being real and likely threats. As a result, there was an institutional commitment, measured by resource availability and time spent preparing, to address mitigation and preparedness efforts around flooding and wind damage.

Although not in response to this specific question, one interviewee noted that the university had engaged a consulting firm to conduct an enterprise-wide risk assessment in order to reduce insurance premiums. This example illustrates that a specific outcome, reducing insurance premiums, was a criterion for investing resources in pre-incident emergency management activities. This same emergency manager, also not in response to this direct question, mentioned that in anticipation of Y2K and then again in the wake of September 11, there was a big push by the institution to focus on emergency management planning, including business continuity planning. After a period of time, the interest waned. The phenomenon of waning interest after an incident or anticipated incident has passed was mentioned by several interviewees in response to various questions.

One individual spoke about the need to understand the values of the decision maker and his or her priorities. She commented that through trial and error she had figured out that her boss was much more apt to approve requests for physical items as opposed to requests for additional people. Once she figured this out, she adjusted her requests accordingly. Along these same lines, another noted that a criterion was something that provides significant value of protection for the cost. This emergency manager went on to note that when presenting a proposal to a decision maker, it is important to try and provide some

sense of value so that the decision maker can justify the expense. He stated that it is difficult to put a value on life or days of school/work missed, repair costs, or damage costs, so he felt decisions were influenced by what other institutions were already doing as well as the potential for negative publicity for not having something in place, especially if other institutions had a particular program in place.

Another respondent stated, “Cost is the first parameter. Senior administrators will tell you safety and security is foremost, but it is really more about brand management and media relations. Liability is third.” This same respondent noted that there seems to be a different weighting scale used during an exercise than during an actual incident. He believed that liability was thrust to the forefront during an exercise and was not the foremost consideration during an actual incident.

Although not in response to this question, one respondent indicated that the President of his university had a close relative who experienced Hurricane Katrina firsthand. He felt the President’s personal experience with a significant disaster, even if it was an indirect experience, had shaped the President’s decision making about the value of being prepared. He also noted that the institution had prepared for several large-scale, planned events, which shaped the institution’s preparedness and planning for other types of events and created a commitment to planning. The implication is that the pending nature of an event influences decision making as does personal experience.

Compliance with mandates and compliance with terms of a grant were mentioned as factors decision makers consider when deciding which programs and initiatives to pursue.

In summary, a wide variety of considerations were offered by the respondents, most of whom were not in the position to make funding decisions, about the criteria decision maker’s used when deciding which preparedness activities to pursue. Money was an obvious consideration as was branding and

reputation; focusing on likely threats; addressing those risks that could be addressed with given resources; planning for pending and known events; impact of past events; liability or perceived liability; perceived value of engaging in a certain activity; and what other institutions were doing to be prepared.

2. What Criteria Do You Think Decision Makers *Should* Consider When Deciding Which Preparedness Activities to Pursue?

As with the previous question, responses to this question were diverse. One interviewee's response was "Use common sense. We can all see what is real and what is not. Don't come back and ask me to show or prove why a certain project is worth X amount of dollars….Use empathy, caring, sensitivity, concerned understanding, not money." Another respondent stated that the amount of risk an institution is willing to take should be communicated by decision makers. Several persons mentioned the value of conducting risk assessments, identifying the most serious risks and systematically reducing those risks. One respondent stated hard data should be considered, such as prior flooding or the number and severity of hurricanes. Along this line of thinking, another emergency manager cautioned against chasing the "hazard dejour" and encouraged looking at a risk based decision analysis model that looked at the likelihood of an event; the risk exposure; and the cost of action and the cost of inaction. Another person offered that the institution would benefit by determining where interdependencies exist, especially with respect to critical infrastructure.

One interviewee spoke about using NFPA 1600 standards as well as the EMAP accreditation standards as benchmarks. Another spoke about developing a strategic plan with subject matter experts and key decision makers and then working towards accomplishing the plan. She mentioned the tendency to address the "low hanging fruit" while ignoring the "elephants in the room," such as critical infrastructure interdependencies, because these more complex problems tend to be overwhelming and they also tend to be outside the sphere of control of one person or one department.

In summary, there was a diverse array of suggestions. There seemed to be a desire on the part of the respondents to have a clearer, more defined picture of expectations and to have specific goals or objectives towards which to work. Some felt it was not possible, or at least it would be difficult, to quantity and measure the impact of preparedness activities on risk, and others thought more sophisticated analysis was needed, especially to show interdependencies.

3. How Does the Institution Define Its Core Mission? And, What Are the Institution's Core Values?

The responses interviewees gave to these questions mirrored the institution's mission and value statements as found on their institution's respective Web sites. In reviewing the various Web sites, most of the HEIs had well-developed mission and vision statements and several even had institutional strategic plans. For purposes of illustrating the types of concepts contained within a HEI's mission statement, the University of Oregon's mission statement has been cited:

- a commitment to undergraduate education, with a goal of helping the individual learn to question critically, think logically, communicate clearly, act creatively, and live ethically
- a commitment to graduate education to develop creators and innovators who will generate new knowledge and shape experience for the benefit of humanity
- a recognition that research, both basic and applied, is essential to the intellectual health of the university, as well as to the enrichment of the lives of Oregonians, by energizing the state's economic, cultural, and political structure
- the establishment of a framework for lifelong learning that leads to productive careers and to the enduring joy of inquiry
- the integration of teaching, research, and service as mutually enriching enterprises that together accomplish the university's mission and support its spirit of community
- the acceptance of the challenge of an evolving social, political, and technological environment by welcoming and guiding change rather than reacting to it

- a dedication to the principles of equality of opportunity and freedom from unfair discrimination for all members of the university community and an acceptance of true diversity as an affirmation of individual identity within a welcoming community
- a commitment to international awareness and understanding, and to the development of a faculty and student body that are capable of participating effectively in a global society
- the conviction that freedom of thought and expression is the bedrock principle on which university activity is based
- the cultivation of an attitude toward citizenship that fosters a caring, supportive atmosphere on campus and the wise exercise of civic responsibilities and individual judgment throughout life
- a continuing commitment to affordable public higher education. (University of Oregon, n.d.)

The following is a sampling of mission statements pulled from other HEI Web sites:

> The University was founded on the principle that serious and sustained discourse among people of different faiths, cultures, and beliefs promotes intellectual, ethical, and spiritual understanding. We embody this principle in the diversity of our students, faculty, and staff, our commitment to justice and the common good, our intellectual openness, and our international character. (Georgetown University, n.d.)

> Its object, to qualify its students for personal success, and direct usefulness in life; And its purposes, to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness. (Stanford University, 2010)

Concepts iterated in the mission statements of several other HEIs included: create a sense of human solidarity and concern for the common good; teach students to think critically, objectively, and creatively and to be lifelong learners, engaged leaders and productive citizens; pursue research to advance knowledge and to address state, national and global challenges; serve the public through the generation, broad dissemination and application of knowledge; and cultivate a diverse community of learning and discovery that produces leaders

across the spectrum of human endeavor. In addition to values embedded within the mission and vision statements, several HEIs specified their values in separate institutional value statements. Some of these values included: diversity, excellence, collaboration, innovation, integrity, respect, and accountability.

Interviewees were not specifically asked how the mission, vision, and values of the institution impacted decision making, but several interviewees made spontaneous statements. One commented that performance appraisals centered on the institution's values, but he was not certain if the institution's espoused values drove the decision-making process for emergency management. He was not willing to state that the decisions were not in line with the values; rather, it was not clear to him that the espoused values were consciously considered during the decision-making process. Another stated that proposals for program or project funding had to demonstrate that the program or project fulfilled the institution's mission. Another respondent expressed some mild criticism that the university's actions did not seem to resonate, at times, with the espoused values. Another person offered a similar perspective in that she felt that the decisions that were made were likely in line with the institution's values, but they might not have been made in order to be in line with those values.

In summary, the mission and values of the HEIs represented in this study shared the common goal of education, which was expressed using different words, as well as broader goals such as conducting research that improves the human condition. Values included concepts such as citizenship, ethics, and tolerance of diversity. Institutional values were explicitly used to guide the emergency management decision making at a couple of the HEIs in this study and perhaps implicitly by others, although that is not certain.

F. BARRIERS TO PREPAREDNESS

In terms of barriers to achieving greater preparedness, responses were varied to the question: What are the barriers to reaching a greater level of preparedness?

Money; time; constrained resources (people and equipment); executive attention; competing priorities; lack of leadership; human tendency for denial; and a lack of a common understanding of exposures were mentioned. One person commented that there is never enough time to work on strategic initiatives because there is always a pressing matter with which to deal. With respect to leadership, one respondent stated that the absence of clear directives and leaders to direct the process sometimes lead to a lack of follow through because people assumed someone else was taking responsibility. She also commented that there is a need to get leaders and middle managers to view emergency management as an institutional responsibility.

Several interviewees stated that the effectiveness of a presentation made to senior administrators was a determining factor, making the decision more about the effectiveness of the sales pitch and less about scientific rigor. One emergency manager felt there was a lack of institutional guidance, which resulted in departments undertaking their own efforts, which sometimes equated to no efforts because people were not sure what to do or what was expected. One risk manager spoke about the tendency to plan for the short-term rather than the long-term.

One barrier to preparedness that seems patently obvious from the responses, but was only mentioned directly by one individual in response to this specific question, is the lack of a clear definition of preparedness and the lack of criteria to measure preparedness. As this one person stated, “It hasn’t been defined, so it can’t be measured.” Given the myriad definitions of preparedness that exist coupled with the broad spectrum of potential risks for which an

institution might prepare, it is not completely surprising that institutions have not defined preparedness. It is challenging, however, to make optimal decisions in the absence of a clearly defined, desired end-state.

Although not in response to this question, a police chief made the following comment about risk assessments:

> I hope you have a lawyer in the room. My concern is that once you have identified the risk, then the institution is on notice. There's a huge difference between knowing about a risk and doing nothing to mitigate it and not knowing that a risk exists.

Concerns about liability surfaced in several areas. This same chief also noted that a lack of collaboration had a negative impact on preparedness. Specifically, she stated that different departments are all competing for the same limited pool of money. She thought it would be more effective if groups came together, decided upon strategies and priorities, and worked together to tackle projects that would benefit the institution.

In summary, those familiar with emergency management at HEIs identified a variety of potential barriers to enhanced levels of preparedness. Organizational barriers included: limited resources (people), competition for constrained resources, a lack of collaboration, and a lack of clarity regarding roles and responsibilities. Strategic barriers included: the need for leadership and executive attention, a lack of understanding of institutional interdependencies and exposures, and a tendency to make decisions using a short time horizon rather than focusing on longer term planning. Process barriers included: a lack of specific objectives and desired outcomes; the lack of a structured process for making decisions, especially a process based upon scientific rigor and data; and a tendency to make decisions in response to recent events or from a place of denial regarding the potential for events to occur as well as the impact of those events.

G. CHAPTER SUMMARY

In order to discover how to better evaluate proposed emergency management preparedness activities specifically at HEIs, this research sought to understand how HEIs are currently making these types of decisions as well as the ways in which individuals who are familiar with the field of emergency management at HEIs believe the decision-making process could be improved. It was assumed that several factors would influence how and what decisions were made. This research focused on four areas: organizational structure, strategic planning, decision-making processes, and decision-making criteria, including institutional values. The following is a summary of the general findings reviewed in this chapter.

With respect to organizational structure, the research revealed that organizational structure influenced decision making insofar as the structure determined who was involved, or not involved, with the decision-making process, but there was no indication from this small sample population that a particular organizational structure contributed to optimal decisions being made. The emergency preparedness guidance literature specific to HEIs recommends that representatives from various stakeholder groups within the HEI be included in the planning process. Stakeholders would include faculty, staff and students as well as representatives from different functional groups such as police, fire, emergency management, environmental health, and safety and senior administration. Most of the HEIs had emergency management committees, but the composition varied as did the function of the emergency management committee. Institutional clarity regarding roles and responsibilities for off-campus facilities and branch campuses was lacking. Clarifying these roles would enhance institutional knowledge.

With respect to strategic planning, the research showed that only two of the 10 HEIs engaged in a strategic planning process that resulted in a strategic plan being developed and available for public viewing. It was not clear if these plans contributed to optimal preparedness decisions being made, but the plans

did contain a level of specificity regarding goals and objectives that, if followed, would likely contribute to enhanced levels of preparedness.

With respect to decision-making processes, none of the HEIs indicated they engaged in any specific type of structured decision-making process. Rather, decisions seemed to be made based upon consensus or by a decision maker in response to a presentation that had been given on a specific program or project. No one was aware of a tool for evaluating preparedness alternatives. Opinions about the potential value and effectiveness of an analytical tool that would enable this type of an evaluation were mixed, although this finding was based upon statements made spontaneously and not in response to a specific question. A couple of individuals indicated the field of emergency management would benefit from a more systematic approach that capitalized upon science and technology. Others thought that the level of uncertainty associated with emergency management preparedness planning made it challenging, if not unrealistic, to apply a formalized decision-making process and expect that it would produce decisions that were any more optimal than the way in which decisions are made without such a tool.

In terms of decision-making criteria, responses were diverse. Money was an obvious consideration as was branding or reputation. Other criteria included: focusing on likely threats; addressing those risks that could be addressed with given resources; planning for pending and known events; impact of past events; liability or perceived liability; perceived value of engaging in a certain activity; and what other institutions were doing to be prepared. Several of the HEIs indicated that the institution's values were intentionally considered when making preparedness decisions, others were not certain and still others did not believe these values were considered.

In summary, the results of this research did not reveal any definitive organizational structures, strategic planning practices, decision-making processes, or decision-making criteria specific to HEIs that would lead to optimal preparedness decisions being made, but aspects of what was uncovered could

be incorporated into a framework that would enable decision makers to evaluate preparedness alternatives in order to make optimal decisions. Several interesting ideas—such as the use of GIS, having a faculty member manage the emergency management program, and structuring an emergency management program around ESFs—were discovered that might of interest to other HEIs even if they were not incorporated into a process for evaluating preparedness alternatives. Integrating the results of this study with the information gleaned during the literature review, the following chapter will present a rudimentary framework for evaluating emergency management preparedness alternatives developed by blending traditional decision analysis methodologies with Raha's 2010 concept of starting the decision-making process by clarifying intrinsic values and building a value diagram.

V. DECISION ANALYSIS

A. OVERVIEW

This chapter presents a rudimentary framework for evaluating pre-incident emergency management preparedness activities. The framework was developed using decision analysis concepts and is based upon the information gathered during the course of the research combined with aspects of the researcher's personal knowledge about emergency management and the way in which a HEI functions. This chapter will address the following questions:

- Using value diagrams, how might we clarify the value frame in emergency decision making?
- How might we create decision diagrams that are consistent with a value diagram and could possibly be shared across different emergency management contexts?
- How might we get clarity of action on a specific emergency mitigation decision?

B. VALUE DIAGRAMS

For purposes of illustration, the value diagram of Stanford University's President (Figure 15), which was presented earlier, will be used as the starting point for illustrating the way in which a value diagram could be used to clarify the value frame in emergency decision making, as well as how to create a decision diagram that is consistent with a value diagram (2010). As a reminder, Raha created this diagram after interviewing the President of Stanford University. The fundamental or intrinsic values that guided the decision making of the university president were: education, lack of trauma, and lack of coercion.

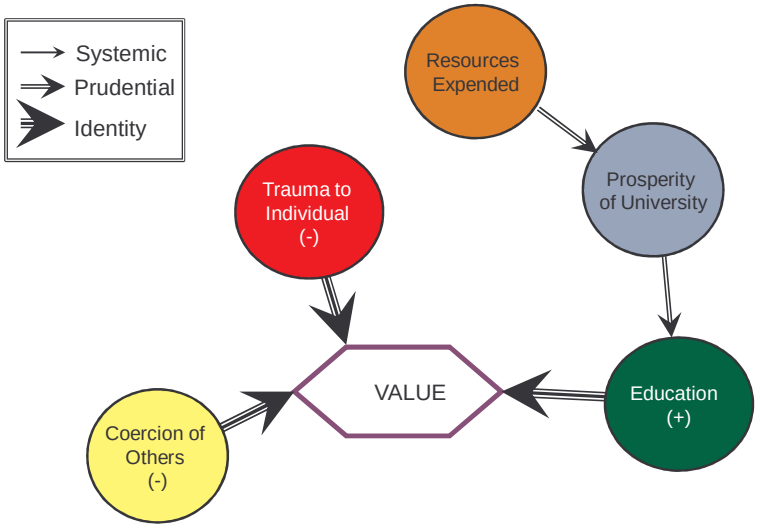

Figure 15. University Decision Maker's Value Diagram (After Raha, 2010)

Based upon the responses provided by the interviewees in this research project, the fundamental values of an emergency management program at a HEI could be considered to be: to protect lives, to protect property, and to preserve the institution's reputation. If these were to be determined to be intrinsic values for a HEI, the institutional value diagram would appear as follows (Figure 16):

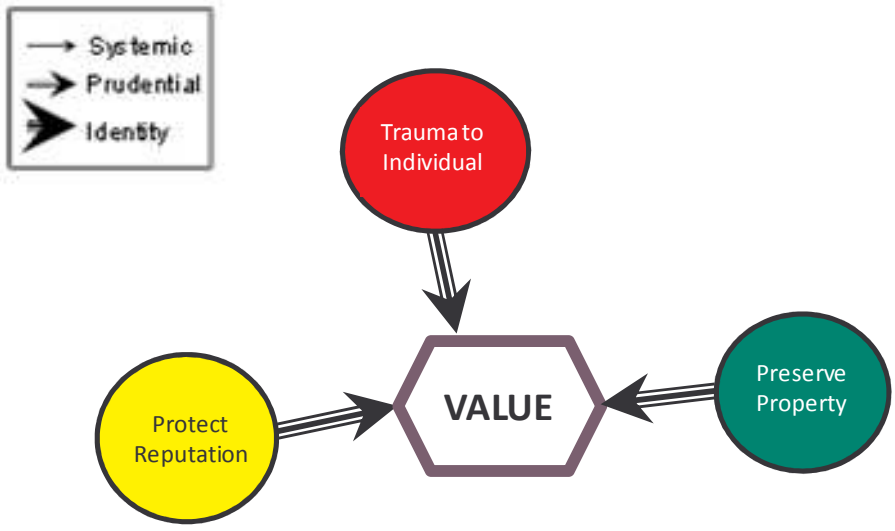

Figure 16. Conceptual Value Diagram for HEI Emergency Management

C. BUILDING A DECISION DIAGRAM FROM A VALUE DIAGRAM

This section will illustrate how to build a decision diagram from a value diagram. For simplicity, one branch of the value diagram shown in Figure 15 will be expanded. Raha (2010) calls this process "unpacking a node." The node, which will be "unpacked," will be the one titled "prosperity of the university." In Figure 17, the blue circles represent the ways in which the prosperity of the university takes place. Donations (development), student tuition, portfolio performance, and grants from sponsored research are some of the major ways in which the prosperity of a university can be created. These examples are not exhaustive and could be altered by a more thorough analysis. Following in the spirit of Raha's "rules" for drawing value diagrams, only intrinsic value nodes may directly contribute to value.

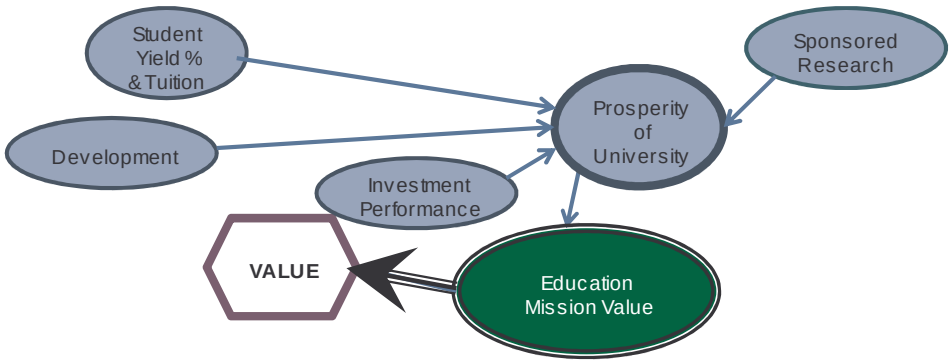

Figure 17. Value Diagram to Decision Diagram—Prosperity of the University

The next diagram (Figure 18) shows the ways in which the prosperity of the university can be impacted, primarily through major expenditures such as business operating costs (salaries, contracts, utilities, etc…), building construction, maintenance, and liability. Facilities could be included within the business operating cost node but was purposefully listed as a separate node because of an influence that will be seen in the next diagram. Building upon the original value diagram, the "cost nodes" are shown in orange.

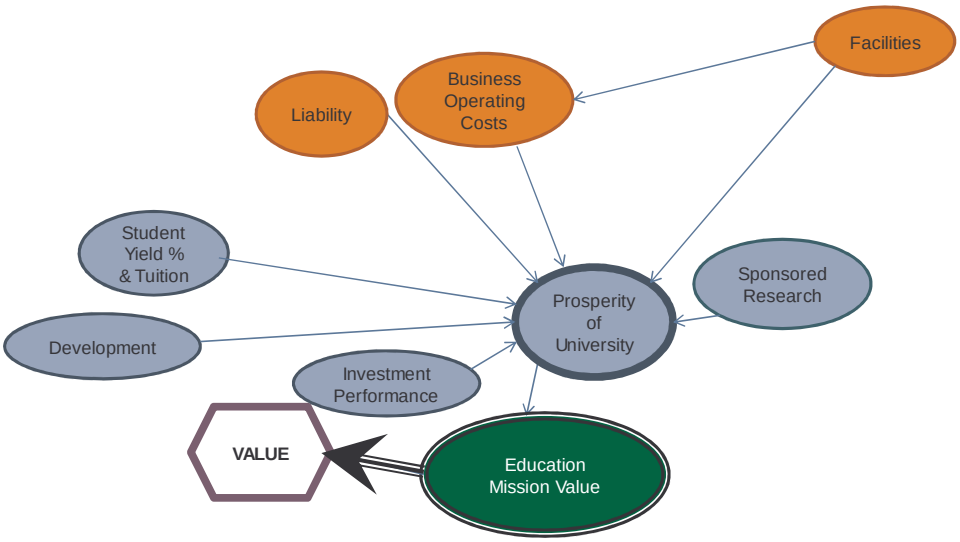

Figure 18. Value Diagram to Decision Diagram—Expenditures

The next diagram (Figure 19) shows the way in which perceptions might impact outcomes. Reputation was mentioned by several of the individuals interviewed as part of this research project as a factor that decision makers either use or should use when making decisions, so it was specifically included in this diagram. Upon reviewing the diagram, a senior level administrator added "perception of safety" as a consideration distinct from reputation. He stated that the perception of safety was a factor that influenced students and their parents when they were deciding between elite universities, which, in turn, impacted the student yield percentage, which, in turn, impacted the prosperity of the university. This distinction might not be included in another decision maker's diagram. The point was raised that the perception of safety also influenced some faculty members' decisions to accept an offer of employment at one institution over another. Because people often think "crime" when they hear the words "safety," it is worth noting that at least for some individuals, safety also includes safety from natural disasters. Perceptions are shown as olive green nodes.

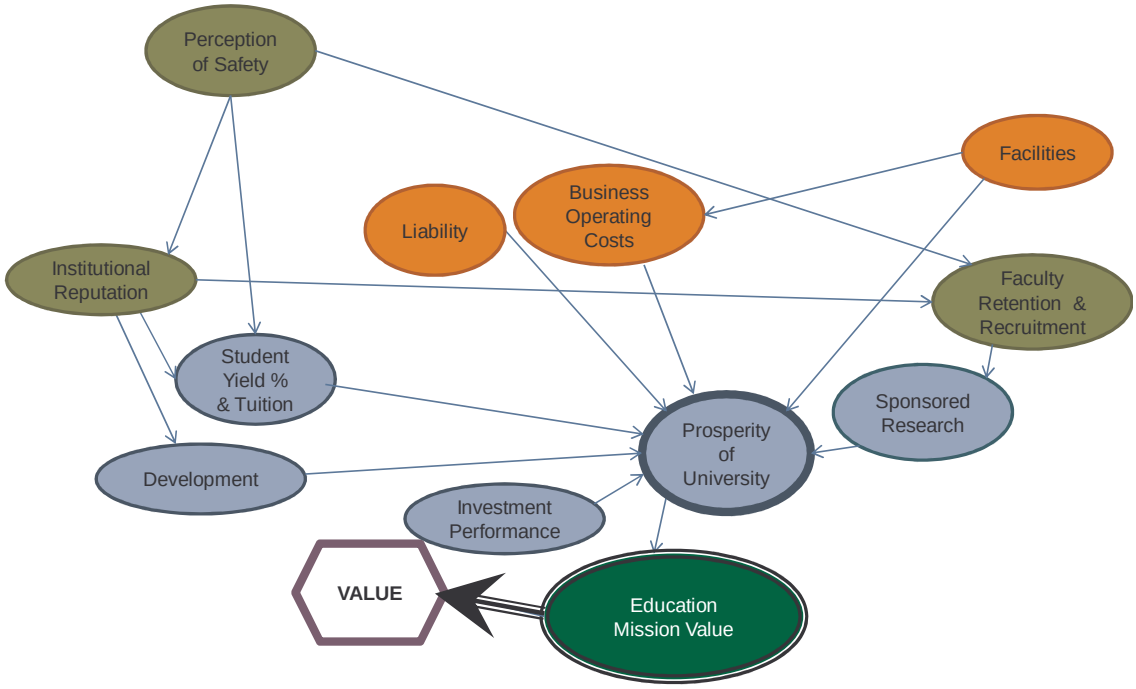

Figure 19. Value Diagram to Decision Diagram—Reputation and Perception

The precipitating critical incident and traumatic outcomes have been added to the diagram in Figure 20. It is also worth noting that a distinction was not made initially between natural disasters and man-made incidents, but as the diagram evolved, it became clear that a distinction was warranted. For example, there might be different values attached to the perception of safety in connection with the threat of an active killer situation as compared to the threat of an earthquake. Another refinement to the conceptual decision diagram that occurred after the inclusion of the critical incident is that the facilities node was altered to represent facilities damage. The rationale for this change is that the quality and type of facilities can impact faculty recruitment, especially in the sciences where lab space is important. If a faculty member is deciding between two institutions, the type of facilities available to her could be a determining factor in her decision. Conversely, in the wake of a disaster, especially one that results in significant damage that might not be readily repaired, an institution risks losing faculty members to competing institutions. The loss of faculty members has potential

consequences including: costs to fill the position, loss of sponsored research, and the impact on student yield rates. With respect to the latter, some students decide which educational institution to attend based upon whether a specific faculty member is employed by the HEI or not. If a faculty member elects to leave one HEI for another, some students (namely graduate students) may follow. Many institutions care about the quality or caliber of students in addition to the number of students. Thus, damage to facilities can have an impact on the quality of research or teaching. The diagram shown in Figure 20 also adds a value dimension to measure the intrinsic value of the quality of education. This distinction came about after discussions with a Provost about the quality of education as compared to the mission of education. Such a distinction might not be necessary depending upon the HEI for which the model is being developed.

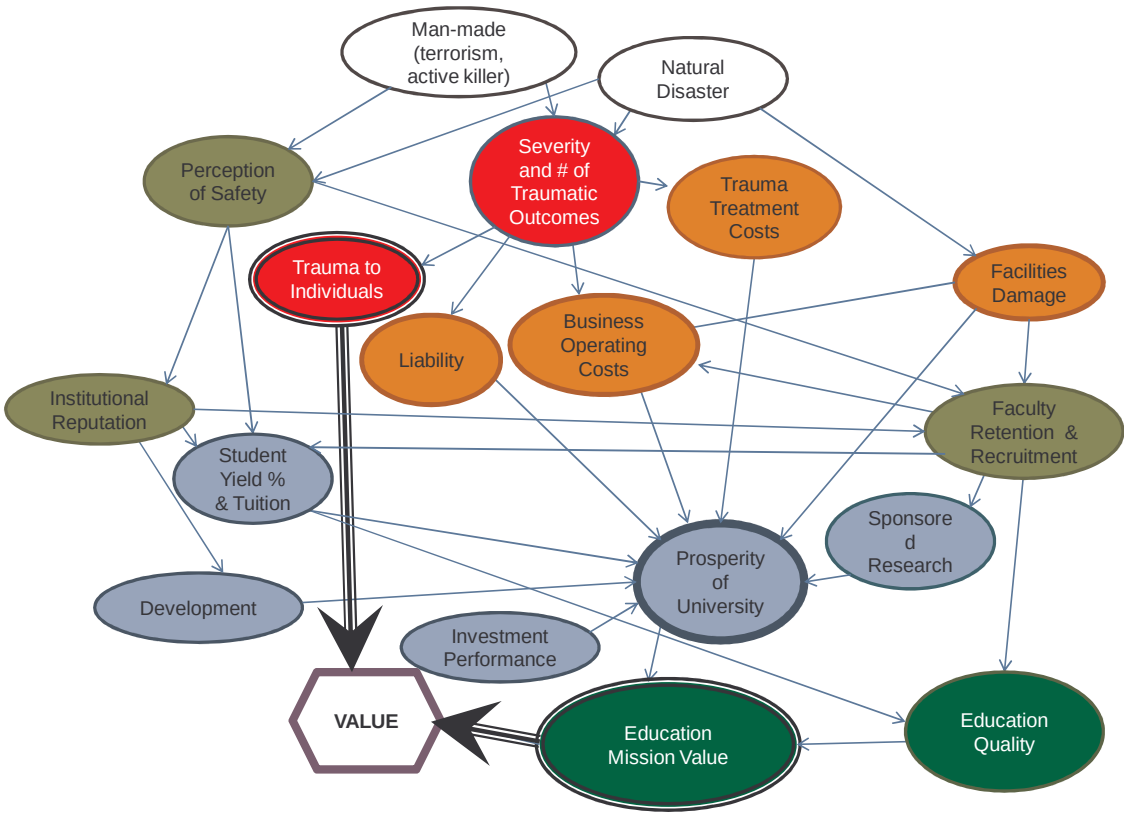

Figure 20. Value Diagram to Decision Diagram—Precipitating Emergency Event and Trauma Impact

In the aforementioned diagram (Figure 20), it is important to point out the distinction between the "# and severity of traumatic outcomes" and "trauma disvalue." The "# and severity of traumatic outcomes" is a prudential or systemic value that can be quantified using commonly accepted practices. For example, severity could be measured by hospital treatment costs per injury. This node could be further refined to indicate hospital costs for trauma and the cost of the loss of a life. This node could be refined even further to represent the costs covered by insurance and costs not covered by insurance. "Trauma disvalue," on the other hand, is the amount of money a decision maker would be willing to spend in order to prevent someone from being injured. This value would be based upon a personal preference, which in this case is being shown as an intrinsic value. This attribute might appear to be nonsensical to some, but people make these types of financial tradeoffs unconsciously all the time. Consider, for example, that individuals are often willing to pay hundreds of dollars over the face value of a concert ticket in order to be able to see their favorite musical artist perform from the front row seats. Similarly, people pay more for a home or a hotel room that has an ocean view compared to a home or hotel room in the same vicinity that does not offer the attractive view. The value of these trade-offs is in the mind of the decision maker. What is intriguing about including a node for an intrinsic value in the decision diagram is that it provides a mechanism for measuring factors that are often hard to measure—such as quality of education, or the political costs of a decision or the social value (or disvalue) of a decision or the value of knowledge. Granted, some might balk at the idea of reducing these types of considerations to dollars. The school of decision analysis from which Raha (2010) received his education argues that reducing trade-offs to a common variable (money) forces a decision maker to examine what really matters.

The next diagram (Figure 21) is intended to illustrate the idea that the purpose of a preparedness or mitigation tool or program is to influence the system. To keep the original value diagram developed by Raha (2010) intact, the coercion disvalue has been added to this diagram.

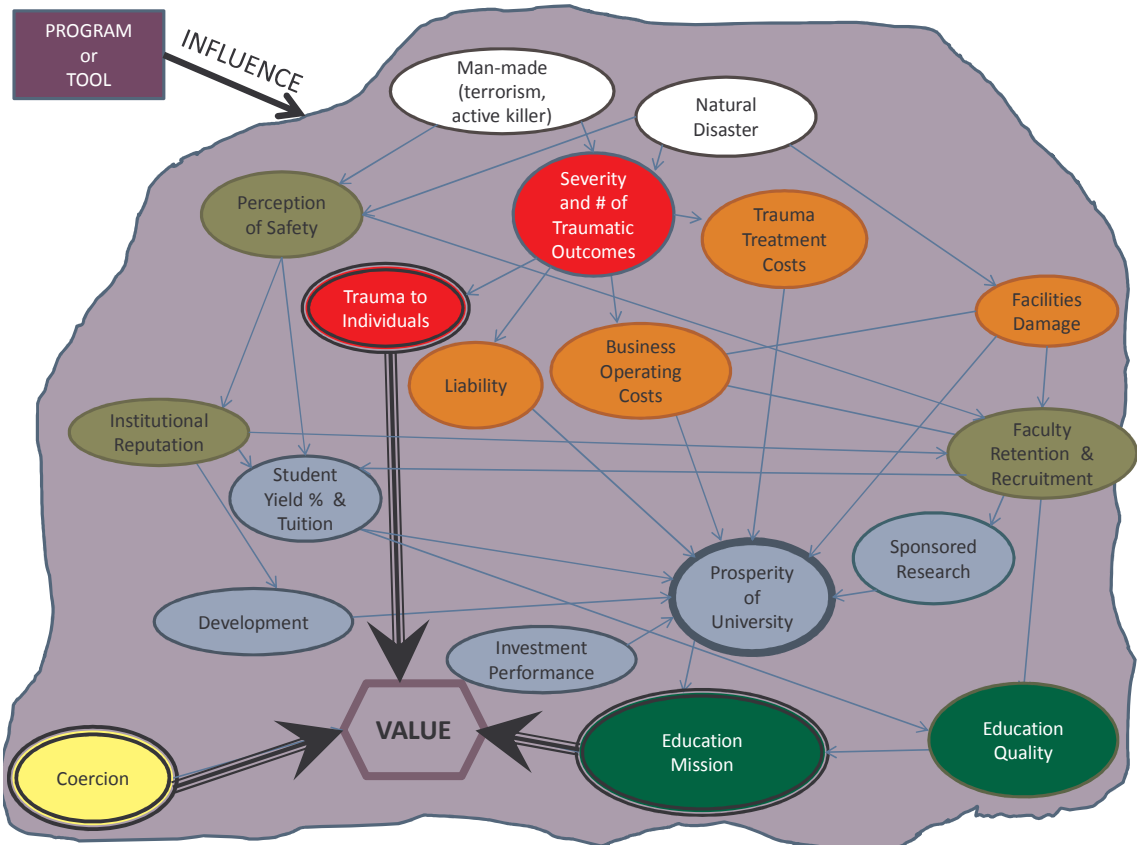

Figure 21. Value Diagram to Decision Diagram—Impact of Intervention on System

The next diagram (Figure 22) represents specific ways in which a program or tool might impact the risk (threat, vulnerability, and likelihood) of a critical incident. Depending on the tool, there could be additional factors that could be added or factors that are no longer relevant and could be removed.

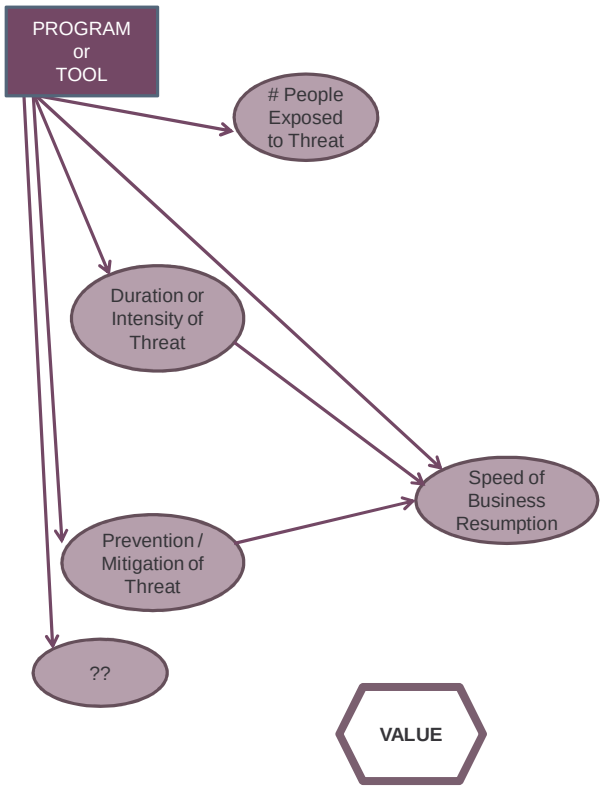

Figure 22. Value Diagram to Decision Diagram—Impact of Intervention Tool

Blending the diagrams in Figure 20 and Figure 22 produces the conceptual diagram shown in Figure 23. The lines illustrating the influence of the tool have been drawn thicker in Figure 23 to highlight their effect. In this example, the tool is expected to impact the number of people exposed to risk, which, in turn, impacts the number of people who might be injured, which, in turn, impacts liability claims, which ultimately impacts the prosperity of the university. A similar effect might be expected with respect to the tool having a mitigating effect on the impact of a critical incident, which ultimately impacts the prosperity of the university, which ultimately impacts the ability of the university to perform its fundamental mission of education. What should be apparent is that the visual diagram captures the interconnectedness of decisions much more effectively

than a written description. Additionally, the process of developing the decision diagram can facilitate discussions about connections, interdependencies, and influences.

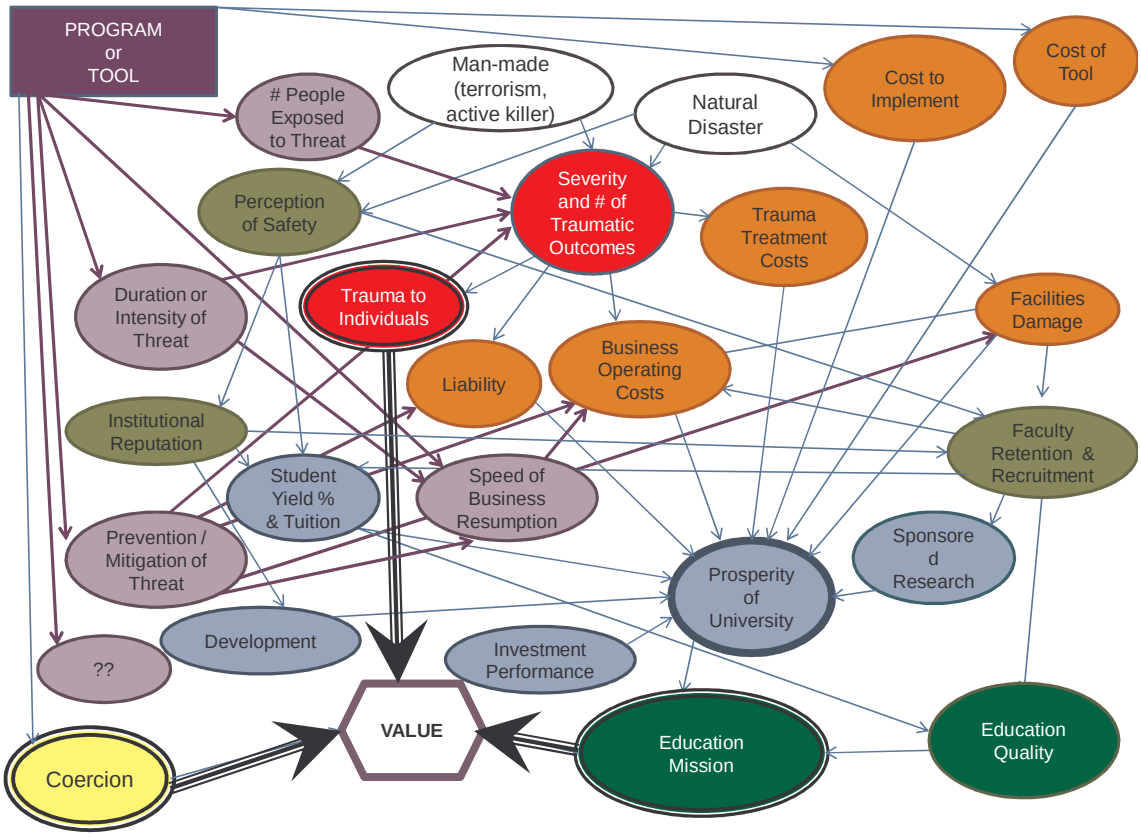

Figure 23. Value Diagram to Decision Diagram—Impact of Intervention on Value

A decision maker could focus solely on costs without the intrinsic nodes—coercion disvalue, trauma disvalue, and educational mission value—which would result in the conceptual diagram shown in Figure 24. Note that the value being determined in this model is the prosperity of the university, which is not unlike determining profit for a business.

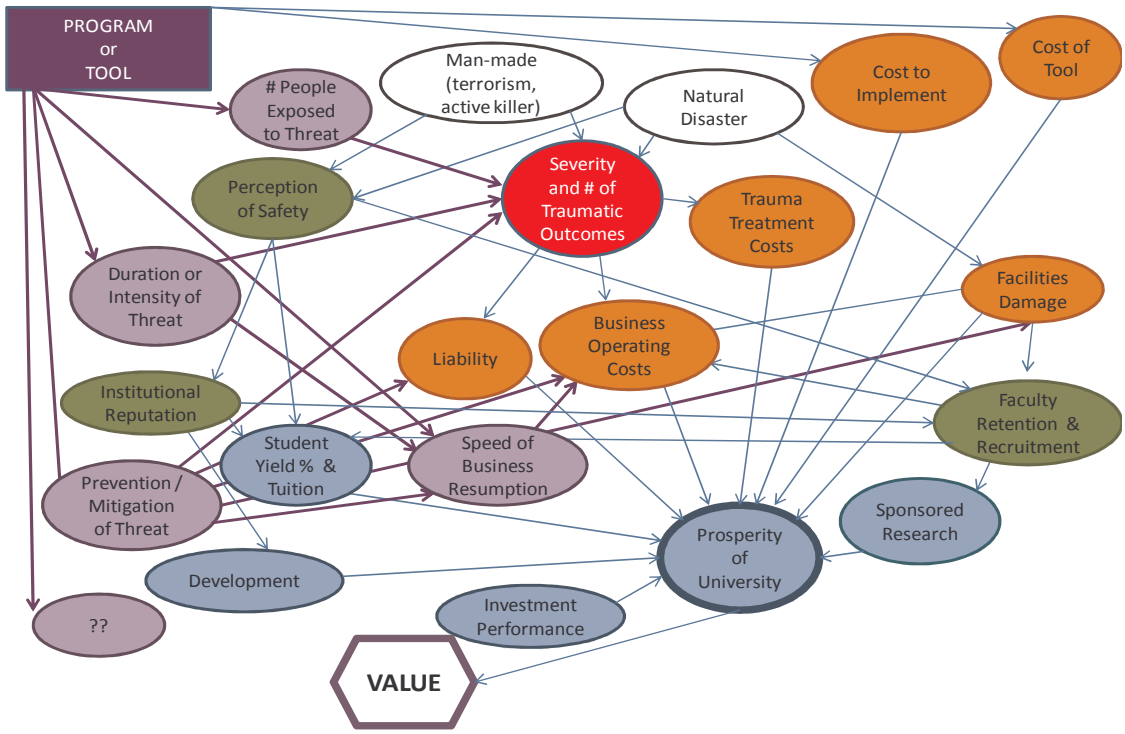

Figure 24. Decision Diagram without Value Attributes

The conceptual decision diagrams that have been shown thus far are quite complex and they do not adhere strictly to the formal principles of decision analysis for drawing and building decision diagrams; they could, however, be converted into true decision diagrams by following these axioms and verifying accurate decision analysis notations have been used. For purposes of illustrating how decision analysis could be used to evaluate preparedness alternatives, a simplified example (Figure 25) will be referenced throughout the remainder of this chapter.

D. EVALUATING ALTERNATIVES

1. Framing the Decision

Most of the interviewees in this study mentioned saving lives as a fundamental desired outcome of emergency management. Using a reduction in

trauma as the desired outcome, the decision represented in Figure 26, which does not yet include the “trauma disvalue node” seen in Figure 25, can be summarized by the question: “Using trauma as the predominant measurement criterion, what is the value of emergency management intervention Y?” Included in the decision is the probability (uncertainty) that a given event will take place, which is represented by the node titled “Emergency,” and the probability that trauma will be reduced by the intervention, which is represented by the node titled “Success|Intervention.” “Success|Intervention” stands for “success given the intervention.” Also included in the decision is the price of the tool, which is represented by the deterministic node “price of the tool.” The node “implementation cost | intervention” represents the cost to implement the tool. This node could be calculated using the salary data of those involved with the implementation and any “hard” costs such as computers or other physical resources. The questions contained within the diagram are as follows: What is the probability of a given emergency taking place (“emergency”)? If that emergency takes place, what do we believe about the distribution of serious injuries (# traumatic outcomes”)—would they be high, medium, or low (and we could put numbers on each)? Given a level on the number of injuries, what are the likely treatment costs (“trauma treatment costs”)? To decide whether to invest in a given intervention, the price of the tool and the cost of implementation must be determined. And finally, taking all of these considerations into account, what is the value of the intervention?

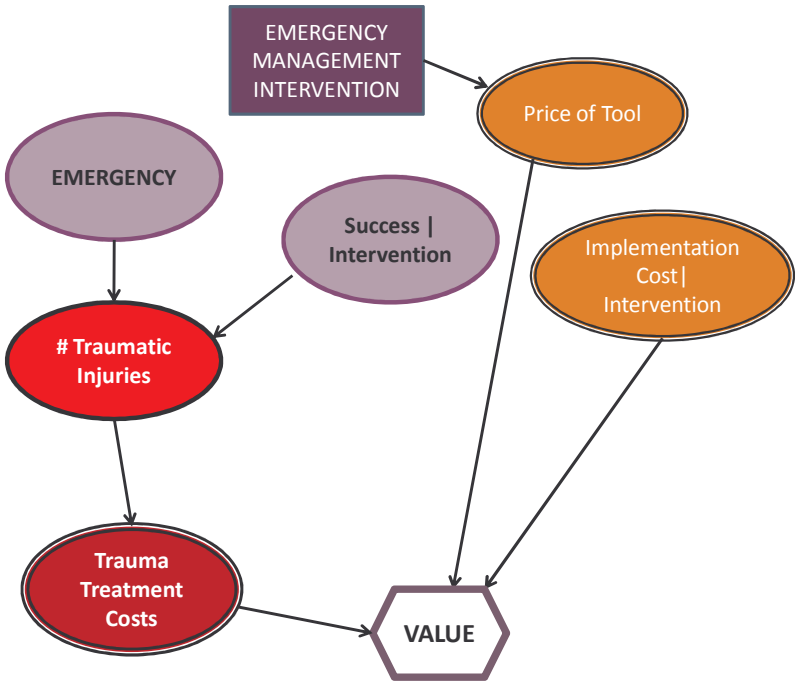

Figure 25. Emergency Management Intervention Decision Diagram without Value Attribute

Figure 25 illustrates a decision based solely upon cost. What impact does an individual's intrinsic value on trauma to others have on this decision? As previously mentioned, individuals are often willing to pay hundreds of dollars over the face value of a concert ticket in order to be able to see their favorite musical artist perform. The value of the ticket is not the purchase price, but the most that the purchaser is willing to pay for the ticket. Applying this line of thinking to the emergency management decision being examined, a decision maker might have strong personal feelings about preventing harm to others. His feelings about this issue could be so intrinsic to his being that he would be willing to pay to prevent harm from occurring to others. Figure 26 incorporates the disvalue of trauma into the decision diagram.

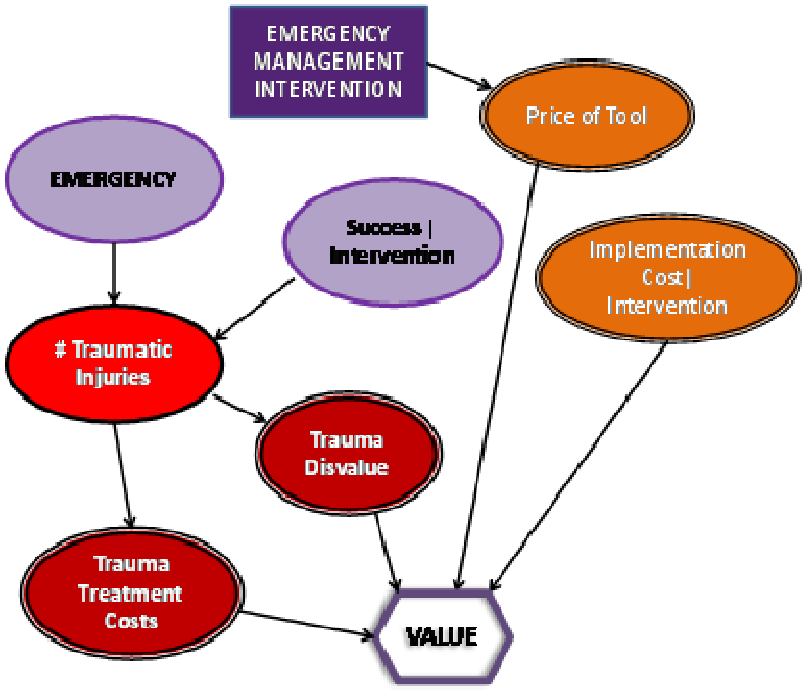

Figure 26. Emergency Management Intervention Decision Diagram with Value Attribute

2. Analyzing the Decision

This section will be divided into two parts. The first part will analyze one alternative and provide five examples of how the final value of the intervention is altered by changing the input variables. The second part will describe how various interventions (alternatives) can be compared to one another in order to assist a decision maker choose between different options. The results shown in all of the examples in this section were reached using a computational model built by Raha (2010) specifically to solve the decision diagram Figure 26.

Figure 27 shows the various possible input variables for the model as well as the calculated outputs. The green rectangles are the inputs and the bright green rectangle (which turns to red if the value is a negative number) titled "Value of Intervention" shows the calculated value of the intervention. In Example 1, the intervention is assumed to be 100 percent successful. If the

decision maker does not believe that the intervention will be successful in achieving these results, she can input the anticipated success of the intervention as being less than 1.0 in the input box labeled “Probability of Success of Intervention.” The consequence of entering a probability of success that is less than 100 percent is that the number of traumas that are anticipated to be reduced by the introduction of the intervention will not be as high. In other words, more people will be injured if the intervention is not 100 percent successful, which will increase trauma costs. As shown in Figure 27, there are a number of other variables included in the computational model that contribute to the final valuation: the probability of the emergency, risk-taking attitude (preference), risk tolerance, the price of the intervention, implementation costs, the probability the intervention will be successful, the anticipated reductions in injuries given success of the intervention, and the trauma disvalue.

a. Analysis of a Single Intervention Decision

For purposes of illustration, the emergency scenario will be an earthquake and the intervention being considered will be a mass notification system. The time frame will be constrained to be over the course of the next five years. All values are hypothetical.

(1). Example 1. Figure 27 shows the input variables used in this example. Based upon the given inputs, the value of the intervention is $3,925, as shown in the green rectangle. The positive number means that the value of the intervention exceeds the cost of the intervention, although not by a very large margin. A negative number would have indicated that the intervention costs were more than the anticipated benefits. Using trauma costs as the only value being considered, the results indicate that purchasing the mass notification system would be a worthwhile investment.

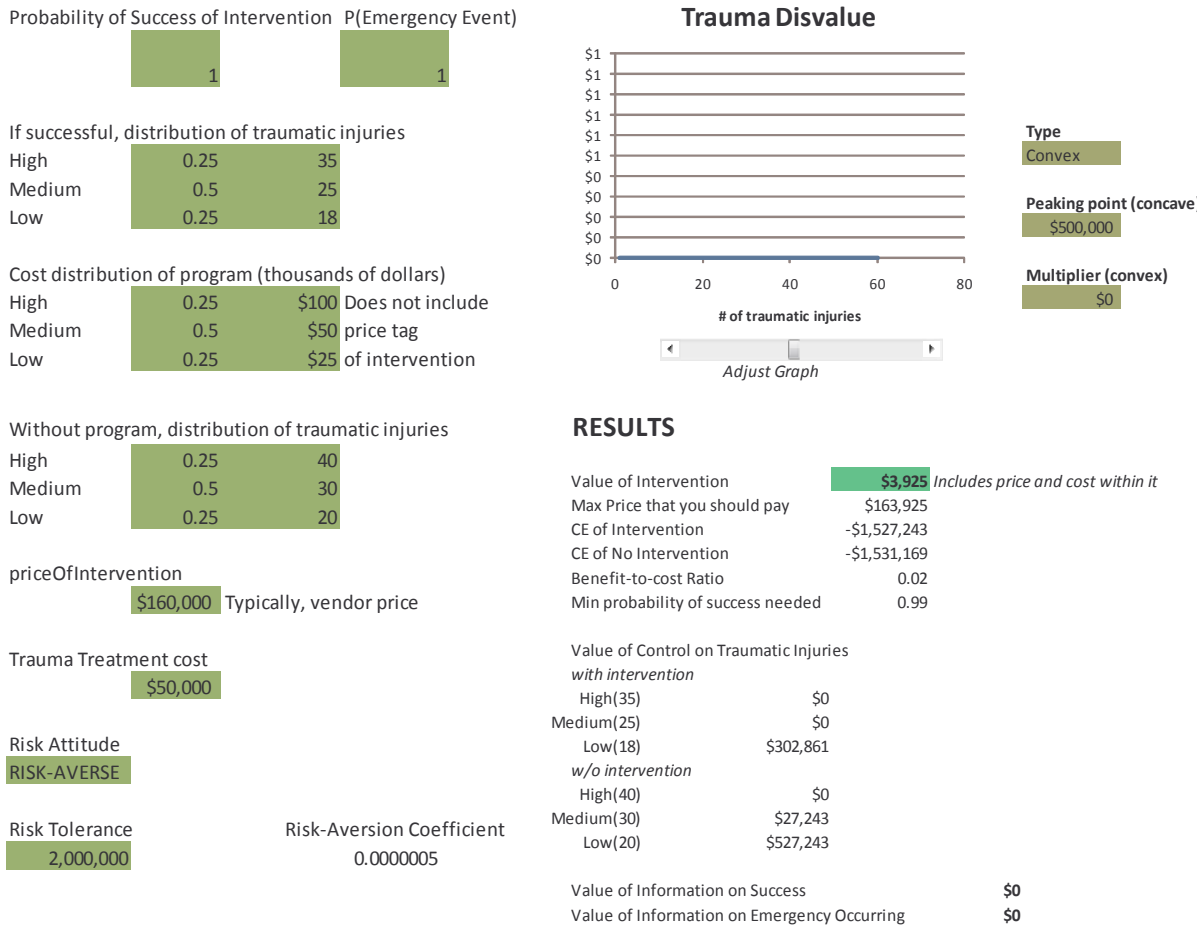

Figure 27. Valuation Results Example 1

(2) Example 2—Risk Attitude. The specific input variables used in example 2 as well as the anticipated value of the intervention can be found in Appendix B (Figure 30). In example 2, the only input variable that was altered was the decision maker's preference or attitude about risk. The significance of this variable is that it allows for personal preferences regarding risk to be factored into the decision. A decision maker's preferences would be discovered during conversations with the decision maker. In the first example, the decision maker was risk-averse. In this example, he is risk-neutral. This one

change causes the final valuation to shift from being a positive investment of $3,925 to a negative investment of $3,750. Theoretically, the decision maker should not invest in the tool if the value is a negative number.

(3) Example 3—Probability of Event and Success of Intervention. The specific input variables used in example 3 as well as the anticipated value of the intervention can be found in Appendix B (Figure 31). In this example, the probability of success of the intervention was set at .8 (80 percent) and the probability of an earthquake occurring was set at .5 (50 percent). The value of the intervention with these inputs is negative $88,598, significantly less than the value of the intervention when it was assumed that the probability of success of the intervention was 100 percent and the likelihood of the emergency taking place was also 100 percent. Most decision makers would not be able to make this type of determination in their heads without the use of a decision support tool. If trauma is the only value being considered, then the results of this model would indicate that purchasing the mass notification system would ***not*** be a worthwhile investment.

(4) Example 4—Increasing Trauma Disvalue. The calculations for Example 4 can be found in Appendix B (Figure 32). In the first three examples, trauma disvalue was set at $0. Example 4 was included to show how much money a person would need to be willing to expend, using the same inputs that were used in the previous examples, to have the value of the intervention become neutral. In reality, placing money on the table, so to speak, does not guarantee a change in the outcome. The point of including this number is to demonstrate the value of paying for the “ocean view,” which in this case is the value a decision maker would be willing to pay so that no one suffers an injury. This number could also be interpreted as representing the level of trauma, in dollars, a decision maker must be willing to accept if the only available tool being applied to a problem is the mass notification system. The trauma disvalue to make the value of the intervention neutral was $131,367 for the first person.

(5) Example 5—Capped Trauma Disvalue. The calculations for example 5 can be found in Appendix B (Figure 33). In Example 4, trauma disvalue was modeled using the assumption that a person would be willing to spend more money to prevent high trauma numbers relative to the amount of money she would be willing to spend to prevent a fewer number of traumas. Example 5 was included to show how altering this assumption impacts the final valuation. In this example, the decision maker has placed a ceiling or cap on the amount of money he is willing to spend to prevent trauma to others. If the cap were to be set at $2,039,720, then the value of the intervention becomes $0. The trauma disvalue for the first injury is $99,478.

3. Comparing Alternatives

a. Comparing Alternatives—Example 1

This section shows how a series of emergency management alternatives can be compared to one another based upon the value/cost ratios. This type of comparison can assist a decision maker choose between alternatives when confronted with multiple potential options. The input variables and calculations used to create the graph displayed in Figure 28 can be found in Appendix B (see Figures 34, 35, and 36). For purposes of illustration, the three alternatives are being considered: a CERT program (see Figure 34), a mass emergency notification system (see Figure 35), and the purchase of a risk assessment/business continuity tool (see Figure 36). Again, the value being calculated is based solely upon trauma costs. In the example below, the impact of the intervention on the number of traumas was kept constant. All values are hypothetical.

Intervention Title	Value/Cost	Cost	Value	Cumulative Cost	Cumulative Value
CERT	2.964040678	$73,750	$218,598	$73,750	$218,598
Emergency Notification	0.362917919	$216,250	$78,481	$290,000	$297,079
Business Continuity	0.027087179	$292,500	$7,923	$582,500	$305,002

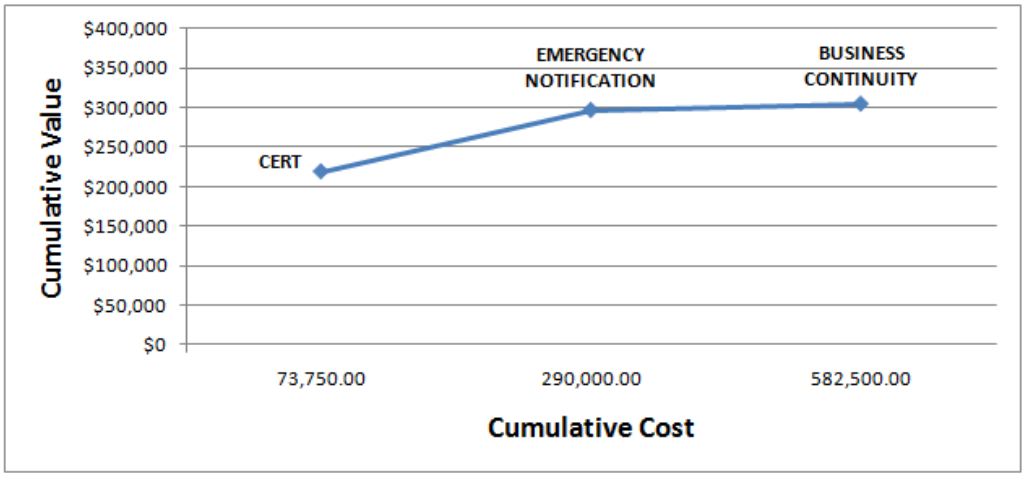

Figure 28. Comparing Alternatives Example 1—Cumulative Value to Cost Comparison for Three Emergency Preparedness Activities

The ratios shown in the graph are predicated upon the decision maker's beliefs about the expected reduction in traumas given a specific intervention, as well as the cost of the intervention, including implementation costs. The intervention that provides the highest benefit to cost ratio is the CERT program, followed by the emergency notification program, and then the risk assessment /business continuity tool. The graph also shows that if the CERT program and the emergency notification system were both implemented, the total cumulative cost of both programs would be $290,000 and the expected combined value of both programs would be $297,079. The decision maker is then faced with the decision of investing $297K for a return on the investment of $7,097.

b. Comparing Alternatives—Example 2

For purposes of illustration, the anticipated reduction in the number of injuries was increased for the risk assessment / business continuity tool (see input variables in Figure 37). The input variables and calculations used to create the graph displayed in Figure 29 can be found in Appendix B (see Figures 34, 35, and 37). As seen in the graph (Figure 29), the reduction in the number of injuries has a significant impact on the overall value of this intervention and causes the mass emergency notification system and the business continuity tool to switch places, and causes the mass emergency notification system to become the least attractive alternative based upon a value/cost ratio. Again, it is highly unlikely that most decision makers would be able to make this type of assessment without a tool.

Intervention Title	Value/Cost	Cost	Value	Cumulative Cost	Cumulative Value
CERT	2.964040678	$73,750	$218,598	$73,750	$218,598
Business Continuity	1.507900855	$292,500	$441,061	$366,250	$659,659
Emergency Notification	0.362917919	$216,250	$78,481	$582,500	$738,140

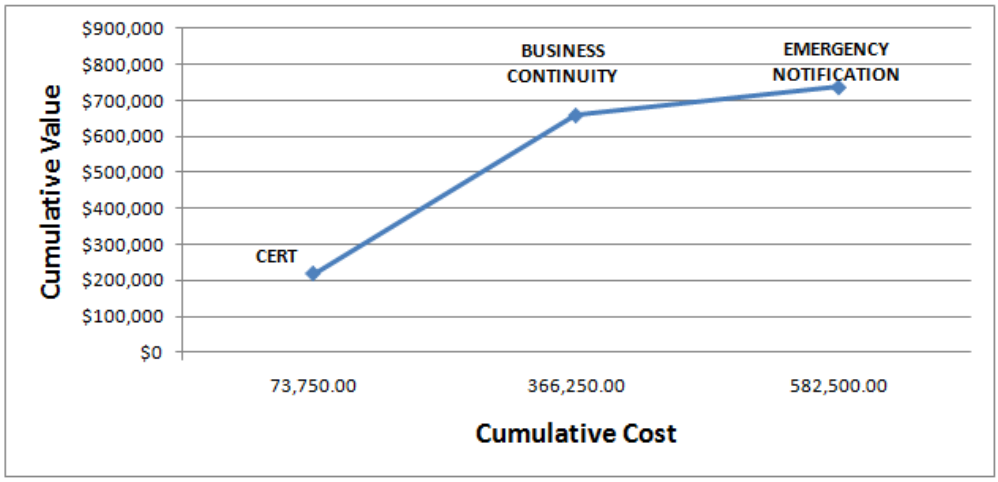

Figure 29. Comparing Alternatives Example 2—Cumulative Value to Cost Comparison for Three Alternative Emergency Preparedness Activities

4. Making the Decision

Using Example 1 for illustration, given that the decision is related to life safety, a decision maker would likely make the decision to invest in both a CERT program and an emergency notification system because lives would be saved without an unreasonable expenditure. If the investment did not have a nexus to a fundamental or intrinsic value for the decision maker, a profit of $7,097 on a $290K investment might not be as attractive to a decision maker. The distinction between a fundamental value and a prudential value comes into play at this point in the decision-making process, which illustrates one potential value of Raha's (2010) proposed methodology of clarifying values as part of the decision-making process.

5. Summary

The examples in this section were provided to illustrate how minor changes in attitudes and beliefs can impact the anticipated value of a given decision. Without the benefit of an analytical tool, the impact of these minor changes would not be readily apparent to most individuals. In addition to gaining a better understanding about a single alternative, the results from the model can also be used to compare several alternatives. This comparison provides a decision maker with an even more robust understanding of the value of the possible alternatives from which she may choose.

THIS PAGE INTENTIONALLY LEFT BLANK

VI. CONCLUSION

This thesis took the position that because of the ubiquitous presence of HEIs throughout the United States, HEIs are positioned to contribute to the nation's preparedness in at least two ways:

1. By influencing the preparedness behaviors of the over 18 million students who enroll in degree granting post-secondary educational institutions each year by modeling preparedness behaviors; and
2. By being prepared organizations within their own communities.

The intent of this research project was to gather information about the ways in which HEIs are currently making emergency preparedness decisions and how those most familiar with emergency management at HEIs think that these decisions should be made in order to develop an analytical tool specific to HEIs that would enable decision makers to evaluate proposed preparedness alternatives in order to determine the best course of action for the HEI. The underlying assumption of this approach is that the use of an analytical tool will lead to one of two primary outcomes:

1. upon seeing the positive value (benefit) of a given activity, a decision maker will invest in that preparedness activity, which will contribute to the HEI being better prepared to prevent, respond to and recover from man-made and natural disasters, which will, in turn, contribute to the community's preparedness; or,
2. upon determining that the proposed activity would not benefit the HEI, the HEI decision maker(s) will make an ***informed*** decision not to invest resources into that preparedness activity, which will minimize wasteful expenditures.

Regardless of the actual outcome of the analysis, the intent was to develop a tool that would enable this type of assessment to be performed so that decision makers can make optimal decisions on behalf of the HEI.

Decision research has indicated that humans are apt to make less than optimal decisions, especially when faced with assessing risk and uncertainty, so the assumption was that a normative based approach would assist decision makers make better decisions than they would make without the use of such a

tool. Decision analysis was selected as an approach for developing the model because it offers a normative approach to decision making. Additionally, decision analysis was selected because it offers the ability to incorporate uncertainty and preferences into the analysis of a decision, as compared to simplistic weight-and-rate multi-criteria methods that lack this ability; it offers the ability to depict a decision visually in a way that shows the interdependencies that exist in a decision; and it affords a mechanism for understanding how changing one's beliefs and preferences with respect to different variables contained within the decision impacts the final valuation. Raha's (2010) work on value diagrams was valuable to the development of this framework because it offered a method to incorporate intangible preferences and, more importantly, to clarify and communicate the intrinsic values that are in the minds of individual stakeholders involved in the decision-making process. Clarifying individual and institutional values should lead to a reduction in the amount of time spent debating in the realm of systemic and prudential values when the heart of a disagreement about a given course of action really stems from differences in intrinsic values. Additionally, once intrinsic values have been identified and agreed upon for the purposes of organizational decision-making, the framework can help ensure that subsequent decisions are consistent with these underlying intrinsic values. As a reminder, decision analysis does not profess or try to predict the future; rather, it affords a process consistent with the norms of good decision making for making the best decision possible at the present time with the information that is and can be known.

The persons who were interviewed for this research included emergency managers, police chiefs, and one risk manager. Interviewees were asked a predetermined set of questions, but the structure of the interviews, most of which were conducted by phone, also allowed for discussion and the inclusion of information that had not specifically been solicited. When developing the questions to ask interviewees, it was assumed that several factors would influence the decision-making process relative to preparedness including, but not

limited to: the organizational structure of the emergency management program, strategic plans specific to emergency management, decision-making processes, and specific criteria for determining which activities to pursue. The final set of assumptions preceding this research was that the responses to the interview questions would contribute to a comprehensive picture of the current state of emergency preparedness planning at HEIs; that some common themes and patterns would emerge; and that these commonalities would be the ones that would be incorporated into an analytical framework.

The interviews produced a broad and diverse set of responses, including several interesting concepts, and the responses did afford an overview of aspects of emergency management programs at 10 HEIs, but the pervasive themes and patterns that were anticipated did not emerge. In fact, there was a fair amount of diversity in the content of responses. Taking this diversity into account, a rudimentary conceptual decision diagram for evaluating preparedness alternatives was developed using the information gleaned from the interviews as well as the researcher's personal knowledge about emergency management and university operations. The conceptual decision diagram that was created to depict the interdependencies that exist within a HEI and how a preparedness intervention might impact the system was quite complex. For simplicity, a branch of the overall diagram was selected to demonstrate how a decision analysis would be performed. Trauma to individuals was selected as the factor to be evaluated. This criterion was selected because reducing harm to individuals is one of the fundamental principles of preparedness and would likely be an intrinsic value for most decision makers. The decision diagram was simplified and refined. A computational model was then created for this simplified decision diagram with the assistance of Raha. Five examples were shown in this paper to demonstrate how even minor alterations to just one distinction—such as the probability that an emergency event will take place, or the anticipated reduction in the number of injuries as a result of implementing an intervention—can have significant impacts on the final valuation. These types of impacts would not be

readily apparent to most individuals without the assistance of a tool, which is why this thesis has advocated for the development of an analytic tool to assist decision makers optimize decisions that are made about which preparedness alternative to pursue.

In terms of next steps, principles of decision analysis that were not covered in this paper—such as the use of the tornado diagram and sensitivity analysis—would allow for the more complex diagram to be simplified to reflect those aspects that have the greatest impact on the final valuation. This exercise would be worthwhile as it reduces the complexity of the model as well as reduces the amount of information that must be gathered in order to make an informed decision. In other words, every nuance included in an initial conceptual decision diagram need not be evaluated because of the minor influence some factors have on the final valuation. Having someone adept in decision analysis work with a group of HEI emergency managers and decision makers to further refine the decision diagram could lead to the development of a more refined tool that would prove to be useful for HEIs. Integrating Raha's (2010) work regarding clarifying intrinsic institutional values might offer a worthwhile starting point for conducting this analysis.

Moving away from the idea of using the results from the interviews to develop an analytical tool that utilizes a normative approach to decision making and looking at ways to enhance preparedness decision making independent from a tool, the results of this study, combined with insights gleaned from the literature review, provide several potential areas for improved preparedness decision making at HEIs.

From an organizational perspective, the absence of a dedicated emergency manager or emergency management department could result in emergency management preparedness "falling through the cracks" because no one has direct responsibility for focusing on emergency management and preparedness. Evidence of this possibility was seen with the lack of clarity regarding responsibility for emergency management planning for the off-site

facilities and branch campuses at many of the HEIs in this study. At the same time, while the existence of a formal or dedicated emergency management department could be perceived as representing an institution's commitment to emergency management, this arrangement could also mask an institution's commitment to emergency management. If senior level administrators believe that they have addressed emergency management by creating a department and hiring people to address the issue, they may disengage from the emergency management planning process. By comparison, the senior level administrators at HEIs that do not have a dedicated department might feel more responsibility for emergency management because the burden and responsibility for ensuring the HEIs' preparedness falls directly on their shoulders; so they remain engaged in the decision-making process. This observation about formalized emergency management departments merely stands as a cautionary warning to senior level administrators not to be lulled into a false sense of preparedness based on the fact that the institution has committed resources to an emergency management program.

Guidelines from the U.K. noted that smaller/less complex institutions have tended to adopt top-down risk management processes, suggesting that risk management processes are overlaid onto existing management processes rather than being truly embedded (HEFCE, 2005). The results of this research did not necessarily support the idea that the size of the institution determines whether the process is overlaid or embedded. In fact, although the specific question was not posed, based upon the responses to other questions, emergency management did not appear to have been integrated into the overall operational culture of any of the HEIs in this study. The significance of this point is not to distinguish between how smaller and larger institutions approach emergency management, but rather to stress that an emergency management program that has become embedded into the overall operational culture of the HEI, if not the day-to-day operations, will result in greater institutional awareness and involvement and will likely result in higher levels of preparedness compared to a

top-down or overlaid process. The idea of embedding risk management into the organizational culture of a HEI by requiring department level risk assessments; engaging in a bottom-up/top-down review; tying the review to the annual budget cycle; and even making risk management or emergency management part of the annual performance evaluation for all employees were some of the most compelling ideas that emerged from the literature review. These ideas did not surface during the interviews as practices that had been adopted by the HEIs involved in this research.

In terms of roles and responsibilities, there was evidence of “stove piping” of information regarding institutional risks and strategies being employed to address those risks. There are several disadvantages of this model: pockets of individuals could be duplicating work on projects that might be similar in nature, resulting in inefficient uses of time and resources; or working on projects that have overlapping impacts, which might be enhanced by a more collaborative and collective approach; or, because individuals assume that someone else is addressing a particular matter, no one ends up addressing the risk at all. Given the myriad risks and interdependencies that exist within a HEI, the emergency manager, if there is one, should be involved with, or at least be advised about and be aware of, the content of the institution’s risk assessment as well as informed, if not consulted, on which risks are being addressed and how they are being addressed. The results of this research did not indicate that emergency managers were expected to perform this type of a role at the HEIs involved in this study although a couple indicated that they thought that they should.

The recommendations made thus far are associated with a more centralized and perhaps somewhat regulatory approach to emergency management. None of the emergency managers in this study appeared to have the institutional authority to mandate that certain preparedness activities be performed. Thus, to accomplish their goals, they relied upon persuasion to garner buy-in and participation. Although driven by necessity, this decentralized approach might have unintended, positive consequences for an institution’s

overall preparedness. Brafman and Beckstrom (2006) present an argument in ***The Starfish and the Spider*** that networked systems, especially those systems that evolve through the voluntary input of stakeholders, are more robust and resilient than centralized systems. Examples offered to support this theory include the decentralized Apache Nation being able to withstand attacks from the seemingly more powerful hierarchical arranged Spanish Army in the 1680s; why Alcoholics Anonymous has survived and flourished without a designated leader; and how Craigslist and Wikipedia not only function but have flourished by "allowing" users to exert control over the process rather than a centralized office being the governing and driving force (Brafman & Beckstrom, 2006). Extrapolating this concept to the HEI environment, if the theory espoused in ***The Starfish and the Spider*** is accurate, then a centralized approach to preparedness might not lend itself to developing a resilient HEI when compared to a more decentralized approach. Many HEIs tend to operate in a somewhat decentralized manner, especially larger HEIs, so they are already positioned organizationally to operate as a network, at least in theory. The question becomes, what would need to be in place to induce or spark the departments of a HEI to voluntarily engage in preparedness activities and function more like a network with respect preparedness as opposed to relying upon a centralized office of emergency management to be more-or-less solely responsible for the institution's preparedness? This thesis did not endeavor to answer this question, but rather poses it for others to consider. Whatever the answer might be, it will have to be compelling enough to overcome the psychological barriers that have been offered to explain why people do not engage in preparedness efforts. The relevant point is that an organizational structure that relies upon a central office of emergency management might not actually offer the best structure for facilitating a HEI's overall level of preparedness, but a hybrid approach that incorporates an element of centralization combined with a decentralized approach in which the school or departments play an active role in ensuring preparedness at the school or department level.

With respect to strategic planning, it seems logical to assume that engaging in a process that identifies the current state of emergency management, the desired state of preparedness and a plan for accomplishing those goals would benefit the decision-making process and ultimately the HEIs level of preparedness. Despite the apparent logic, most of the HEIs in this study had not engaged in a strategic planning process, developed a strategic plan specific to emergency management nor even defined what it meant to be prepared. This study did not attempt to measure the level of preparedness of the HEIs in this study, so it is unknown if engaging in a strategic planning process does actually enhance the decision-making process or the institution's level of preparedness. A potential area of future research would be to conduct an assessment of preparedness at HEIs and see if there is a relationship between strategic planning and levels of preparedness. One of the challenges will be to define the measurements that will be used to gauge preparedness since there are many definitions and opinions about what it means to be prepared.

Assuming that strategic planning does contribute to more optimal decision making, then one recommendation is that HEIs should engage in an emergency management strategic planning process that includes defining and establishing specific preparedness objectives. The emergency management strategic plans from the University of Washington and the University of Oregon were offered as two examples of fairly robust strategic plans that might offer insights to other HEIs about how to structure such a plan. It was also noted that HEIs undoubtedly have faculty members with expertise in business or organizational management who could assist with the strategic planning process should assistance be needed and wanted.

In addition to these broader recommendations, several specific practices were uncovered that might be of interest to other HEIs. One practice is the use of GIS mapping to visually depict geographic areas of risk; this idea is being used at the University of Oregon. The primary benefit of this approach is that threats and hazards can be overlaid on a map to show visually which areas are at the

greatest risk for experiencing the impacts of various types of hazards, including those areas that might be impacted by multiple hazards. This information can be combined with other information—such as population density, building types or the location of research projects—to provide decision makers with a greater awareness of potential vulnerabilities. Theoretically, improving situational awareness should help optimize decisions that are made. In some respects, the use of GIS mapping is similar to the use of decision diagrams in decision analysis in so far as they both depict information visually, which allows decision makers to see relationships and interconnections much more readily than a conversation or written document would afford.

The second notable practice that emerged, also from the University of Oregon, is the management of the emergency management program by a faculty member. The advantages of having a faculty member manage a program—such as credibility and ready access to other faculty and students—were addressed earlier. More intriguing is the concept of managing an emergency management program like a research project, including soliciting research grants and engaging students in the management of the program. This model provides students with real-life educational opportunities, which fulfills the fundamental mission of HEIs: to educate. This thesis is not suggesting that emergency management programs need to be managed by faculty members. Rather, HEI emergency management programs should leverage the expertise and knowledge contained within the organization to enhance the preparedness of the institution.

This final observation leads to what might be the most significant insight gleaned from this research: the potential for HEIs to contribute to the nation's preparedness by utilizing the expertise that is already contained within the HEI—the faculty, staff, and students—to develop innovative and creative ideas—such as the use of GIS mapping along with the application of decision analysis—to help tackle complex emergency management problems. What is needed is a leader or a catalyst to engage these resources in such a way that they become interested in and committed to looking inward to help the HEI enhance its

preparedness efforts, which will, in turn, contribute to the preparedness of the community where the HEI is located, which will contribute to the preparedness of the state where the HEI is located. State preparedness will, in turn, contribute to the nation's preparedness. Perhaps, HEI emergency managers could be those leaders whose influence starts locally but expands nationally.

In closing, in keeping with this line of thinking regarding the potential impact HEIs and HEI emergency managers could have on national preparedness, this thesis proposes replacing the proverbial mantra "Think global and act local" with the following: "Think ***and*** act locally in order to have an impact globally." And, in order to make optimal decisions about how to best act at the local level, invest the time and resources into developing a strategic plan, but avoid becoming wedded to the plan and inflexible; be aware of heuristics and biases that might have a negative impact on preparedness decision making; utilize a structured decision-making process, preferably one that has elements of a normative approach to decision making, to make preparedness decisions; and strive for an approach to emergency management preparedness that is both centralized and decentralized in order to enhance the resiliency of the institution.

APPENDIX A. INTERVIEW QUESTIONS

I. INTERVIEWEE INFORMATION
   a. What is your current position (title)?

   b. How long have you been in this position?

   c. How long have you been in the public safety /emergency management profession?

   d. Please briefly describe your professional experience / background

II. RESEARCH QUESTION: What are the overarching characteristics of the higher education institution?

   a. General Characteristics

      i. Is the institution public or private? 2 year or 4 year?

      ii. Is the institution part of a system or is an in independent institution?

   b. Mission and Values

      i. How does the institution define its core mission?

      ii. How does the institution define its core values? What are the institution's core values?

   c. Geographic location and structure of the institution

      i. Describe the institution's geographic composition. For example, is the campus largely self-contained or are its facilities spread out across a geographic region?

      ii. Does your institution operate branch academic campuses? If yes, where are they located?

      iii. Does your institution operate facilities that support the operation of the campus (other than academic branch campuses) that are located off the main campus? If yes, please describe the types of operations that are managed off-site?

d. Composition of the main campus:

    i. What is the average daytime population?

    ii. How many undergraduate students are enrolled?

    iii. How many graduate students are enrolled?

    iv. How many faculty work on the main campus?

    v. How many staff work on the main campus?

    vi. Is the campus population predominantly commuter or residential based?

        1. How many students live on campus?

        2. How many faculty and staff live on campus?

        3. How many or what percentage of students live off campus in areas that are owned or operated by the institution?

        4. How many or what percentage of students live off campus, but clustered in facilities that are not owned or operated by the institution?

e. Emergency Management

    i. What entity or entities are responsible for emergency management planning for the main campus?

    ii. Does the institution have a central department of emergency management? If yes,

        1. What are the responsibilities of this office?

        2. How many people are employed in this department?

    iii. Do departments or schools within the university have recognized emergency manager positions? If yes,

1. What are the responsibilities of these positions?

2. How do these positions relate to the university's central emergency management program?

iv. Branch campuses:

1. What entity handles emergency management planning at the branch campuses?

2. How are the emergency management plans for these branch facilities incorporated into the university's emergency management plans?

v. Off-site facilities

1. What entity handles emergency management planning at the off-site campuses?

2. How are the emergency management plans for these off-site facilities incorporated into the university's emergency management plans?

vi. Emergency Management Advisory Committee

1. Does the institution have a formalized Emergency Management Advisory Committee? If yes,

a. What is the mission of this committee?

b. Which entities are represented on the committee?

c. Which department / position chairs the committee?

d. How does this group influence the decisions that are made about pre-incident university emergency management initiatives, needs and programs?

III. RESEARCH QUESTION: How are preparedness and mitigation decisions currently being made at colleges and universities?

a. Strategic direction

i. What are your institution's guiding principles with respect to emergency management?

ii. Does the institution have an emergency management ***strategic*** plan? Does the institution have an ***operational*** plan? If yes (to either or both),

1. Is this plan documented? How is the plan shared with others?

2. Which entity or entities developed the strategic direction / operational response?

3. What process was used to develop the strategic plan / operational response?

4. How long ago was the plan developed?

5. How often is the plan updated?

b. Risk Assessments

i. Does the institution conduct enterprise-wide risk assessments? If yes,

1. Which entity is responsible for conducting the assessment?

2. How often are assessments conducted?

3. What process is/was used to conduct the assessment?

a. Do you utilize any type of decision support tool to conduct these assessments?

4. How is this information obtained from a risk assessment used to inform decisions about which mitigation or preparedness programs, initiatives to pursue?

ii. Do individual departments or schools conduct local risk assessments? If yes,

1. Are these individual risk assessments reviewed by a central department or group? If so, what department or group?

2. How are these results conveyed to key stakeholders such as police, fire, risk management and emergency management?

3. How are these results integrated into a common operating framework for the university?

iii. Which emergency management related threats most concern your university? How was this determination made?

c. Preparedness

i. How does the institution define preparedness?

ii. How does the institution measure its level of preparedness?

iii. How would you suggest measuring level of preparedness?

iv. How does the institution decide which specific emergency preparedness initiatives and programs to pursue?

v. What aspect or aspects of the emergency management program specific to preparedness activities do you consider to be the most successful?

vi. Does the institution utilize any type of decision support tool to determine which programs or initiatives to pursue? If yes, please describe the tool and the process.

vii. What criteria do decision makers consider when deciding which preparedness initiatives to pursue?

viii. What do you consider to be the barriers to reaching a greater level of preparedness?

d. Mitigation

i. How does the institution define mitigation?

ii. How does the institution determine what level of mitigation actions to pursue?

iii. How does the institution measure or evaluate its mitigation decisions?

iv. How does the institution decide which mitigation initiatives and programs to pursue?

v. What aspect or aspects of the emergency management program specific to mitigation efforts do you consider to be the most successful?

vi. Does the institution utilize any type of decision support tool to determine which mitigation programs or initiatives to pursue? If yes, please describe the tool and the process.

vii. What criteria do decision makers consider when deciding which mitigation initiatives to pursue?

viii. In what ways could the levels of mitigation be improved?

ix. What do you consider to be the barriers to implementing stronger mitigation efforts?

IV. RESEARCH QUESTION: How could the pre-incident emergency management decision-making process be improved?

a. Are you aware of any decision support tools, systems or processes for evaluating preparedness activities? If yes, please describe.

b. Are you aware of any decision support tools, systems or processes for evaluating mitigation activities? If yes, please describe.

c. What criteria do you think decision makers should consider when deciding which preparedness activities to pursue?

d. What criteria do you think decision makers should consider when deciding which mitigation activities to pursue?

e. How could the pre-incident emergency management decision-making process be improved?

APPENDIX B. INPUT VARIABLES FOR MODELING EXAMPLES

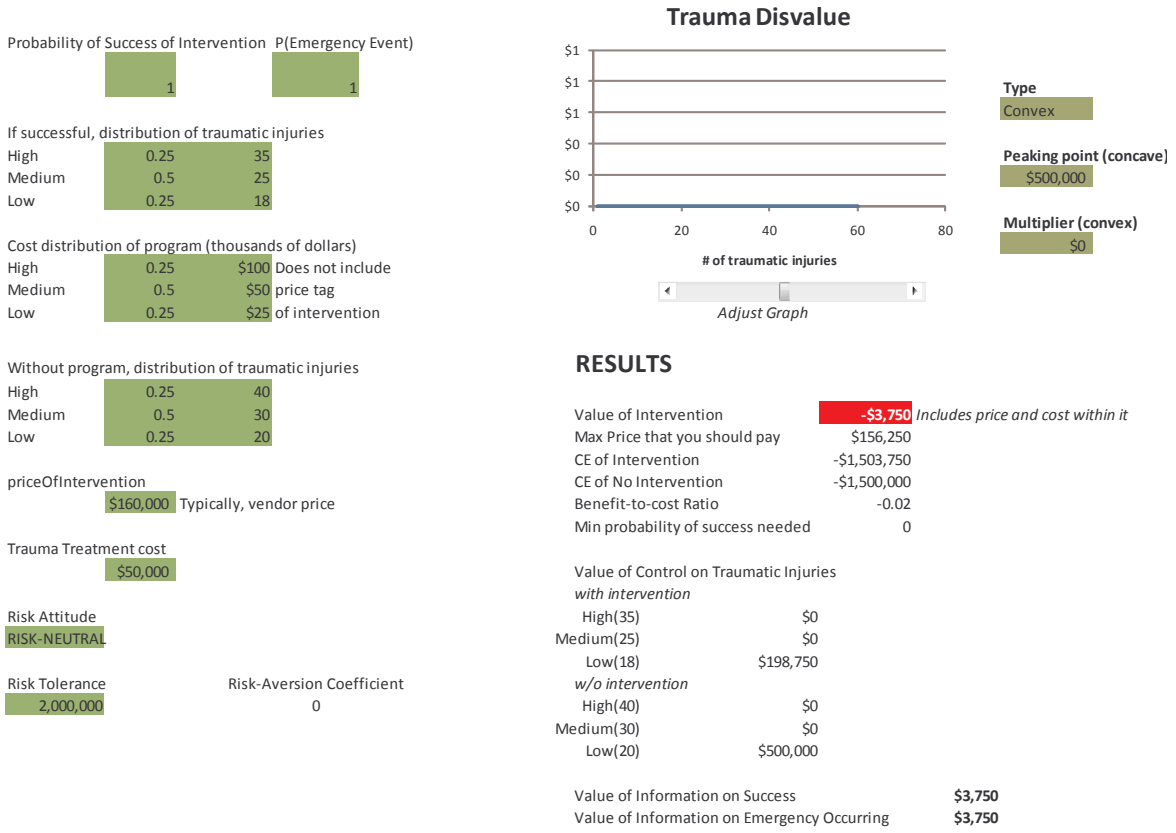

Figure 30. Valuation Results Example 2—Risk Attitude

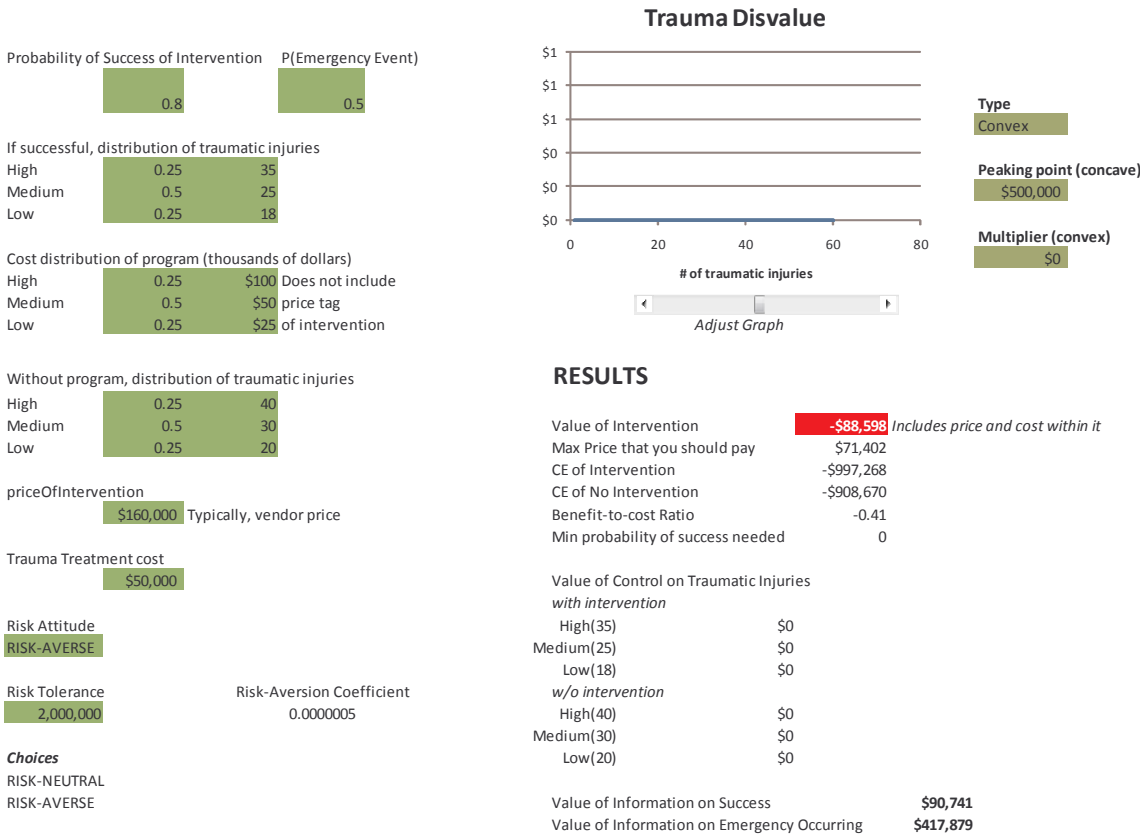

Figure 31. Valuation Results Example 3—Altering the Probability of the Event and the Success of Intervention

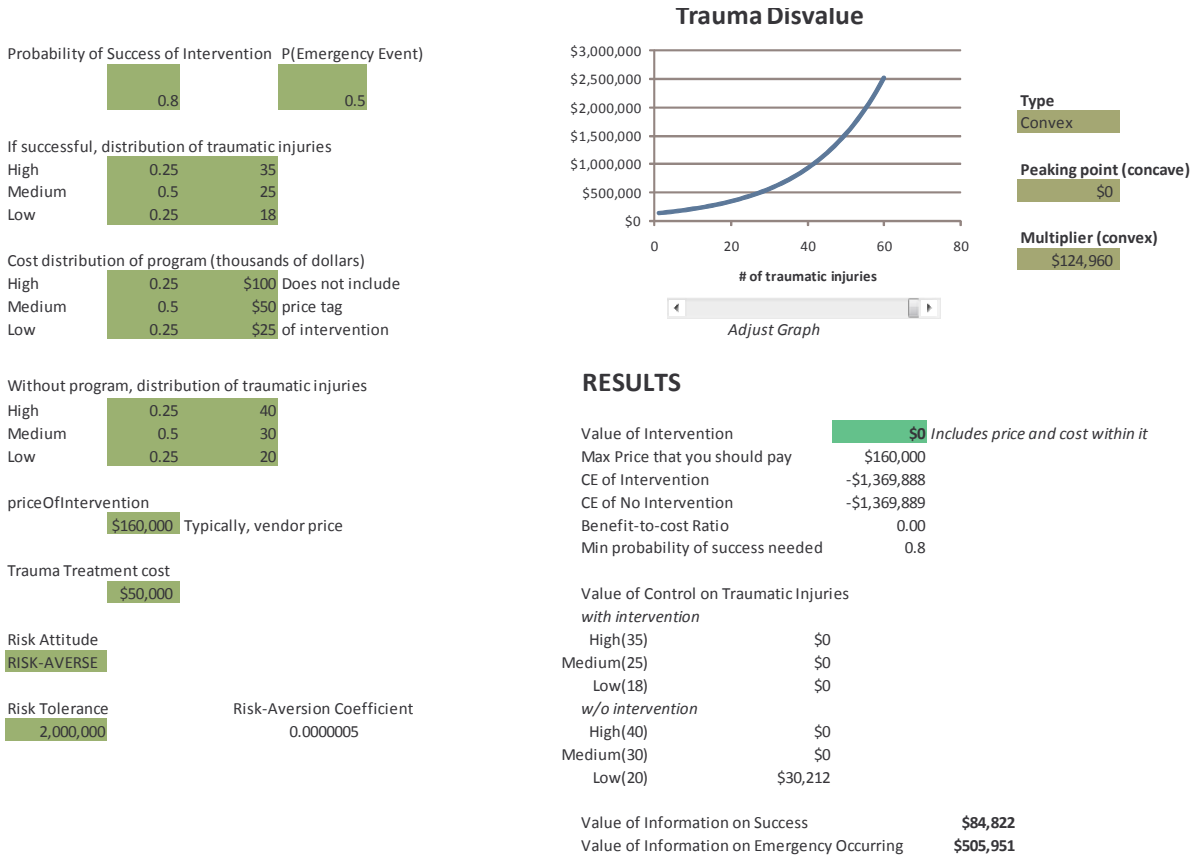

Figure 32. Valuation Results Example 4—Increasing the Trauma Disvalue

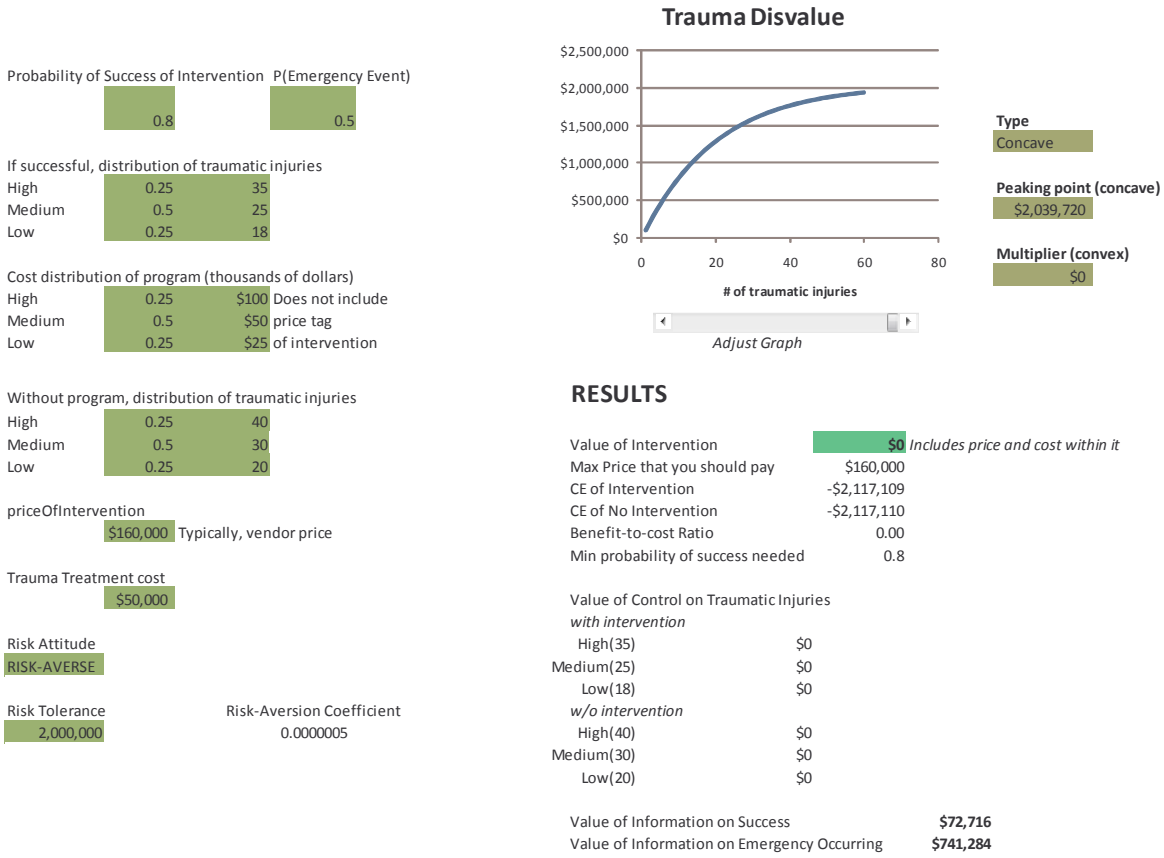

Figure 33. Valuation Results Example 5—Capped Trauma Disvalue

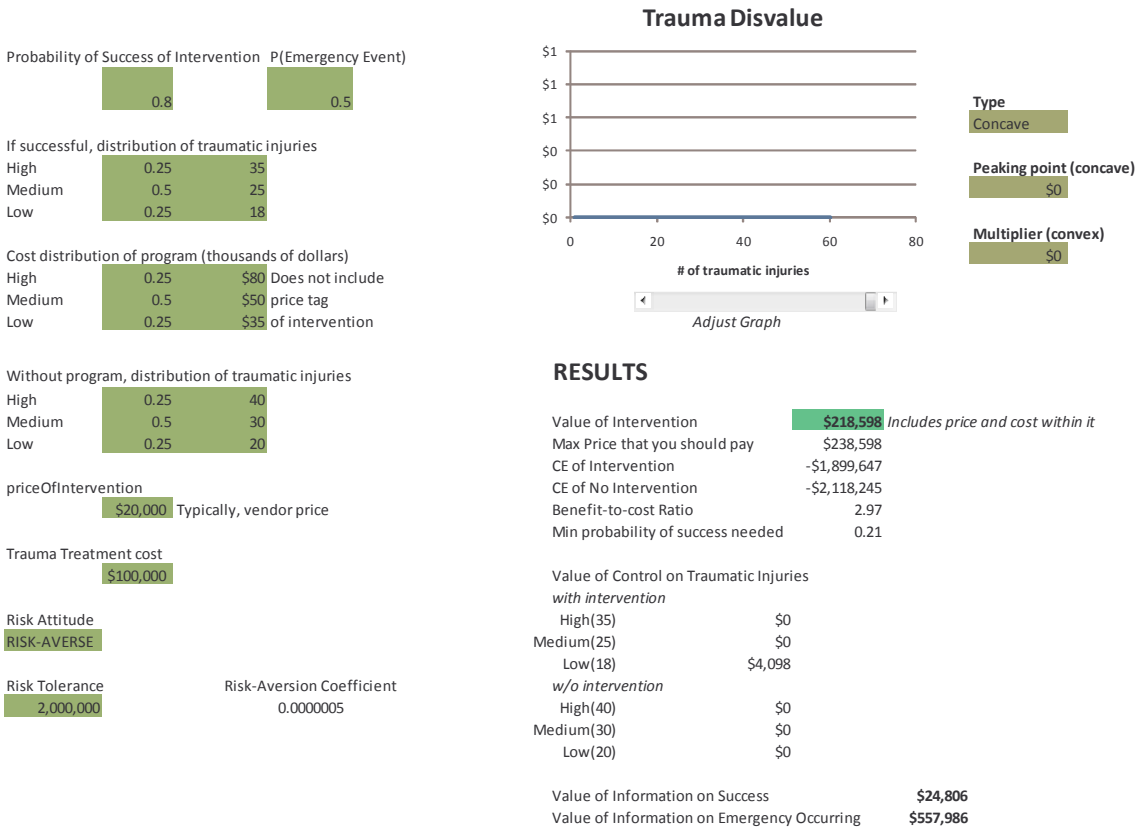

Figure 34. Valuation for CERT Program—Comparing Intervention Alternatives Examples 1 and 2

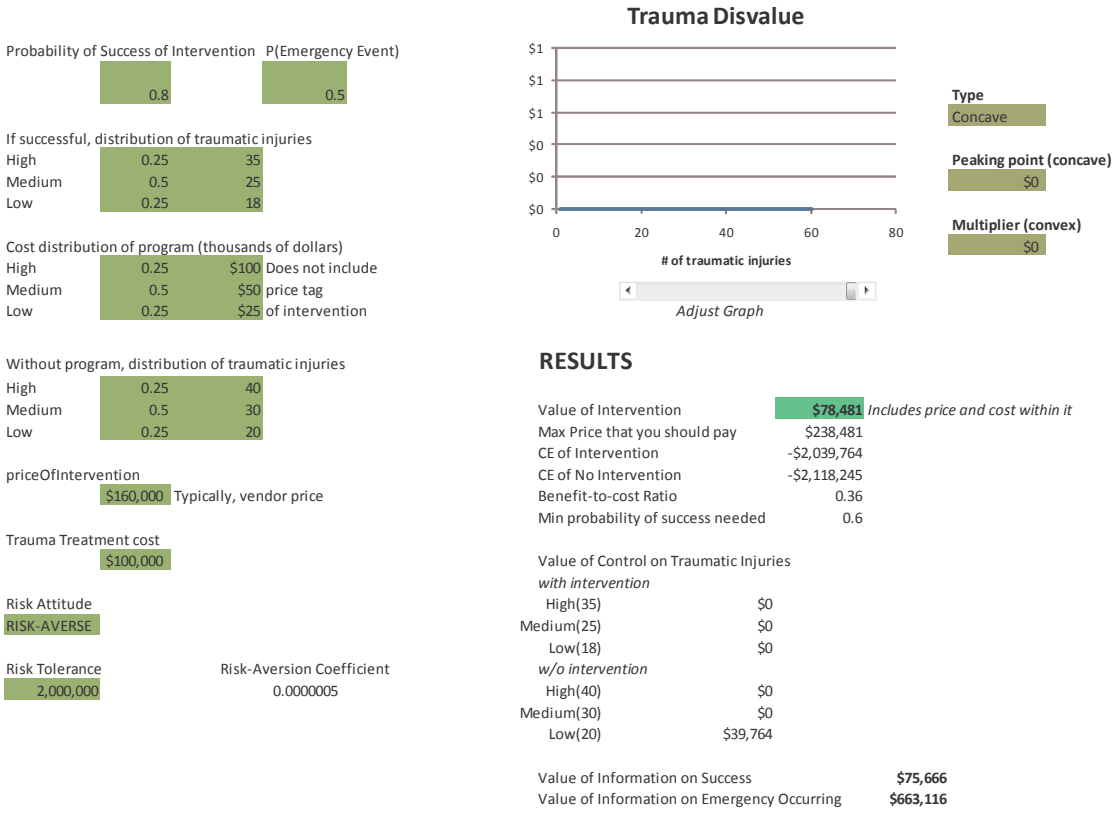

Figure 35. Valuation for Mass Emergency Notification System—Comparing Intervention Alternatives Examples 1 and 2

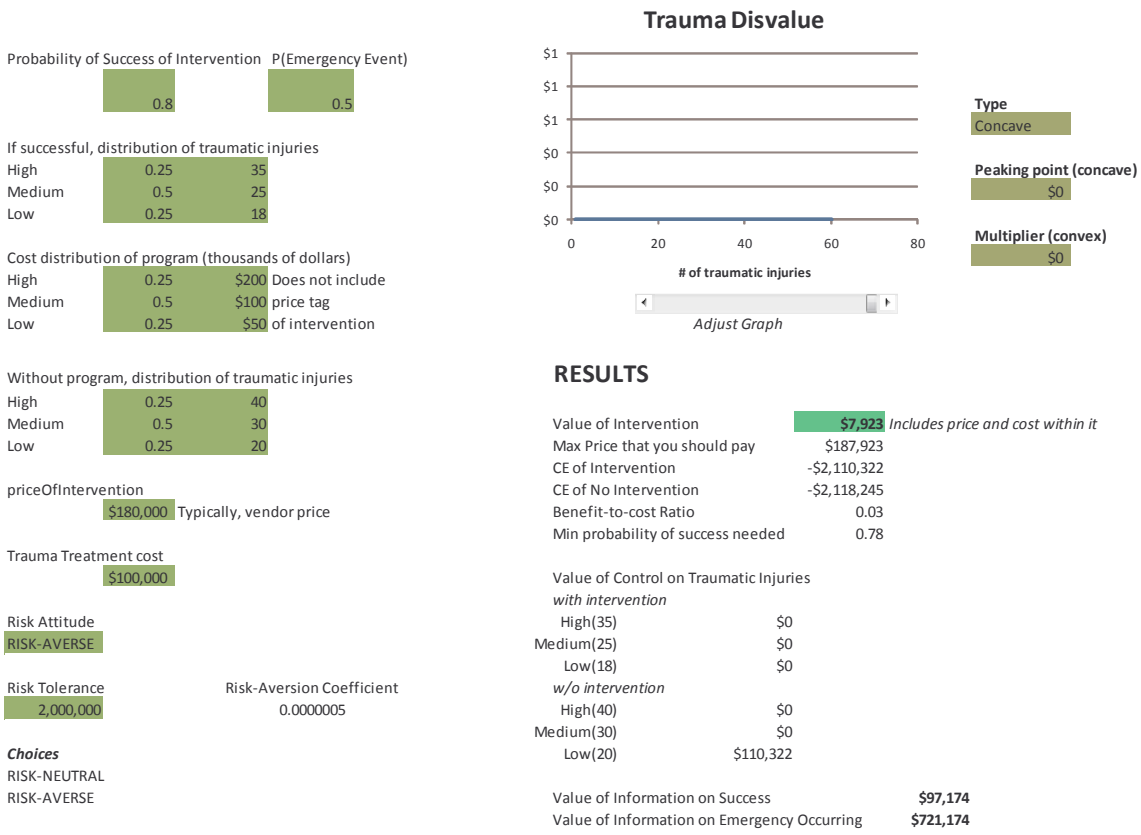

Figure 36. Valuation for Business Continuity Tool—Comparing Intervention Alternatives Example 1

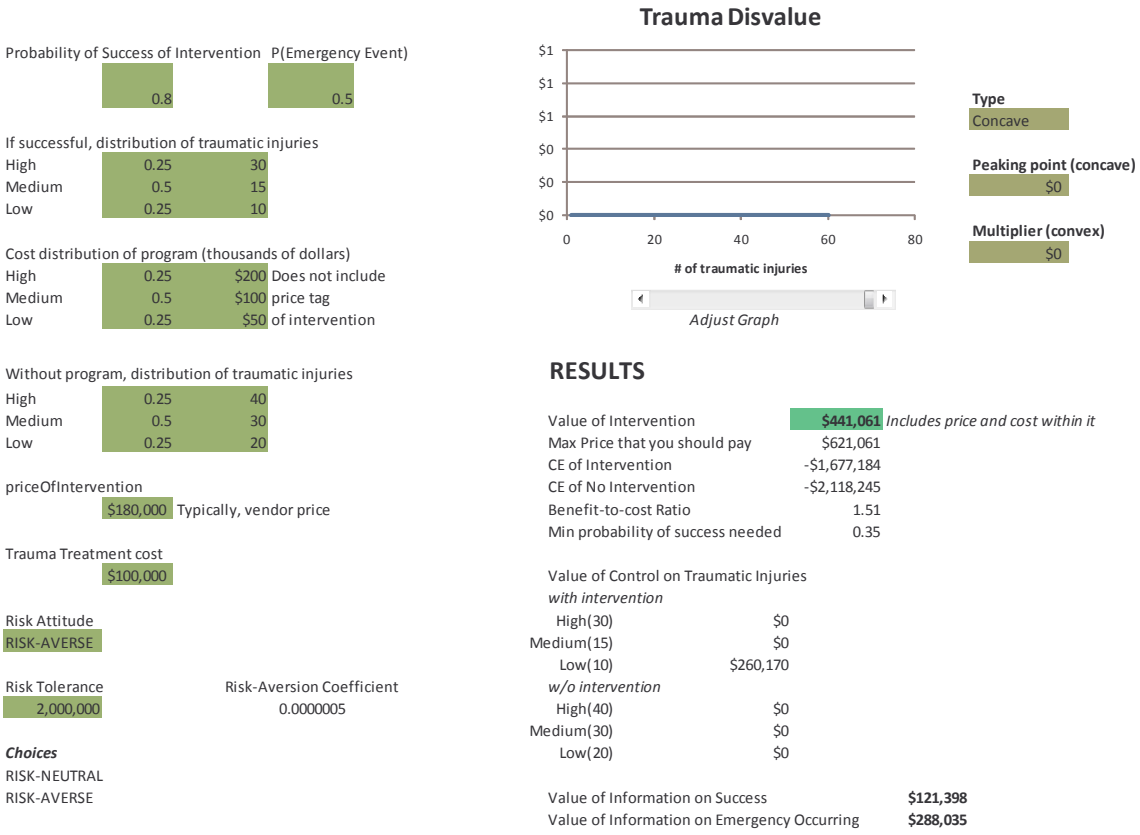

Figure 37. Valuation for Business Continuity Tool—Comparing Intervention Alternatives Example 2

LIST OF REFERENCES

All prizes in economic sciences. (2009). Retrieved August 21, 2010, from http://nobelprize.org/nobel_prizes/economics/laureates/

Beach, L. R. (1997). ***The psychology of decision making: People on organizations.*** Thousand Oaks, CA: Sage Publications.

Becker, G. S. (1976). ***The economic approach to human behavior.*** Chicago, IL: Universoty of Chicago Press.

Beinhocker, S. K. (2003, January). The real value of strategic planning. ***MIT Sloan Management Review***, 71–76.

Blanchard, B. W. (2008). ***Guide to emergency management and related terms, definitions, concepts, acronyms, organizations, programs, guidance, executive orders & legislation***. Retrieved August 20, 2010, from http://training.fema.gov/EMIWeb/edu/docs/terms%20and%20definitions/Terms%20and%20Definitions.pdf

Brafman, O. & Beckstrom, R. A. (2006). ***The starfish and the spider: The unstoppable power of leaderless organizations.*** New York: Penguin Books.

Bryson, J. M. (2004). ***Strategic planning for public and non-profit organization.*** San Francisco: Jossey-Bass.

Buede, D. M. & Bresnick, T. A. (2007). Application of decision analysis to the military systems acquisition process. In R. F. Ward Edwards, ***Advances in decision analysis: From foundations to applications*** (pp. 539–563). New York: Cambridge University Press.

Celona, P. & McNamee, J. (2008). ***Decision analysis for the professional.*** Menlo Park, CA: SmartOrg, Inc.

Community Service Center University of Oregon. (2010). ***History***. Retrieved July 3, 2010, from http://opdr.uoregon.edu/about/history

Delaware River Basin Commission. (2007). ***Delaware River Basin Commission—Flood information.*** Retrieved July 10, 2010, from www.state.nj.us/drbc/Flood_Website/NJmitigation/PrioritizationTool_example.pdf

EdFund Government Relations and Regulatory Analysis Unit. (2009, April 7). ***Overview of the Higher Education Opportunity Act (HEOA).*** Retrieved August 10, 2010, from http://www.edfund.org/pdfs/HEOA_Overview.pdf

Edwards, W., Ralph F. Miles, J., & Winterfeldt, D. V. (2007). Introduction. In ***Advances in decision analysis: From foundations to applications*** (pp. 1–12). New York: Cambridge University Press.

Federal Emergency Managment Agency. (2001, August). ***Understanding your risks: Identifying hazards and estimating losses.*** Retrieved August 5, 2010, from http://www.fema.gov/library/viewRecord.do?id=1880

Federal Emergency Managment Agency. (2002, September). ***Getting started: Building support for mitigation planning.*** Retrieved August 5, 210, from http://www.fema.gov/library/viewRecord.do?id=1867

Federal Emergency Management Agency. (2003a, August). ***Building a disaster resistant university.*** Retrieved March 13, 2010, from http://www.fema.gov/library/viewRecord.do?id=1565

Federal Emergency Managment Agency. (2003b, August). ***Bringing the plan to life: Implementing the hazard mitigation plan.*** Retrieved August 5, 2010, from http://www.fema.gov/library/viewRecord.do?id=1887&fromSearch=fromsearch

Federal Emergency Management Agency. (2003c, April). ***Developing the mitigation plan: Identifying mitigation actions and implementation strategies.*** Retrieved March 5, 2010, from http://www.fema.gov/library/viewRecord.do?id=1886

Federal Emergency Managment Agency. (2003d, September). ***Integrating manmade hazards into mitigation planning.*** Retrieved March 5, 2010, from Federal Emergency Managment Agency: http://www.fema.gov/library/viewRecord.do?id=1915

Federal Emergency Management Agency. (2004, August). ***Are you ready? An in-depth guide to citizen preparedness.*** Retrieved August 5, 2010, from http://www.fema.gov/pdf/areyouready/areyouready_full.pdf

Federal Emergency Management Agency. (2007, May). ***Using benefit-cost review in mitigation planning.*** Retrieved April 17, 2010, from Federal Emergency Management Agency: http://www.fema.gov/library/viewRecord.do?id=2680

Federal Emergency Management Agency. (2009a, March). ***Developing and maintaining state, territorial, tribal and local government emergency plans: Comprehensive preparedness guidelines 101***. Retrieved March 20, 2010, from http://www.fema.gov/pdf/about/divisions/npd/cpg_101_layout.pdf

Federal Emergency Managment Agency. (2009b, October 7). ***IS-230 fundamentals of emergency management.*** Retrieved March 13, 2010, from http://training.fema.gov/EMIWeb/IS/is230a.asp

Federal Emergency Managment Agency. (2009c, September 11). ***Multi-hazard mitigation planning.*** Retrieved March 13, 2010, from http://www.fema.gov/plan/mitplanning/index.shtm

Georgetown University. (n.d.). ***University mission statement***. Retrieved August 20, 2010, from http://president.georgetown.edu/sections/governance/missionstatement/

Haimes, Y. Y. (2009). ***Risk modeling, assessment, and management*** (3rd ed.)***.*** Hoboken, NJ: John Wiley & Sons.

Hammond, J. S. (2001, June). The hidden traps in decision making. ***Harvard Business Review on Decision Making***, 143–167.

Hansson, S. O. (1994, August 18). ***Decision theory: A brief introduction .*** Retrieved July 25, 2010, from http://www.infra.kth.se/~soh/decisiontheory.pdf

Higher Education Funding Council for England. (2005). ***Risk management in higher education: A guide to good practice.*** Retrieved August 21, 2010, from http://www.hefce.ac.uk/pubs/hefce/2005/05_11/05_11.pdf

Higher Education Funding Council for England & Association of University Chief Security Officers. (2009). ***Planning for and managing emergencies: A good practice guide for higher education institutions.*** London: Cabinet Office.

Howard, R. A. (1966). ***Decision analysis: Applied decision theory. Proceedings of the 4th International Conference on Operational Research.*** Retrieved July 25, 2010, from Stanford Decisions and Ethics Center: http://decision.stanford.edu/library/ronald-a.-howard/Decision%20Analysis-%20Applied%20Decision%20Theory.pdf

Howard, R. A. (1983). ***The evolution of decision analysis***. Retrieved August 5, 2010, from http://decision.stanford.edu/library/ronald-a.-howard/the-evolution-of-decision-analysis-1

Howard, R. A. (1988). Decision analysis: Practice and promise. ***Management Science, 34***(6), 679–695.

Howard, R. A. (1992). In praise of the old time religion. In W. Edwards, ***Utility theories: Measurements and applications*** (pp. 27–55). Boston, MA: Kluwer Academic Publishers.

Howard, R. A. (2004, June). Speaking of decisions: Precise decision language. ***Decision Analysis, 1***(2), 71–78.

Howard, R. A. (2007). The foundations of decision analysis revisted. In R. F. Ward Edwards, ***Advances in decision analysis: From foundations to applications.*** Cambridge, MA: Cambridge University Press.

Howard, R. A. & Matheson, J. E. (1984). Influence diagrams. ***Principles and Applications of Decision Analysis, Vol II*** . Menlo Park, CA: Strategic Decisions Group.

Kahneman, D., Tversky, A., & Slovic, P. (1982). ***Judgment under uncertainty: Heuristics and biases.*** Cambridge, MA: Cambridge University Press.

Kahneman, D., & Tversky, A. (2002). Choices, values, and frames. In D. Kahneman & A. Tversky, ***Choices, Values, and Frames*** (pp. 1–16). Cambridge, MA: Cambridge University Press.

Kapucu, N. & Wang, X. (2007, February 2). ***Public complacency under repeated emergency threats: Some empirical evidence.*** Retrieved June 8, 2010, from Journal of Public Administration Research: http://jpart.oxfordjournals.org/cgi/reprint/18/1/57

Matheson, J. & Howard, R. A. (2005, September). Influence diagrams. ***Decision Analysis, 2***(3), 127–143. Retrieved March 13, 2010, from http://mielsvr1.ecs.umass.edu/mie686x/handouts/HowardInfluence.pdf

National Fire Protection Association. (2007). ***National Fire Protection Association.*** Retrieved July 5, 2010, from http://www.nfpa.org/assets/files/PDF/NFPA1600.pdf

National Fire Protection Association. (2010). ***National Fire Protection Association 2010 Edition.*** Retrieved March 13, 2010, from http://www.nfpa.org/categoryList.asp?categoryID=628&URL=Research%20&%20Reports/Fact%20sheets/Homeland%20Security

National Oceanic and Atmospheric Administration. (2007). ***Hazard mitigation strategies***. Retrieved March 13, 2010, from http://www.csc.noaa.gov/products/nchaz/htm/dinfo1.htm

Natural hazard mitigation saves lives: An independent study to assess the future savings from mitigation activities. (2005). Retrieved July 5, 2010, from http://www.nibs.org/client/assets/files/mmc/Part1_final.pdf

Nobel Foundation. (1992). ***Autobiography of Gary S. Becker***. Retrieved January 7, 2010, from http://nobelprize.org/nobel_prizes/economics/laureates/1992/becker-autobio.html

Office of Postsecondary Education, U.S. Department of Education. (2005, June). ***U.S Department of Education.*** Retrieved July 3, 2010, from http://www2.ed.gov/admins/lead/safety/handbook.pdf

Paté-Cornell, E. & Guikema, S. (2002). Probabilistic modeling of terrorist threats: A systems analysis approach to setting priorities among countermeasures. ***Military Operations Research***, ***7***(4), 5–20.

Paté-Cornell, M. E. (2007). The engineering risk analysis method and some applications. In R. F. Ward Edwards, ***Advances in decision analysis: From foundations to applications*** (pp. 302–324). New York: Cambridge University Press.

PricewaterhouseCoopers' Health Research Institute. (2007). ***Closing the seams: Developing an integrated approach to health system disaster preparedness.*** Retrieved August 20, 2010, from http://www.aap.org/disasters/pdf/ClosingTheSeams.pdf

Raha, S. (2010, May). ***Achieving clarity on value.*** Retrieved August 21, 2010, from http://www.stanford.edu/~somik/research/thesis/document.pdf

Skinner, D. C. (2001). ***Introduction to decision analysis.*** Gainesville, FL: Probablistic Publishing.

Stanford University . (n.d.). ***Stanford University—Visitor Information***. Retrieved August 20, 2010, from http://www.stanford.edu/dept/visitorinfo/basics/about.html

Taleb, N. N. (2007, April 22). The black swan: The impact of the highly improbable***. New York Times.*** Retrieved June 26, 2010, from http://www.nytimes.com/2007/04/22/books/chapters/0422-1st-tale.html?_r=1&ex=1178769600&en=bdae1078f2b4a98c&ei=5070

Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. ***Science, 185***(4157), 1124–1131. Retrieved August 21, 2010, from http://www.sciencemag.org/cgi/content/abstract/185/4157/1124?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=Judgment+Under+Uncertainty%3A+Heuristics+and+Biases&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT

U.K. Cabinet Office. (2008). ***Cabinet Office.*** Retrieved June 25, 2010, from http://www.cabinetoffice.gov.uk/media/cabinetoffice/corp/assets/publications/reports/national_risk_register/national_risk_register.pdf

U.S. Department of Commerce, NOAA. (2007, July 24). ***What is mtigation?*** Retrieved March 13, 2010, from http://www.csc.noaa.gov/products/nchaz/htm/whatmit.htm

U.S. Department of Education. (2009). ***Fast facts***. Retrieved March 20, 2010, from http://nces.ed.gov/fastfacts/display.asp?id=98

U.S. Department of Homeland Security. (2005, March). ***Campus preparedness assessment.*** Retrieved May 26, 2010, from http://www.iaclea.org/visitors/wmdcpt/cprc/secure/docs/threatRiskAssessment/Campus%20Prep%20Assessment-BOOK.pdf

U.S. Department of Homeland Security. (2007a, September). ***National preparedness guidelines.*** Retrieved March 15, 2010, from http://www.fema.gov/pdf/emergency/nrf/National_Preparedness_Guidelines.pdf

U.S. Department of Homeland Security. (2007b, September). ***Target capabilities list: A companion to the to the national preparedness guidelines.*** Retrieved March 16, 2010, from https://www.llis.dhs.gov/docdetails/details.do?contentID=26724

U.S. Department of Homeland Security. (2008, January). ***Overview: ESF and support annexes coordinating federal assistance in support of the national response framework.*** Retrieved July 22, 2010, fromhttp://www.fema.gov/pdf/emergency/nrf/nrf-overview.pdf

U.S. Department of Homeland Security: Federal Emergency Management Agency. (2009, December). ***Personal preparedness in America: Findings from the 2009 Citizen Corps national survey.*** Retrieved March 15, 2010, from http://www.citizencorps.gov/downloads/pdf/ready/2009_Citizen_Corps_National_Survey_Findings.pdf

U.S. Government Accountability Office. (2004). ***Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*** (GAO-04-408T). Retrieved August 20, 2010, from http://www.gao.gov/new.items/d04408t.pdf

U.S. Government Accountability Office. (2007). ***Natural hazard various mitigation efforts exist, but the federal efforts do not provide a comprehensive strategic framework*** (GAO-07-403)***.*** Washington, DC: White House.

U.S. General Accountability Office. (2009, April). ***National preparedness: FEMA has made progress, but needs to complete and integrate planning, exercise and assessment efforts.*** Retrieved March 13, 2010, from http://www.gao.gov/new.items/d09369.pdf

University of Oregon. (2009, November 10). ***Strategic plan 2007.*** Retrieved May 22, 2010, from http://em.uoregon.edu/downloads/pdf/admin/UOEM_StratPlan_101008.pdf

University of Oregon. (n.d.). ***University of Oregon mission statement***. Retrieved July 13, 2010, from http://www.uoregon.edu/~uosenate/UOmissionstatement.html

University of Washington. (n.d.). Retrieved from http://www.washington.edu/emergency/files/documents/2009-2014_UWEM_Multi-Year_Strategic_Plan.pdf

University of Washington . (2009, February). ***Multi-year strategic plan.*** Retrieved July 13, 2010, from http://www.washington.edu/emergency/files/documents/2009-2014_UWEM_Multi-Year_Strategic_Plan.pdf

University of Washington Emergency Management. (2009, April 8). ***University of Washinton emergency management strategy map***. Retrieved July 25, 2010, from http://www.washington.edu/emergency/files/documents/strategymap.pdf

White House. (2003). ***Homeland security directive 8: National preparedness.*** Retrieved February 22, 2010, from U.S. Department of Homeland Security: http://www.dhs.gov/xabout/laws/gc_1215444247124.shtm#1

Zimbardo, P. G. (2007). The strategy of terrorism and the psychology of mass-mediated fear. In B. Bongar, L. M. Brown, L. E. Beutler, J. N. Breckenridge, & P. G. Zimbardo, ***Psychology of Terrorism*** (pp. 116–133). New York: Oxford Press.

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California