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Preface

This paper was prepared for the Intermodal Freight Transportation Institute (ITFI) at the University of Memphis to help advance research, education, and outreach related to intermodal freight transportation. The primary audience for the paper includes IFTI faculty, staff, and students as well as representatives of the public and private organizations that support IFTI.

The paper is part of an ITFI initiative to improve mutual understanding between the public and private sectors relative to intermodal freight transportation. Many of the referenced documents are available online, and links are provided in the text or in the list of references.

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The author is solely responsible for the content, findings, and conclusions.

Abstract

Emergency management is often described in terms of phases or components, using terms such as mitigation, preparedness, response, and recovery. Some sources add or substitute different terms, but virtually every source—policy documents, plans, manuals, textbooks, journals, and research reports—agree that “recovery” is an essential part of emergency management. This paper examines disaster “recovery,” focusing on the complexity of issues, multiple stakeholders, distinctions between short- and long-term recovery, conceptual models of community recovery, and the recovery of businesses impacted by disasters. The purpose is to provide background information for transportation researchers and practitioners.

The paper also addresses the question of whether “recovery” has been neglected by researchers, practitioners, and policy makers. Part of the answer seems to be that the current focus is more on eliminating or reducing the *need* for recovery. The public sector is emphasizing prevention, protection, reduced vulnerability, increased sustainability, and improved resilience. Likewise, the private sector is giving increased attention to risk management and related concepts.

Nonetheless, disasters will occur and recovery will be required. Whether or not recovery has been the most neglected phase of emergency management in the past, transportation researchers and practitioners now have important opportunities to influence research and policy development related to recovery.

The Recovery Phase of Emergency Management

The purpose of this paper is to provide an overview of the “recovery” phase of emergency management in the United States and to identify sources and potential topics for more focused research. In this context, recovery is one of multiple phases or components, usually described as:

- Mitigation
- Preparedness
- Response
- Recovery

Some sources add “prevention” or “protection” as separate components. Others modify “mitigation” to “mitigation and prevention.” Others expand or integrate the notion of phase or components with concepts such as disaster-resistance, sustainability, and resilience. The private sector is more likely to use terms like contingency planning, business continuity, and risk management.¹

The word “phase” is used in this paper interchangeably with “component,” “activity,” “aspect” and “function.” The term “emergency management” is used here to encompass all of the activities carried out by the federal, state, and local agencies that are referred to as “emergency management agencies (EMAs),” and, more broadly, the efforts of the public and private sectors to deal with hazards, risks, and disasters of all types.

Alternative definitions are examined for a few other key terms used in the paper, but many terms are used without offering specific definitions. Readers should be alert for unusual or multiple meanings. Words and phrases that have specific meanings among emergency management practitioners may have different meanings in the transportation arena. In addition, since emergency management is an interdisciplinary field of study, the languages of multiple disciplines are intertwined. Since the primary audience for the paper is focused on transportation, transportation examples and comparisons are used in many sections.

This paper is divided into five sections, beginning on the next page:

- Recovery is Complex and Has Many Stakeholders
- Short-Term Versus Long-Term Recovery
- Conceptual Models of Recovery
- Business Recovery
- Is “Recovery” Neglected?

RECOVERY IS COMPLEX AND HAS MANY STAKEHOLDERS

¹ A companion background paper, “The ‘Phases’ of Emergency Management,” provides definitions and descriptions for all of the phases/components of emergency management and examines related concepts.

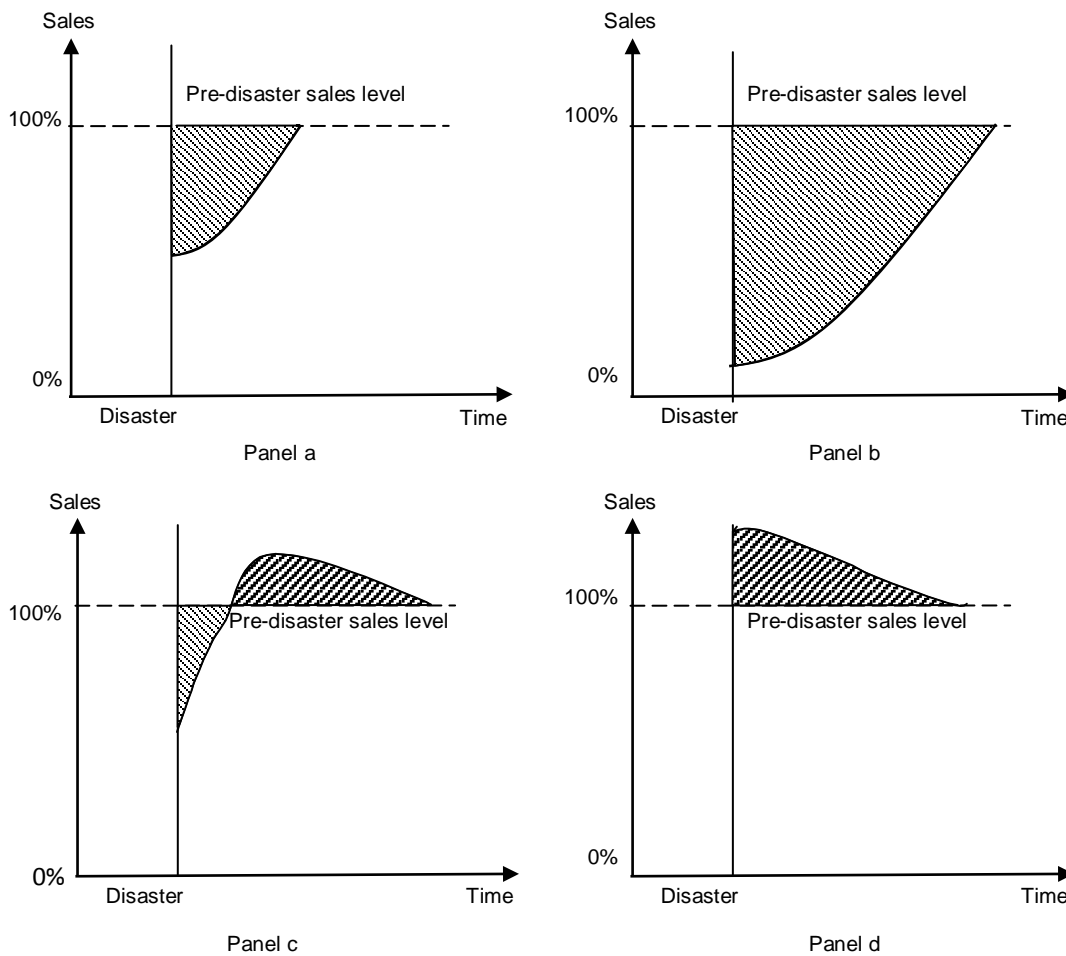


Figure 11. Patterns of Business Sales Changes after Environmental Disasters
(Lindell 2006, based on Zhang 2004)

Another source addresses business vulnerability and recovery as shown in Figure 12. This is from a paper that examined vulnerability based on the impact of the 2001 Nisqually earthquake on two “hard-hit” business districts in Seattle. The study “investigated the extent of losses, patterns of disparities, and underlying loss factors.” Data was collected through 107 interviews with business owners and managers in 62 buildings. Figure 12 illustrates the “conceptual framework” to explain how business vulnerability dimensions contribute to disaster loss. According to the authors:

We bring together insights from the theoretical literature on social vulnerability and the empirical literature on business losses to investigate how this vulnerability helped create differential business impacts . . . (Chang 2002)

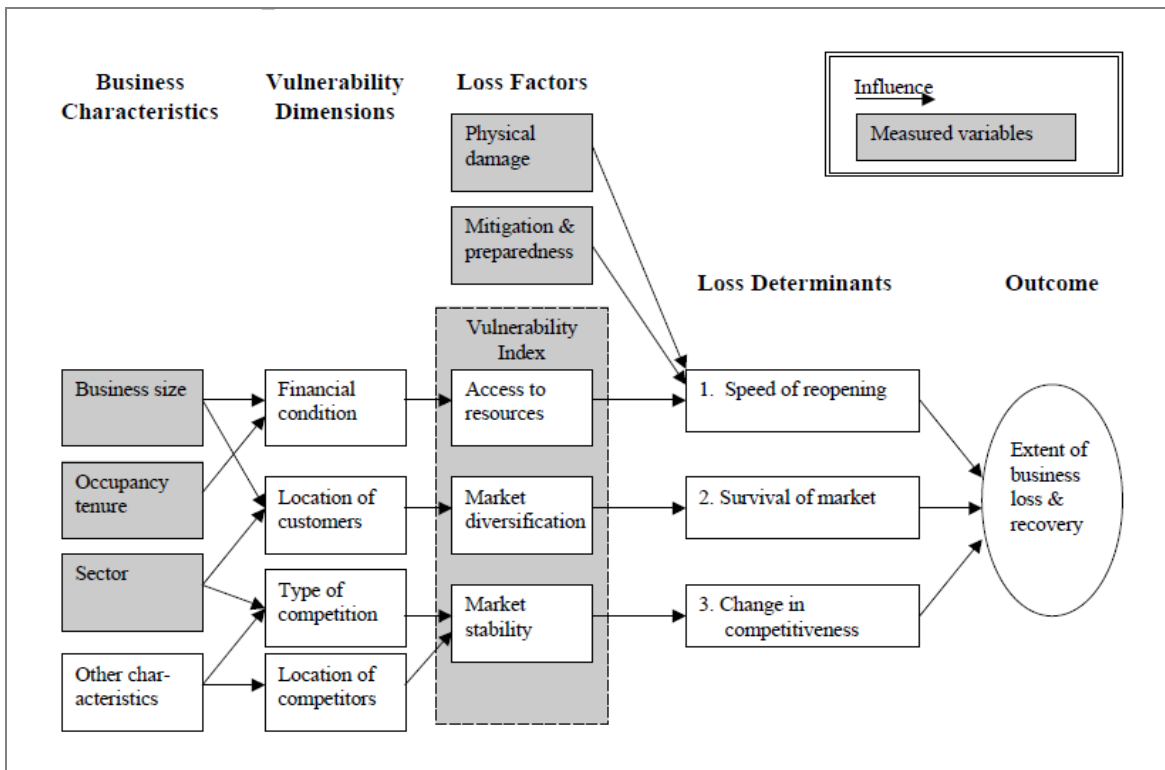


Figure 12. Conceptual Framework of Business Vulnerability and Loss in Disasters (Chang 2002)

The authors explain the framework by beginning on the right hand side of Figure 12. The three “Loss Determinants”—speed of reopening, survival of the market, and change in competitiveness—were based on review of the literature on business loss. The diagram shows the measured variables and how each was assumed to influence the loss determinants, from left to right.

For vulnerability, the authors developed a “proxy variable” that “indirectly reflects such considerations as access to resources and market diversification.” The variable, labeled “vulnerability Index,” is explained this way:

The proxy variable is based upon measurable business characteristics such as size, sector, and building occupancy tenure that affect business vulnerability. This approach focuses on variables for which data are readily available from statistical publications, thereby facilitating the development of predictive models that can be applied to anticipate future disaster impacts. Alternatively, more direct measures such as a self-reported index of the business’s financial marginality could be used. Predictive loss models based on such measures would, however, be hampered by the scarcity and uncertain reliability of such data. (Chang 2002)

The study led to the three main conclusions:

First, the “hidden” economic costs of disasters, particularly business losses, are at least as important as the documented costs.

Business losses can be explained largely by vulnerability factors, rather than by either physical damage or preparedness behavior. While vulnerability is a complex concept, we developed a proxy measure with high explanatory power.

Neighborhood effects are important in determining business loss and recovery. Businesses should not be viewed atomistically . . . there are important spatial feedback effects that can reinforce the effects of disaster vulnerability, particularly to businesses in the retail sector. (Chang 2002)

Although the Nisqually study examined businesses in just two districts following a single event, the data provides some insight on how businesses pay for repair and recovery. During the interviews each business was asked “How will you pay for earthquake related damage?” and “How will you pay for losses associated with business interruption?” Table 3 summarizes the results, based on the primary source cited by each business. For both questions, the vast majority of the responses were either “business reserves or self-insured” or “out-of-pocket.” The combination of “insurance” and “SBA loan” accounted for only 15 percent of responses.

Table 3. Sources of Repair and Recovery Financing in Two Business Districts in Seattle

Primary source of finance	For repairing damage (N=67) (%)	For business interruption loss (N=63) (%)
Insurance	6	5
SBA loan	9	10
Commercial loan	3	5
Business reserves or self-insured	51	55
Out-of-pocket	28	22
Unsure	3	5
Total*	100	100

*Columns may not add to 100% due to rounding.

Source: Chang and Falit-Baiamonte, *Disaster Vulnerability of Businesses in the 2001 Nisqually Earthquake*

Another way of examining and understanding the impacts of disasters on individual businesses is shown in Figure 13. This model identifies seven “critical cords” for a business, including a “functional transportation system.” The idea is that a business is in jeopardy if any one of the critical cords is severely damaged. (Green 2008)

The Seven Critical Cords of Business Survival (Alesch)

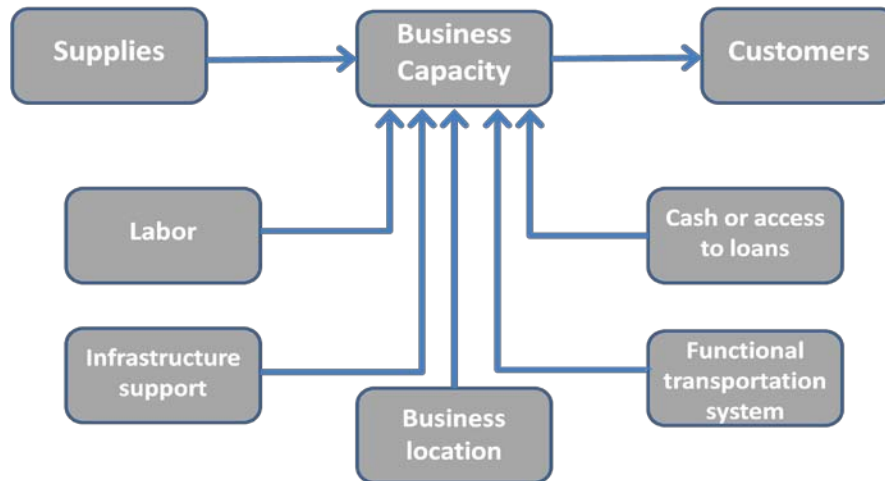


Figure 13. The Seven Cords of Business Survival

Twin Cities Business Sector Flood Impacts Survey Centralia Business and Professional Committee, May 14, 2008, Dr. Rebekah Green, Institute for Global and Community Resilience, Western Washington University

This graphic is an adaptation of work by David Alesch who used the seven cords in conjunction with the graphic show previously in this paper as Figure 1 (page 3).² Following a disastrous event, any one of the seven critical cords shown below could be damaged by one or more of the following (as illustrated on page 50):

- Immediate Consequences
- Immediately Following Consequences
- Systemic Consequences
- Ripple Consequences
- Ripple Reverberation Consequences (Alesch 2007)

All of the examples described above contribute to an increasing understanding of how individual businesses are impacted by disasters. However, the research to date provides very limited insight on the effectiveness of alternative actions, strategic or tactical by businesses or public agencies, to facilitate businesses recovery.

² In a conference presentation, “Business Survival and Recovery from Extreme Events,” at the *Understanding Earthquakes: From Research to Resilience* Conference, April 22-26, 2008, Seattle, WA, Alesch used the same “seven chord” diagram, but for the lower block on the right-hand side (labeled above as “Functional Transportation System”), Alesch used “Transformation/Transaction Facilities.” [Link](#)

IS “RECOVERY” NEGLECTED?

One of the suppositions that led to this research was that “recovery” has received less attention and a lower priority, in research and in practice, than the other phases of emergency management, especially from a transportation perspective. The practical evidence and the opinions of other researchers, as outlined below, indicates that yes, recovery has been neglected relative to the other phases. However, there is also some evidence to the contrary. The next several pages examine the indications for both “yes” and “no.”

Yes, Neglected

References to “recovery” are mostly parenthetical in the volumes of documents published by federal and state agencies since 9/11. When it is mentioned, “recovery” is often within the phrase “response and recovery” as if describing a single process with one objective or perhaps a seamless process with two barely separable objectives. The emphasis has been on protection, prevention, preparedness, mitigation, and, especially after the Katrina debacle, on response. Recovery in New Orleans and along the Gulf Coast is being studied by researchers and public officials, but the lessons are still being learned.

The following is from a chapter entitled “Sustainable Disaster Recovery: Operationalizing an Existing Agenda,” by Gavin Smith and Dennis Wenger, in the *Handbook of Disaster Research*:

Disaster recovery represents the least understood aspect of emergency management, from the standpoint of both the research community and practitioners (Berke, Kartez, & Wenger, 1993; Rubin, 1991). When compared to the other widely recognized phases of emergency management, that is, preparedness, response, and mitigation, scholars have yet to address fundamental questions, while practitioners have failed to establish an integrated policy framework or utilize readily available tools to improve disaster recovery outcomes (Berke 1993; May 1986; Mileti, 1999). (Smith 2007, 234)

Smith and Wenger provide this assessment of federal and state planning for recovery:

The evaluation of state and federal recovery planning remains virtually nonexistent and represents a fertile area of needed research (Waugh 1996). Nor has the role of federal and state agencies in local recovery practice been adequately described. Anecdotal evidence suggests that states are more likely to develop recovery plans than local governments. Yet their quality, including the degree to which they provide the tools necessary to coordinate state recovery efforts, assist local governments to develop sound plans, or embrace the concepts of sustainable recovery remain uncertain. A nationwide analysis of local and state recovery plans is needed to more accurately assess their effectiveness. (Smith 2007, 242)

A recent article in the *Journal of Homeland Security and Emergency Management* summarizes a “content assessment” of the journal’s articles and book reviews over the previous two years (2007 and 2008). A total of 40 research articles were published over that period, and not a single article addressed “Recovery.” (As shown in Table 4, the authors used another alternative to “phase”—instead of phase, they used “hazards management area.” They also used “prevention/mitigation” as a single category.) (Kushma 2009)

damage to infrastructure and to expedite emergency procurement processes when needed. Transportation and public works agencies have become more active participants in emergency drills and exercises. Public agencies are letting their stakeholders know about improvements in mitigation, preparedness, and response, but searches of publications and websites did not identify a single initiative among public agencies focused exclusively on recovery.

In the research arena, the Transportation Research Board (TRB) of the National Academies acted promptly after 9/11 to address the threats of terrorism against the nation's transportation system and the system users. According to the TRB:

Since September 11, 2001, 100 security-, emergency management-, and infrastructure protection-related projects have been authorized in the Cooperative Research Programs: 82 of these projects have been completed; 10 projects are in progress; and 8 projects have contracts pending or are currently in development. (TRB 2009)

Approximately \$13 million had been spent or committed on these projects as of September 2009.

However, only two of the one hundred Cooperative Research Program projects are directly related to the "recovery" phase of emergency management. The first, *Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies* was completed in 2005. Work is expected to begin in late 2009 on the second, *Pre-Planned Recovery and Accepted Practices for Replacement of Transportation Infrastructure*. Information about each of the 100 projects is available from a special TRB [website](#).

An additional reason to conclude that recovery has been neglected is highlighted by this excerpt from a letter to the FEMA Administrator dated August 28, 2009, from the Senate Committee on Homeland Security and Governmental Affairs:

The Post-Katrina Act required that FEMA, in coordination with other relevant federal agencies, complete a National Disaster Recovery Strategy. This strategy is now more than two years overdue and FEMA has not yet provided an estimate of when it will complete the strategy. What is your projected completion date for the recovery strategy? Please provide a FEMA staffing plan for completion of the recovery strategy. (Lieberman 2009)

We now have a *National Response Framework*, a *National Incident Management System*, and *National Preparedness Guidelines*, but no comparable framework, system, or guidelines for recovery. Looking at FEMA's organizational chart it is not clear which unit, if any, is responsible for recovery-related issues.

No, not neglected

Some evidence can be cited to argue that "recovery" has *not* been neglected, at least from some perspectives. Writing in 1997, Neal opined that, even though "early disaster research ignores recovery-time efforts . . . the past twenty years of disaster research sees an increased focus on recovery issues." (Neal 1997, 244; Barton 1970) No similar conclusions were found elsewhere in the research literature; but, obviously, researchers have not totally ignored recovery since numerous sources are cited in the

preceding descriptions of complexity, stakeholders, short-term versus long-term perspectives, conceptual models, and business recovery.

In addition, new research projects are underway. The NCHRP project mentioned above (*Pre-Planned Recovery and Accepted Practices for Replacement of Transportation Infrastructure*) is one example. Two new projects are described on the website for the Disaster Research Center (DRC) at the University of Delaware, one entitled *Methods for Measuring, Monitoring and Evaluating Post-Disaster Recovery* and the other *Resiliency of Transportation Corridors During Disasters*. (Descriptions can be viewed at [Link1](#) and [Link2](#).)

Numerous efforts are underway to document and assess the Katrina recovery efforts in New Orleans and along the Gulf Coast, but research for this paper did not identify any overarching description of underway research or any cataloging of results.

The extensive research and public policy attention given to on mitigation, sustainability, disaster resistance, and disaster resilience all add to the understanding of recovery, or at least to the understanding of how to reduce the challenges of recovery. Reducing the challenges of recovery is at the core of mitigation, sustainability, resistance, and resilience.

Practitioners could argue that recovery, at least “short-term” recovery, is a central part of their work and receives no less attention or lower priority than other responsibilities. In fact, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, passed in 1988, authorized federal financial assistance specifically for recovery, and the Stafford Act has been amended several times to add additional categories and levels of assistance. FEMA and state EMAs administer those funds.

Based on the previous examination of the differences between short- and long- term recovery, another way to answer the question of “neglect” is that the parts of recovery for which the EMAs are responsible have definitely not been neglected. For the other parts of recovery (e.g., longer term), the answer is less certain, and only anecdotal information is available.

Practitioners could also point to *Emergency Support Function (ESF) #14* as recognition of the importance of Long-Term Recovery. The following is an excerpt from the Emergency Support Function #14 – Long-Term Community Recovery Annex:

Purpose: ESF #14 – Long-Term Community Recovery provides a mechanism for coordinating Federal support . . . to enable community recovery from the long-term consequences of extraordinary disasters. ESF #14 accomplishes this by identifying and facilitating availability and use of sources of recovery funding, and providing technical assistance . . . for community recovery and recovery planning support.

Scope: ESF #14 may be activated for incidents that require a coordinated Federal response to address significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, community infrastructure, the environment, human health, and social services) to foster sustainable recovery. ESF #14 support will vary depending on the magnitude and type of incident.

Policies: ESF #14 recognizes the primacy of affected State, tribal, and local governments and the private sector in defining and addressing risk reduction and long-term community recovery priorities, and in leading the community recovery planning process . . . (FEMA 2008)

According to FEMA, the federal ESF #14 team, Long-Term Community Recovery “responded with assistance in 10 of 75 federally declared disasters in 2008, deploying teams of long-term recovery specialists to 26 communities across 11 states to assist in charting an efficient and streamlined path to recovery.” (FEMA, 2008b) All of the state-level emergency plans reviewed as part of this research also included a long-term recovery ESF. FEMA has a website for “ESF #14 Planning Resources.” [Link](#)

Although FEMA has not developed a “national recovery framework” as required by the Post-Katrina Recovery Act, the requirement is still there, and at least some members of Congress are still pressing. Others are also supportive. A copy of a briefing, “Developing a National Disaster Recovery Framework,” to the Congressional Hazards Caucus is available on the Caucus’s [website](#). (Johnson, 2009) Further, the January, 2009, issues of *Natural Hazards Observer*, was entitled “Toward a National Disaster Recovery Act of 2009.” No such act emerged, but some specific ideas were placed on the table. [Link](#)

The Obama Administration has established a Long Term Disaster Recovery Working Group, co-chaired by the Secretaries of the Departments of Homeland Security (DHS) and the Department of Housing and Urban Development with representatives from approximately 20 federal departments and agencies. “Stakeholder Forums” were held in four cities, including Memphis, in November 2009. [Link](#)

Finally, from a transportation perspective, the U.S. Department of Transportation circulated a draft report entitled *Recovering from Transportation Disasters: The National Transportation Recovery Strategy (NTRS)* in May 2009, and a final version was published in November 2009. The introduction to the final NTRS report includes this statement:

The *NTRS* is designed to help transportation industry stakeholders and local, tribal, and State government officials prepare for and manage the transportation recovery process following a major disaster. *The overall goal of this Strategy is to promote a recovery process for transportation networks – and subsequently of communities in general – that results in a greater level of resilience.* (USDOT 2009)

The report is further described as an initial step in a national effort:

NTRS begins a comprehensive national effort to promote community resiliency through effective transportation recovery planning and implementation. You are encouraged to use the *NTRS* as a resource to start planning for your role in the transportation and overall recovery process of your community following a disaster.

The U.S. Department of Transportation (DOT) and its Federal partners are firmly committed to enhancing the usefulness of this initial Strategy through the future development of additional tools and resources for industry stakeholders and local, tribal, and State authorities facing the difficult task of recovering a transportation network. DOT is leading a joint effort with the U.S. Department of Homeland Security (DHS) to produce the package of products that will enhance the *NTRS*. (USDOT 2009)

CLOSING

The following advice from Daniel Alesch helps summarize much of the current thinking and public policy toward disaster recovery:

The best advice for recovery is not to need it. (Alesch 2008)

A companion background paper, “The ‘Phases’ of Emergency Management,” describes the popular emphasis on mitigation and related concepts to reduce the challenges of recovery—through prevention, protection, reduced vulnerability, increased sustainability, and improved resilience. Likewise, the private sector is giving attention to business continuity, risk management, and related concepts. All of these initiatives are aimed at not needing “recovery,” or at least reducing the extent of damage when disaster occurs and/or increasing the inherent capabilities for recovery.

Nonetheless, disasters will occur and recovery will be required. Whether or not “recovery” has been the most neglected phase of emergency management in the past, transportation researchers and practitioners now have important opportunities to influence “recovery” research and policy development. The information presented in this paper is intended to provide insight on the complexities of recovery, the differences between short-term and long-term recovery (and the associated responsibilities), the factors that influence business recovery, and the conceptual models developed through previous research.

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