THE CIP REPORT

CENTER FOR INFRASTRUCTURE PROTECTION
AND
HOMELAND SECURITY

MARCH 2014
EMERGENCY MANAGEMENT

VOLUME 12 NUMBER 9

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This month *The CIP Report* focuses on **Emergency Management**. Our authors examine various aspects of community preparedness and evaluate disaster response capabilities.

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First, Michael Collins, Julia Yaeger, Lori Eaton, Julia Phillips, and Frederic Petit of Argonne National Laboratory present an index to measure public preparedness at the community level. Then, Admiral James M. Loy provides an insightful review of Dane S. Egli's recent book, *Beyond The Storms: Strengthening Homeland Security & Disaster Management to Achieve Resilience*, and Homeland Security and Emergency Management professor Emily Bentley argues for a reassessment of risk regarding the transportation of crude oil by rail. Staff Critical Care Paramedic Eugene Elliott of the U.S. Coast Guard follows with a discussion of Emergency Medical Services, and CIP/HS Research Assistant Manal Farooq analyzes the use of social media in disaster management. Lastly, Emergency Management Consultant Amanda Phan makes a case for disaster recovery preparedness as an essential element of community confidence building.

We would like to take this opportunity to thank this month's contributors. We truly appreciate your valuable insight.

We hope you enjoy this issue of *The CIP Report* and find it useful and informative. Thank you for your support and feedback.

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Creating an Index to Measure Public Preparedness

by Michael Collins, Julia Yaeger, Lori Eaton, Julia Phillips, and Frederic Petit
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Introduction

Public preparedness as it relates to the field of emergency management is a major concern in the United States, as demonstrated by the amount of time, money, and organizational emphasis devoted to the topic by several federal, state, and not-for-profit organizations.[1] Numerous efforts have attempted to evaluate the relative readiness of citizens to face an incident while also highlighting the need for better individual preparedness in an emergency.[2] These efforts have proven critical because they provide statistics about the overall awareness and preparedness levels of the U.S. population and allow public officials to identify existing gaps. Nevertheless, these efforts focus on the issue at a national level and have yet to provide communities with a comprehensive and consistent tool to measure how prepared their citizens are (on a community level, rather than an aggregate national scale) or offer suggestions on increasing their citizens' level of readiness.[3]

Conversely, while useful, some tools are too narrowly focused, targeting only the community members and their current knowledge or actions, and not on community programs or resources that better prepare the individual.[4] As such, officials cannot determine specific resources, policies, or programs that could be implemented or enhanced to better prepare the population for an emergency. These tools are not sufficient to assess either citizens' levels of preparation or their contributions to overall community resilience in their entirety. To fully capture the preparedness of individuals, officials need to be able to measure the ability of a community to support the preparedness of its citizens. It is a difficult and time-consuming task to measure directly all of the variables that support the numerous operational preparedness and response functions that would fully capture individual preparedness.

The Public Preparedness Index

To address this gap in capability, Argonne National Laboratory has developed an index to characterize public preparedness within a community and provide a method by which communities can compare relative preparedness levels to those of other similar communities. The index uses proxy variables, developed with the assistance of emergency management and preparedness subject matter experts, to capture the main functions and characteristics of a community that support or increase the preparation of the population facing an emergency.

The variables were formulated to consider the elements that contribute to increasing individual knowledge about preparation and the resources necessary to allow

(Continued on Page 3)

[1] *The Council for Excellence in Government. 2006. Are We Ready? Introducing the Public Readiness Index: A Survey-Based Tool to Measure the Preparedness of Individuals, Families and Communities*. Washington, D.C.: The Council for Excellence in Government, p. 26; FEMA (Federal Emergency Management Agency). 2010. *Ready.gov*. Washington, D.C.: U.S. Department of Homeland Security, available at http://www.ready.gov (accessed February 11, 2014); HSEMA (Homeland Security and Emergency Management Agency). 2010. *72 hours*. Washington, D.C.: Homeland Security and Emergency Management Agency, available at http://hsema.dc.gov/page/72-hours (accessed February 11, 2014); City of Chicago. 2010. *Alert Chicago*. Chicago, Ill.: City of Chicago, available at http://www.alertchicago.org (accessed February 11, 2014).

[2] Citizen Corp. 2009. *Personal Preparedness in America: Findings from the 2009 Citizen Corps National Survey – Summary Sheet*, Washington, D.C.: Federal Emergency Management Agency, p. 8.

[3] The Council for Excellence in Government. 2006. *Are We Ready? Introducing the Public Readiness Index: A Survey-Based Tool to Measure the Preparedness of Individuals, Families, and Communities*, Washington, D.C.: The Council for Excellence in Government, p. 26.

[4] Ibid.

(Continued from Page 2)

individuals to maximize their use of that knowledge. Using these proxy variables allows assessors to conduct the study quickly, identify gaps, and define actionable measures.

After the formulation of proxy variables, a top-down approach, based on the principles of functional analysis and multi-attribute utility theory,[5] is used to define the organization and calculate the structure of the Public Preparedness Index (PPI). This index is organized into four levels of information (Table 1.) *(Continued on Page 4)*

Level 1 – Functions	Level 2 – Components	Level 3 – Activities	Level 4 – Characteristics
Disaster public education programs	Hazards identification	• Threats	Questions [6]
	Hazards awareness	• Education/awareness programs • Resources	
	Training	• Disaster education training courses	
Public information	Crisis communication	• Reception of information regarding hazards • Responder communication • Communication with the public • Handling stakeholder requests for information • Handling public requests for information	
Health care/public health services	Disease prevention/control	• Infection control	
	Medical assets	• Facilities	
	Surge capacity	• Planning • Facilities • Memoranda of understanding/memoranda of agreement	
	Mass casualty support	• Mass casualties	
Community engagement	Public/private partnerships	• Types of community partnerships • Functions of community partnerships	
	Citizens groups/organizations	• Community Emergency Response Teams (CERT) • Local Emergency Planning Committee (LEPC) • Public Safety Committee	
Disaster public education programs	Hazards identification	• Threats	
	Hazards awareness	• Education/awareness programs • Resources	
	Training	• Disaster education training courses	
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	Medical assets	• Facilities	
	Surge capacity	• Planning • Facilities • Memoranda of understanding/memoranda of agreement	
	Mass casualty support	• Mass casualties	
Community engagement	Public/private partnerships	• Types of community partnerships • Functions of community partnerships	
	Citizens groups/organizations	• Community Emergency Response Teams (CERT) • Local Emergency Planning Committee (LEPC) • Public Safety Committee	

Table 1 – Public Preparedness Index Structure

[5] Dyer, J.S. 2005. "MAUT – Multi-attribute utility theory." *International Series in Operations Research & Management Science*, in J. Figueira, S. Greco, M. Ehrgott (Eds.), Multiple Criteria Decision Analysis: State of the Art Surveys, Volume 78(IV), pp. 265–92.

[6] The PPI groups around 360 multiple choice questions (e.g., Does the Community have written procedures for the activation of: Community sirens, Telephone warnings systems, Radio warnings systems, Television warnings systems, E-mail warnings systems, Permanent or portable warning signs, Stationed call boxes? (select all that apply)) and yes/no questions (e.g., Has the community identified what medical surge resources are needed from partners?, Does the community have an emergency services focused committee representing the individual capabilities of the jurisdiction?).

(Continued from Page 3)

The first level corresponds to main community functions meant to capture actions that a community should take to support public preparedness. The second level corresponds to components a community should have in place to support their main functions (e.g., warning/notification systems consists of disaster warning systems, public notification systems, and health alert systems). The third level corresponds to activities, which define the different tasks that constitute preparedness components. Finally, the fourth level corresponds to the characteristics of the individual questions that relate to the Level 3 activities captured during the preparedness survey.

Gathering the Information

Only the information in the fourth level (characteristics) is collected. The other levels of the PPI are informed by the aggregation of the characteristic information. The questionnaire (Level 4 information) was developed in collaboration with subject matter experts (SMEs), as well as by using existing survey characterizations of public preparedness, individual response capabilities, and social resilience.[7] Through the use of objective questions (e.g., the presence of a specific plan or resource), the survey ensures the collection of accurate and transparent information that can be compared and interpreted in a consistent manner. The questionnaire was developed to be completed by individuals in charge of the various service functions within a community over a short amount of time. The survey covers the main functions of a community to support public preparedness considering a possible catastrophic event,[8][9] as previously identified. The information required to complete the PPI can be collected by participating in community visits conducted by state or federal officials or by taking a self-assessment diagnostic conducted by emergency management representatives within a community.

Index Calculation

Each Level 4 question in the index is combined with other related questions pertaining to a specific activity of public preparedness (Level 3). Those parts are then combined into the broader components (Level 2). The Level 2 components are then combined to determine the Level 1 Functions, which are then merged to yield the overall PPI for the community. The PPI produces a value between 0 and 100, where 100 would represent the highest level of public preparedness and the 0 would indicate the lowest level of public preparedness, within the scope of the survey questions asked.

This method of characterizing the capabilities of a community to support the preparation of citizens allows community preparedness officials to understand the gaps in their community capabilities. A score of 100 on the PPI is not necessarily the expected level of capability for public preparedness. Rather, a score of 100 would represent an optimal community with exceptionally prepared individuals—and that would rarely be observed. The information provided by the PPI could be used in a couple of different ways. First, an acceptable level of capability for a community could be determined from an analysis of the average preparedness score of similar communities, combined with examination of minimally accepted capabilities from within each of the PPI levels. Second, a baseline PPI value could be defined on the basis of regional characteristics (e.g., environment, potential threats, and rural vs. urban community) of a given jurisdiction. Such a baseline value should consider federal, state, and local regulations and be based on the elements identified in the

(Continued on Page 5)

[7] Several websites (e.g., Ready.gov, 72hours.gov, AlertChicago.org, FEMA preparedness goal), surveys (e.g., 2009 Citizen Corps National Survey), and tools (e.g., Public Readiness Index developed by the Council for Excellence in Government) address the emergency preparedness of citizens. These as well as other similar resources were used to assist in the development of the PPI. The approach created for the PPI complements previous tools by measuring how prepared the citizens are and what they can do to increase their own levels of preparation and by identifying options that a jurisdiction could adopt to support them.

[8] EMAP, 2013, *Emergency Management Standard*, Emergency Management Accreditation Program, available at http://www.emaponline.org/index.php?option=com_pollydoc&format=raw&id=309&view=doc (accessed February 11, 2014).

[9] NFPA, 2013, NFPA® 1600 - *Standard on Disaster/Emergency Management and Business Continuity Programs*, National, Fire Protection Association, available at http://www.nfpa.org/assets/files/AboutTheCodes/1600/1600-13-PDF.pdf (accessed February 11, 2014).

(Continued from Page 4)

National Preparedness Goal.[10] Setting such a baseline could help the federal and state officials identify regional or national gaps in preparedness and then plan for measures to address those gaps.

To facilitate decision making, municipal or county officials need tools that allow them to consider possible options for enhancement and to observe implications of changes. The PPI can serve as a tool that aids decision making by allowing the community officials to see the potential impacts of changes immediately via the changes in values of the calculated indices. The PPI can also be used to aid communities in assessing their current capabilities, as well as laying out a systematic approach to improving capabilities nationwide by targeting specific areas of weakness.

Conclusion

In a complex and interconnected world, it is vital for communities to enhance public protection and resilience. Preparing the public to face an emergency is uniquely important because providing safety and sustaining a high quality of life are the ultimate goals of virtually any community. Therefore, it is essential to consider how communities can support and enhance the preparedness and ultimately the resilience of their citizens. Utilizing a systematic approach to assessing public preparedness and clearly defining the areas communities can improve the relative resilience of their citizenry will help to ensure that decision makers and emergency management professionals are well equipped to face this significant challenge.❖

***Acknowledgment**

The submitted manuscript has been created by UChicago Argonne, LLC, Operator of Argonne National Laboratory ("Argonne"). Argonne, a U.S. Department of Energy Office of Science laboratory, is operated under Contract No. DE-AC02-06CH11357. The U.S. Government retains for itself, and others acting on its behalf, a paid-up nonexclusive, irrevocable worldwide license in said article to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government. This work is partially supported by the U.S. Department of Energy, Office of Science, Basic Energy Sciences under contract # DE-AC02-06CH11357.

[10] FEMA, 2014, *National Preparedness Goal*, Washington, D.C.: U.S. Department of Homeland Security, available at http://www.fema.gov/national-preparedness-goal (accessed February 11, 2014).

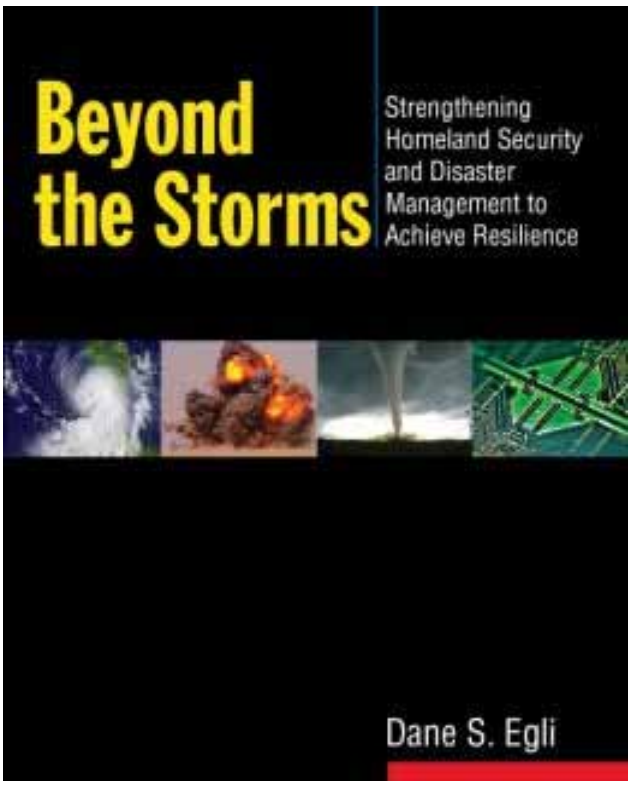
Book Review

by Admiral James M. Loy, USCG (ret)*

Beyond The Storms: Strengthening Homeland Security & Disaster Management to Achieve Resilience, Egli, Dane S. (November 2013), published by M.E. Sharpe, 227 pages, $28.51.

The complexity and costs of preventing and protecting our nation's aging infrastructure from natural disasters, pandemics, and security threats have exceeded solutions offered by public policies. There must be a better way. The expenses and level of uncertainty associated with hardening facilities and confronting the realities of climate change overwhelm the receding funds available to local, state, and federal governments. Despite these challenges, *Beyond the Storms* highlights the continuing importance of taking steps *now* to make the nation's infrastructure more resilient. The author suggests we must do more than attempt to prevent inevitable crises—our challenge is to preserve America's economic strength and global influence. Towards that end, this consequential book lays the necessary groundwork for improving resilience at all levels of the public and private sector.

This book, written by a former seagoing officer with significant operational and strategic planning credentials, actually challenges us to think and act anew in an area that is difficult to quantify or legislate. It asserts the importance of operationalizing critical infrastructure resilience at the community and regional levels, because no single government agency, non-governmental organization, or private-sector firm can do all that's necessary to achieve national preparedness and security.[1] In response to mayors, business owners, and regional policymakers—urgently preparing for future disasters—this practical book provides a framework to mitigate hazards and improve preparedness through resilience.



The book's underlying theme is that our country—while working hard to publish doctrine, defend our borders, and prevent the next attack—is also looking for answers that take us beyond merely *reacting* to the storms and disasters that we know will come. It provides the argument for operationalizing resilience and offers the organizing principles around which we can better plan and prioritize efforts to strengthen the nation's resilience in the face of twenty-first century complexities and uncertainties.

Beyond the Storms examines the most significant challenges of whole-of-government interagency coordination in support of critical infrastructure protection and offers 93 findings and 20 recommendations to improve security and resilience across all domains—air, land, sea, space, and cyber. It documents the results of an exploratory study designed to uncover the state of national preparedness by drawing upon policy reviews, case studies,

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[1] Referring to the mandates of Presidential Policy Directives, *National Preparedness* (PPD-8), and *Critical Infrastructure Security & Resilience* (PPD-21).

(Continued from Page 6)

and expert interviews. The relevant body of literature addressing preparedness and critical infrastructure protection is informed by academic, private sector, cross-governmental, and security imperatives with a focus on the post-9/11, post-Sandy threat environment of natural disasters, terrorism, cyber-attacks, and health pandemics. Against this backdrop, the author examines the following themes:

- The *current state of preparedness* based on policy directives to prevent, protect from, mitigate, respond to, and recover from disasters;

- Understanding the *complexity and interdependencies* of critical infrastructures and the central role of global supply chains;

- The assertion of resilience as a public good *enabled by collective action*,[2] interagency coordination, and public-private partnerships (PPPs);

- The ability of cross-governmental stakeholders to *implement policy* under the current intergovernmental and private-sector constructs; and

- Potential *remedies to strengthen preparedness, response, and resilience* in support of all-hazards safety, security, economic, and environmental objectives.

While this book is not the first one to highlight the single points of failure and acute vulnerabilities of our infrastructure or the inevitable nature of future disruptive events, it is unique in its summary of preparedness efforts to date and trenchant presentation of smart resilience. It issues a refreshing challenge to individuals, local leaders, and regional planners to anticipate crises and posture our infrastructure and ourselves resiliently through hazard mitigation and engagement with the private sector—those who own and operate the majority of our nation's infrastructure.

By creating a more connected world, globalization has made new business efficiencies possible. Businesses have more supply-chain partners than ever before, allowing for greater speed, efficiency, and specialization. Outsourcing and purchasing from a single source reduces costs, and just-in-time delivery is reducing inventory and excess capacity. But these advances have also reduced our margin for error and created a fragile environment where a local disruption can adversely affect the entire supply-chain with cascading impacts. The primary consequences of disruptions reported by businesses are loss of productivity, increased cost of work, impaired service outcome, loss of revenue, and customer complaints.[3]

The author underlines the importance of supply-chain *resilience*: the ability to withstand a crisis, absorb damage, recover quickly, and adapt to disruptive events. Resilience requires long-term planning and investment in redundancy, interoperability, and agility. Crises often cannot be predicted or controlled, but their negative impacts are undeniable. This book underscores the potential for resilience to prepare businesses for economic downturns, emphasizing that companies with supply-chain flexibility and adaptability are better able to reduce expenses during a disruption, allowing them to outperform competitors and receive a substantially higher return on investments.

Resilience is "disaster agnostic," meaning it equally mitigates damage caused by earthquakes, terrorists, electromagnetic pulse, or economic downturns. And though it may be difficult to quantify generally, after every disaster businesses that prepared ahead of time restore services more rapidly. For example, after the 2011 Fukushima earthquake and tsunami in Japan, a semiconductor manufacturer that had developed a strategy to shift production to unaffected manufacturing plants in response to an earthquake three years earlier was able to restore full production quicker than its competitors. Maintaining critical operations in the face of disaster events confers a competitive advantage. Good business practices and homeland security alike are enabled

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[2] Drawing from Collective Action Theory and Tragedy of the Commons work advanced by Elinor Ostrom, 2009 Nobel Laureate in Economic Sciences.

[3] A 2013 study by Accenture found that supply-chain disruptions reduce the share price of affected companies by 7% on average. *Building Resilience in Supply Chains*, World Economic Forum, January 2013, p. 7, http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Building-Resilience-Supply-Chains.pdf.

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by resilience.

The author underscores how investing in resilience is becoming a basic business practice across all 16 critical infrastructure sectors. In addition to mitigating disaster-related damage, investment in resilience—by introducing new flexibility—can increase productivity, revenue, reputation, and shareholder value. Investing in resilience before disaster strikes is the smart choice for companies and governments alike because such preparation helps to preserve critical capabilities and to restore functions quickly while denying terrorists their objectives and preserving economic stability. Resilience not only increases the public confidence in the ability to recover services after a crisis, but it offers a potential deterrent to nefarious actors who would do us harm in the future, because operatives see the futility of attacking those systems which are able to rebound resiliently.

Resilience is not a problem that can simply be handed to the government or studied by policymakers. It is a vexing challenge that crosses the boundaries of federal, state, regional, and local communities and transcends public-sector capabilities. Only a whole-of-nation public-private approach can offer an enduring solution. Furthermore, it is not enough to compile lessons learned from recent disasters: lessons *learned* are really lessons *observed* until they are operationalized. Functional resilience requires that we systematically distill the major lessons of these events *and* formulate a framework for action that can be implemented at local, regional, state, and national levels—an ambitious challenge the book does not minimize.

Recognizing the major challenges of our era—eroding infrastructure, growing interconnectedness of a globalized economy, and the emerging threats of climate change, natural disasters, and terrorism—this book provides a holistic and generalizable framework to face the storms of the future. It reveals a broad consensus that resilience *does* work and ought to be pursued operationally, and as a matter of policy. The author, acknowledging a major challenge of our day, seeks to bridge the gap between national and state policies and the demands of regional planners, owners, and operators. Urging the need for action—informed by risk-mapping of our critical economic nodes and leveraging quantitative analytics—*Beyond the Storms* serves as a catalyst to a new approach. It supports risk-mitigation and offers an actionable framework in which key variables and assessment criteria can be identified *before* disasters come.

The heart of this book—operationalizing critical infrastructure resilience—is a starting point for all stakeholders to systematically prepare for the future by examining infrastructure, discovering complex interdependencies, defining essential functions, and formulating action plans. The cumulative purpose of this effort is to mitigate the risk and adverse impact of future disasters. Finally, by increasing the flexibility and adaptability of critical infrastructures, resilience makes the nation more secure from hostile actors, cyber-attacks, and Mother Nature. Resilience—by focusing on long-term hazard mitigation and systematically investing in eroding infrastructures—makes America more economically competitive because it enables delivery of public goods those critical infrastructures support.

Like President Eisenhower's vision for the public highway system sixty years ago, resilience is both a national security objective and an economic imperative. While the benefits of resilience are unquestionable, it will still take significant effort to sustain public interest as well as integrate such thinking into our public-private communities and homeland security enterprise. Such an initiative is necessary to prepare the communities of America to face the coming storms. For that reason the author has it right and this is a critical reference for all who intend to navigate the hazardous waters of the future.❖

** Admiral James M. Loy is Former Commandant of the United States Coast Guard, Deputy Secretary of DHS, and TSA Administrator. He is currently a senior counselor with the Cohen Group in Washington DC and can be reached at jloy@cohengroup.net.*

Rail Transport of Crude Oil and the Evolving Nature of Risk

by Emily Bentley, J.D.*

Risk assessment in disaster management, as in critical infrastructure protection, is a continuing process. Factors that contribute to risk, including probability of hazard occurrence, vulnerabilities, and consequences, can change. In the case of transportation of crude oil by rail, safety officials and emergency managers are beginning to realize an expedited reassessment of risk is needed.

Situation

Transport of crude oil by rail is increasing in the United States, and several large petroleum spills in 2013 have focused attention on both rail tanker safety and local capabilities to respond to a significant spill and potential fire or explosion. Many consider increased U.S. production of crude a positive in terms of economic growth and national security, and it is acknowledged that this commodity will be transported, stored, and transferred via rail, water, highway, and pipeline. Officials and communities are beginning to ask if we have an accurate view of associated risk and response capabilities commensurate to the risk.

In terms of critical infrastructure, transportation of crude by rail can be considered a high stakes undertaking. Rail transportation is a component of the transportation systems sector, one of the 16 sectors of critical infrastructure identified in Presidential Policy Directive 21 (PPD-21).[1] Transport of crude by rail then is a critical asset transported via critical infrastructure, often moving in close proximity to other critical infrastructure locations and through densely populated areas.

Contemporary emergency management is based on a premise that a realistic and current understanding of risk should inform prevention, protection, and preparedness activities across sectors and organizations. In the case of crude oil transport by rail, a drastic increase in volume and a shift in the type of crude being shipped may create an increased risk about which many local and state emergency managers and officials may not have adequate information. Given the location of railroad tracks through towns large and small, areas urban and rural, capabilities to respond to the potential consequences of a significant rail accident involving crude oil vary widely. Details about the types of oil shipments and on which lines they travel is not information that has regularly been made available to local or state emergency managers. Responsibility for safety of the shipments rests with the railroad once the oil producer delivers the product to the rail facility. As we know, local responders and residents will make up the bulk of initial response capabilities in most locations. Hazardous material response teams are found throughout the United States, including national, regional, state, and local hazmat response teams. Specific types of hazmat teams are categorized in the Federal Emergency Management Agency (FEMA)'s Typed Resource Definitions,[2] and hazmat training is available at multiple training providers. Modeling products are available to inform preparedness and protective action measures for hazardous material spills.[3] These resources and capabilities, however, rely to a degree on having good information about the hazard itself, while several risk components with regard to a portion of U.S. crude seem to have changed.

Crude oil has historically been transported primarily by pipeline in the United States, but that has changed in recent years. Ac-

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[1] President Barack Obama, Presidential Policy Directive (PPD)-21, *Critical Infrastructure Security and Resilience*, 2013.
[2] Federal Emergency Management Agency, FEMA 508-4 *Typed Resource Definitions – Fire and Hazardous Material Resources*, 2005.
[3] National Oceanic and Atmospheric Administration (NOAA), *Hazmat Modeling Products for Spill and Response Planning*, 2012, available at http://www.hsdl.org/?view&did=17072.

(Continued from Page 9)

cording to the Association of American Railroads (AAR), an industry group, almost 234,000 carloads of crude oil traveled on U.S. Class I railways in 2012 with approximately 400,000 carloads estimated for 2013.[4] The 2013 estimate represents a more than 40-fold increase over the 9,500 carloads originated six years ago in 2008. Class I railways are major rail lines that go long distances; there are seven. There are many more short-line (Class II or III) railways that cover the first or last pieces of a rail journey and carry much less volume.

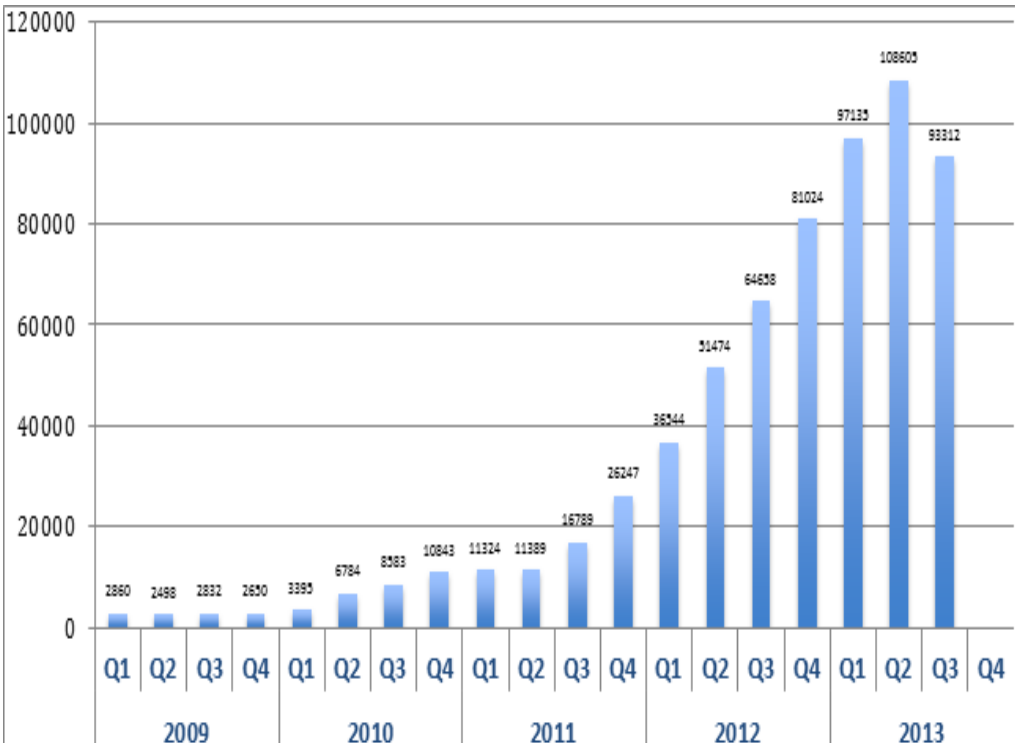

Figure 1. Originated carloads of crude oil on U.S. Class I Railroads, 2009-2013 (source: AAR)

While pipelines have seen higher numbers of spills and higher volumes of crude oil spilled than rail in the past, that changed significantly last year. In 2013, more crude oil spilled in U.S. rail incidents than in the past 37 years combined, according to data from the Pipeline and Hazardous Materials Safety Administration (PHMSA), the unit of the U.S. Department of Transportation (US DOT) responsible for hazardous materials in transit regulation and enforcement.[5] Several large spills were primarily responsible for the high volume—1.2 million gallons—spilled in 2013, including almost 750,000 gallons of crude oil that spilled in November near Aliceville, Ala., bursting into flames. More than 400,000 gallons spilled in a Casselton, N.D. derailment. From 1971 through 2012, less than 800,000 gallons of crude was spilled in rail incidents, according to the PHMSA data.[6] The PHMSA total for 2013 does not include the 1.5 million gallons spilled in the July 2013 derailment in Lac-Mégantic, Quebec, which killed 47 people and destroyed a significant area of the historic downtown.

In the Lac-Mégantic crash and fire, tank cars in a train owned by Montreal, Maine & Atlantic Railway derailed and ruptured. When the oil spilled from multiple tank cars, a fireball engulfed the downtown as thousands of gallons of oil exploded. Recent tests by the Canadian Transportation Safety Board confirm that the fuel that spilled and exploded was a Class 3 PG III material. A key difference in types of material is the material's flashpoint, a measure of the tendency of a material to form a flammable or combustible mixture when exposed to air. "The spilled crude oil had high vapour pressure and a low flash point (<35 degrees C) that was much lower than the temperature at the time of the occurrence (21 degrees C), indicating

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[4] Association of American Railroads (AAR), Moving Crude Oil by Rail. December 2013, accessed at https://www.aar.org/keyissues/Documents/Background-Papers/Crude-oil-by-rail.pdf.

[5] Curtis Tate, "More oil spilled from trains in 2013 than in previous four decades," (*McClatchy Newspapers*, January 20, 2014), accessed March 9, 2014, at http://www.kansascity.com/2014/01/20/4764674/more-oil-spilled-from-trains-in.html; PHMSA Office of Hazardous Material Safety, "Incident Reports Database Search," PHMSA, accessed March 12, 2014, at https://hazmatonline.phmsa.dot.gov/IncidentReportsSearch/search.aspx.

[6] PHMSA Office of Hazardous Material Safety, "Incident Reports Database Search," PHMSA, accessed March 12, 2014, at https://hazmatonline.phmsa.dot.gov/IncidentReportsSearch/search.aspx.

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Derailed tanker train burns outside Aliceville, Ala., Nov. 2013*

it was readily ignitable. Multiple sources of ignition were present at the derailment site such as damaged power lines, derailed equipment, etc."[7] After the incident, the US DOT issued a safety alert that the type of crude oil being produced and transported from the Bakken region in the United States might be more flammable than traditional heavy crude oil. Bakken Shale has played a significant role in the increased U.S. production of crude and natural gas through the process known as fracturing or "fracking."

Risk

The AAR notes that more than 99 percent of hazardous material shipments by rail occur safely. However, with the increasing volume of crude oil moving by rail, and in particular potentially more volatile forms of crude, regulators and emergency managers need to reevaluate risk, safety standards, and capabilities for response.

In remarks to the Railroad Safety Advisory Committee in October 2013, Federal Railroad Administrator Joseph C. Szabo said, "The safety statistics of the MM&A before Lac-Mégantic did little to show an impending accident. Yet with a thorough risk analysis it becomes clearer where pockets of risk were evident. It presents a challenge to go beyond the statistics, to do thorough risk analyses, and to add the safety redundancy that takes away single points of failure."[8] The Federal Railroad Administration (FRA) and other federal agencies in the regulatory scheme are moving to examine and improve safety and security measures, such as retrofitting tank cars used to transport flammable liquids to improve safety.

The most common rail tank cars in service in the United States and Canada, known as DOT-111 cars, are familiar sights. These non-pressurized tank cars can transport a variety of liquids by rail and represent 69 percent of the American fleet of rail tank cars, according to trade web site Oilprice.com.[9] According to the web site and other reports, a main concern with DOT-111 is a tendency of tanks to puncture in a crash. This can pose heightened risk particularly when they are used to transport crude oil produced from American shale.

In the case of Bakken Shale crude, the PHMSA found that crude from the Bakken region in the United States (North Dakota and Montana), at least in some cases, was not properly classified. Shippers of hazardous materials are required to classify hazards using nine categories found in federal regulations. These

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[7] Transportation Safety Board (TSB), Laboratory Report LP148/2013, accessed March 9, 2014, at http://www.tsb.gc.ca/eng/enquetes-investigations/rail/2013/R13D0054/lab/20140306/LP1482013.asp.
[8] Joseph C. Szabo, "Prepared Remarks, 50th Meeting of the Railroad Safety Advisory Committee," (Washington, DC: Federal Railroad Association, October 31, 2013), accessed March 9, 2014, at www.fra.dot.gov/Elib/Document/3475.
[9] Rory Johnston, "DOT-111 Safety Major Issue in Crude-By-Rail Debate", Oilprice.com. accessed March 9, 2014, http://oilprice.com/Energy/Crude-Oil/DOT-111-Safety-Major-Issue-in-Crude-By-Rail-Debate.html.
*Photo courtesy Alabama Emergency Management Agency.

(Continued from Page 11) T classifications determine how the material is packaged, shipped, and placarded, which provides notice to carriers and emergency responders of the nature of the contents. Three notices of probable violations were issued to oil companies.

A component that has not yet been extensively explored is the need for heightened awareness, training, and capability building for warning, evacuation, and response capabilities in areas along frequent crude transportation routes. The state of New York has undertaken a review of crude by rail safety and preparedness issues.[10] The International Association of Fire Chiefs (IAFC) responded to the PHMSA's safety alert with a statement of preparedness elements. The IAFC safety brief notes that Bakken crude may have lower flashpoints than the traditional light crude with which responders likely have had experience or training, and suggests, "First responders should check with local rail carriers, storage, and refining facilities in their response areas to see if this type of crude is moving through or into their area."[11]

Regulation and Preparedness

There are several distinct components in the safety equation for transportation of crude oil by rail. As suggested above, a key initial feature is that the producer appropriately identifies, classifies, and marks the substance. Another factor may be the design and integrity of rail tank cars used to transport liquids via rail. Safety and regulatory compliance inspections are another factor. Response capabilities, including evacuation and hazmat response in communities in proximity to railroad lines where hazardous materials are transported, is another vital component.

While the FRA, another component of the US DOT, has jurisdiction over railroad safety, other agencies, including PHMSA, are responsible for other aspects of transport of crude by rail. PHMSA oversees regulations and standards for transporting hazardous materials generally, across all modes. FRA regulations address safety of tracks, equipment, operating practices, grade crossings, and specifics of hazmat by rail. The FRA has approximately 400 federal inspectors and also makes use of state railroad safety inspectors.[12] Federal regulations for rail transport of hazmat include provisions for security plans, route analysis for risk locations such as road crossings, and points of contact with response organizations.[13]

The National Contingency Plan (NCP), formally the National Oil and Hazardous Substances Pollution Contingency Plan, governs response to certain hazardous material spills, including major oil spills. It is acknowledged, however, that local, territorial, or state responders and officials are likely to be on scene first and will have responsibility for initial response and protective actions, including evacuation of nearby residents and personnel. First responders also may notify the National Response Center, and the NCP would be activated. In terms of initial response, first responders and local emergency managers would initially operate under their own response plans (emergency operations plans [EOPs] or comprehensive emergency management plans [CEMPs]) and procedures. While many local and state EOPs have functional assignments and annexes that address hazardous material response, research would be needed to determine to what degree local plans and personnel have anticipated the explosive nature of the spill hazard experienced in Lac-Mégantic. Experience there indicates that responder and public safety jeopardy could be much more severe and immediate than expected in traditional crude spills.

Opportunities for Improvement

The ubiquitous nature of rail trans-

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[10] Governor Andrew M. Cuomo, Executive Order 125, "Directing The Department of Environmental Conservation, The Department of Transportation, The Division of Homeland Security and Emergency Services, The Department of Health, and The New York State Energy Research and Development Authority to Take Action to Strengthen the State's Oversight of Shipments of Petroleum Products," January 28, 2014, accessed March 7, 2014, at https://www.governor.ny.gov/executiveorder/125.

[11] International Association of Fire Chiefs (IAFC), "Safety on Scene brief: Bakken Crude Oil - Rail Response Considerations," accessed March 9, 2014, at http://www.iafc.org/Operations/ResourcesDetail.cfm?itemnumber=7339.

[12] John Frittelli, Paul Parfomak, Jonathan Ramseur, Anthony Andrews, Robert Pirog, and Michael Ratner, *U.S. Rail Transportation of Crude Oil: Background and Issues for Congress,* (Washington, DC: Congressional Research Service, 2014).

[13] See, for example, 49 CFR 170.802 (security plans); 49 CFR 120.13 (oil spill response plans); 49 CFR 172.820 (route analysis).

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port presents a challenge in that the risk is dispersed, and railroad tracks are mostly where they have always been. Consequently, despite the increased crude oil traffic, organizations responsible for regulation, inspection, and response capabilities may not have noted the increase in risk. In many cases, local officials and responders are likely unaware of what is being transported through their jurisdictions, how much, and the associated potential increase in risk. Recent incidents indicate the need for information sharing among railways, crude producers, and emergency managers along rail routes to provide foundation for comprehensive and current risk assessment and for development of needed protection and response capabilities and plans.

Since last July's Lac-Mégantic derailment and fire, Canadian government officials have called for identification of risk posted to communities, mandatory emergency response plans addressing more combustible types of oil, and additional funding for disaster response coordination capabilities.[14]

Emergency managers and railroad professionals have opportunities to build on existing risk assessments with new information to create an updated understanding of risk. Similarly, enhancing coordinated planning, training, and exercise across local and state emergency management, responder, and railroad organizations can improve understanding of operational procedures and response protocols, as well as capability needs. As part of this cooperative prevention and preparedness effort, emergency management and state fusion centers can work with railroads to maintain improved situational awareness of transport of crude oil, particularly as it travels through identified high-risk locations. This might be supported by sharing appropriate levels of access to web-based common operating platforms used by emergency operations/command centers and fusion centers and, conversely, tracking systems used by railroads.

It is not clear whether the number and volatility of crude oil rail incidents in 2013 was an anomaly, or to what degree and how quickly efforts at improved tank safety and attention to product classification can reduce risk. An examination of derailment occurrences also may be needed to determine the role, if any, of rail infrastructure (e.g., track condition) in the increased spill volume. To protect public safety in the near term, there is need for cooperation and coordination among railroads and local and state emergency management and response organizations to assess risk, prioritize critical locations and facilities, and develop response, protective action, and evacuation procedures. ❖

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[14] Josh Wingrove, "Report on oil shipped by rail calls for emergency response plans, funding," *The Globe and Mail*, accessed March 9, 2014, http://www.theglobeandmail.com/news/national/report-on-oil-shipped-by-rail-calls-for-emergency-response-plans-funding/article16913306/.

Emergency Medical Services Roles, Expectations, and Barriers

by Eugene Elliott, MPH, MPA, PN/ CCEMTP
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As an Emergency Management Function

Background

Emergency Medical Services (EMS) is one of the youngest components of emergency services systems. Though the history of early 'EMS' semblances can be traced back to biblical passages, contemporary EMS have only evolved since the late 60's and early 70's. Advances such as the widespread teaching and utilization of cardiopulmonary resuscitation (CPR) and defibrillation emphasize how effective these systems can be when deployed and available to respond across the country.

In 1966 the National Academy of Sciences published the landmark report, *Accidental Death and Disability: The Neglected Disease of Modern Society*.[1] Often referred to simply as "The White Paper," this report not only compelled governments to augment emergency care provided by ambulance services, but also to further develop overarching response capabilities. A collaborative endeavor to improve emergency medical care in the prehospital setting has since been initiated, ensuring that the public, despite geographic location (urban, suburban, or rural), has access to prompt emergency services. This has grown into an extensive EMS network across the country, establishing the critical infrastructure necessary not only for medical response, but to ensure heightened awareness and robust surveillance systems. Indeed, the last decade has resulted in a paradigm shift that recognizes EMS as a vital element in contemporary emergency management infrastructure.

Embrace of EMS and Public Health

In 2007, President George W. Bush released Homeland Security Presidential Directive 21, establishing a National Strategy for Public Health and Medical Preparedness.[2] This strategy built upon doctrines proposed in the April 2004 directive, *Biodefense for the 21st Century*,[3] which reformed national disaster preparedness by taking an all-hazards approach to defending citizen health.

Biodefense for the 21st Century laid the groundwork for the revolution of disaster health incident response and preparedness efforts. While the pillars of that groundwork—Threat Awareness, Prevention and Protection, Surveillance and Detection, and Response and Recovery—were introduced to direct planning efforts to guard against a bioterrorist attack, they are relevant to a comprehensive assortment of natural and manmade disasters and are thus suitable to operate as the central framework for the Strategy for Public Health and Medical Preparedness.

As a function within the National Response Framework (NRF), the National Incident Management

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[1] The Committee on Trauma and the Committee on Shock, Division of Medical Sciences, National Academy of Sciences, National Research Council, *Accidental Death and Disability: the Neglected Disease of Modern Society*, (Washington, D.C.: The National Academies Press, 1966).
[2] Homeland Security Presidential Directive 21, *Public Health and Medical Preparedness*, 18 October 2007, https://www.fas.org/irp/offdocs/nspd/hspd-21.htm.
[3] Homeland Security Presidential Directive 10, *Biodefense for the 21st Century,* 28 April 2004, https://www.fas.org/irp/offdocs/nspd/hspd-10.html.

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System (NIMS) and the Incident Command System (ICS) structure, EMS plays a critical, though multifaceted role in emergency response, most of which is logically associated with health and medical assets. Presently, the four elements of public health and medical preparedness deemed most essential are biosurveillance, biomedical countermeasures, mass casualty care, and community resilience.[4] While these elements do not specifically speak to all emergency management preparedness requisites, they do retain the weightiest capacity for mitigating morbidity and mortality which can have devastating impacts on global preparedness.

From an emergency management preparedness and infrastructure standpoint, there are several concepts that must be evaluated:

- Incorporation of biosurveillance components and other statistics (human, animal, and environmental welfare, agricultural and meteorological data, intelligence analyses, etc.) delivers a broad portrait of the community health and the concomitant risk atmosphere for assimilation into the domestic emergency management "common operating picture."

- Mass casualty care, like incident response, must be prompt, adaptable, scalable, sustainable, comprehensive, cohesive, and applicable. These descriptors are routine components of EMS training, and therefore easily transferred to incident response.

- Rarely in our nation are cities readily capable of storing, deploying, and systematically dispensing biomedical countermeasures to a majority of affected residents within 48 hours of the determination that such response is warranted. Accepting that emergency management infrastructure is the primary responsibility of local and state governments, they maintain accountability for protecting their citizens. Nonetheless, the federal government has recognized that planning, integration, and nonfederal partners and stakeholders are critical for successful biomedical countermeasure planning and preparedness at all levels, as most EMS agencies are private, hospital-based, municipal-paid, and/or municipal-volunteer.

- State and local government emergency management agencies differ in their capacity, competency, and infrastructure to manage disasters with regard to prehospital and hospital capabilities. Irrespective of a community's capabilities and the degree of integration among resources, experience dictates that local infrastructure geographically closest to the scene of an incident will be subjected to the most impact. Accordingly, all communities must establish plans that have been effectively and recurrently validated with exercises and drills. Furthermore, variations in resources must be addressed by all agencies that retain responsibility for emergency response.

- Deficiencies of qualified physicians, nurses, and specialized EMS personnel, whether through manpower or experience, exist across the continuum of emergency medical response systems. During a mass casualty event, these deficiencies are often exacerbated. Some personnel may choose not to respond during a disastrous event for personal reasons. Similarly, those that do respond during a disaster must undergo sufficient screening, supervision, and certification documentation, which can be challenging and requires appropriate pre-planning.

- Scarcity of critical apparatuses, equipment, and other provisions

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[4] Homeland Security Presidential Directive 21, *Public Health and Medical Preparedness*, 18 October 2007, https://www.fas.org/irp/offdocs/nspd/hspd-21.htm.

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often occur in the aftermath of a large-scale attack, bombing, or natural disaster. In the course of response efforts, deficiencies may be aggravated by the fact that many agencies in a specific region often utilize the same EMS systems and suppliers. Therefore, reserve manpower, stockpiles, and specialized equipment/supplies (i.e., routine medical material, pharmaceuticals caches, intravenous administration equipment, ventilators, and airway management equipment) are necessary.

- Commonly, communication and patient tracking software systems that encompass EMS systems, medical facilities, other first responders (fire departments, rescue divisions, etc.) and public health departments are not compatible, and they may often function in an antagonistic manner. In an effort to enhance overall patient outcomes and reduce otherwise unnecessary miscommunications between and among responders, facilities, family members, and the general public, a data regulation structure must be implemented and tested.

Preparedness and disaster mitigation efforts mandate a concomitant comprehension, allocation, and ongoing evaluation of all resource types. Training EMS providers and other pre-hospital responders, amassing crucial supplies and equipment, and maintaining a steady backup capability is essential, but does necessitate sizeable investments of time and money. An effective emergency medical response to any widespread or resource devouring incident, natural or manmade, requires that all regional system elements be interoperable.

The Future of EMS' Role in Emergency Management

The National Association of EMS Physicians (NAEMSP), having historically reinforced the importance of EMS across the spectrum of prevention and response, now advocates for a robust, resilient role for EMS in all phases of disaster and emergency management-mitigation, preparedness, response, and recovery.[5] There is a renewed push for EMS administrators and medical directors to ensure that sufficient leadership is present during preparedness activities such as training and education, planning, exercises, drills, and community response engagement. Likewise, there are known concerns and hurdles that must be addressed. Prior to and throughout the mitigation, preparedness, planning, response, and recovery periods, EMS needs to have a strong backer for involvement in unified command, amended scopes of practice as applicable for the EMS providers and the specific incident, and augmented functions and responsibilities across the spectrum of response endeavors. The federal government must articulate and devise an overarching strategy for encouraging EMS' role in disaster public health and preparedness to bolster ongoing efforts at local, state, and regional levels to build resilient yet responsive populations notwithstanding latent disastrous health incidents brought about by natural or manmade events.

Knowledge gained from recent disasters has validated that the highest likelihood for a successful outcome in disaster and emergency management response are accomplished through collaboration among all types of first response players, from EMS to law enforcement, fire departments, search and rescue (SAR) agencies, hospitals, hazardous materials response, public health departments, the military, public utilities, and beyond. The function that the EMS system plays in each phase of emergency management has evolved from the customary role of the not so distant past, to that of highly trained and skilled providers specialized in providing care, but also risk reduction and response driven leaders, educators, and responders.

EMS systems, EMS providers, and EMS physician medical directors are to be acknowledged as fundamental to all phases of emergency and disaster management. This comes with a lot of responsibility, but does not escape the central dogma upon which EMS as a profession was cultivated.❖

[5] Christina L. Catlett, J. Lee Jenkins, and Michael G. Millin, "Role of emergency medical services in disaster response: resource document for the National Association of EMS Physicians position statement," *Prehospital Emergency Care*, 15. 3 (2011):420-5.

Social Media in Disaster Management

by Manal Farooq, CIP/HS Research Assistant

The Role of Social Media

Social media has become a formidable tool in the disaster management process.[1] Platforms such as blogs, YouTube Channels, Facebook, Twitter, LinkedIn, and Google+ have brought the global community together by making it easier to collaborate and share information without the limitations of geography and time.[2]

Social media has transformed content consumers into everyday content producers through "peer-to-peer (P2P) networks that are collaborative, decentralized, and community driven."[3] In the context of disaster management, social media platforms can increase a community's preparation and response capabilities. These platforms are often used by survivors, volunteers, and disaster management and law enforcement personnel to share vital information such as notifications of evacuation routes, emergency services, and warnings.

The use of social media in disaster management intensified in the wake of the 2010 Haiti earthquake as it became the new medium for intelligence gathering. In the immediate aftermath of the earthquake, much of what the world was learning about the situation on the ground originated from social media sources.[4] Using Google Maps as a guide, volunteers around the world compiled information from social media outlets in order to create a digital map for relief workers and the U.S. military. The digital map served as a guide that pointed toward the people in most need of aid.[5] Social media also became essential to humanitarian efforts that raised millions of dollars for disaster response. In the first two days following the earthquake, mobile phone users donated over $5 million to the American Red Cross by texting REDCROSS to 90999. Discussion groups and pages were also created on Facebook to share information and offer support to the victims and their families.[6]

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[1] "Social media technologies can improve disaster resilience," *Examiner,* November 25, 2013, available at: http://www.examiner.com/article/social-media-technologies-can-improve-natural-disaster-resilience.
[2] Ibid.
[3] Mark E. Keim and Eric Noji. 2011. Emergent use of social media: A new age of opportunity for disaster resilience, *American Journal of Disaster Medicine* 6, no. 1 (January/February) : 1-8, at 1.
[4] Ibid.
[5] "How Haiti earthquake launched 'digital humanitarianism," *Christian Science*, January 11, 2014, available at: http://www.csmonitor.com/Commentary/the-monitors-view/2014/0111/How-Haiti-earthquake-launched-digital-humanitarianism.
[6] Ibid.

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The Haiti earthquake also challenged prior assumptions that there will be minimal or no communication in the areas near a disaster.[7] In the aftermath of the earthquake, with the use of the Internet and mobile devices, survivors in Haiti sent out cries for help via Twitter, Facebook, and other digital means.[8] Likewise, in Japan, social media became the primary source of communication after the earthquake and tsunami struck in March 2011. Citizens in Japan used Twitter and Facebook to send out warnings, ask for help, and relay any bits of information they could provide from the scene.[9] Hashtags like #prayforJapan, #earthquake, and #tsunami began to trend instantly, and were tweeted by people all over the world.[10] Google's Crisis Response Team also developed a "Person Finder" application that served as a message board for communication in locations where mobile phone access was restricted,[11] because while conventional telephone lines go down or are busy during a disaster, Internet connection often remains active. People are able to get out texts, tweets, and update Facebook statuses quicker than they are able to make a phone call.[12] During Hurricane Sandy, Twitter hashtags like #Sandy, #hurricane, and #hurricaneSandy helped track power outages, and Google maps were used to show the path of the hurricane, identify and assess the damage, and locate Red Cross shelters.[13]

Social Media Strategies

In recent years, lawmakers have begun to assess how disaster management can best adapt the uses of social media. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), and the Federal Communications Commission (FCC) are a few agencies that have implemented social media strategies in their disaster management plans. On April 20, 2011, former DHS Secretary Janet Napolitano announced that "depending on the nature of the threat, alerts may be sent to law enforcement, distributed to affected areas of the private sector, or issued more broadly to the public through both official and social media channels."[14]

While social media was initially used to interact with family and friends around the world, it is now used to monitor and predict all sorts of social, political, and economic related events in today's world. In January 2012, FEMA released the *Crisis Response and Disaster Resilience 2030* report, which identifies major social and technological trends and how they have altered people's interaction with each other. The report also discusses how the emergency management community has adapted to social media outlets by retrieving information from various social networks and Internet news sources before and after disasters and emergencies.[15] At the June 2013 subcommittee hearing on Emergency MGMT 2.0: *How #SocialMedia & New Tech are Transforming Preparedness, Response, & Recovery #Disasters #Part1 #Privatesector*, Congresswoman Susan W. Brookes (R-IN) stated:

> While social media originally started out as a way to share information among family and friends, it is evident that it has evolved to serve other functions such as… its use in

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[7] Ibid.
[8] Ibid.
[9] Erin Skarda. June 9, 2011. "How social media is changing disaster response," *Time,* available at: http://content.time.com/time/nation/article/0,8599,2076195,00.html#ixzz2qJ9mdWr1.
[10] Ibid.
[11] Alan Sawchak. October 29, 2013. "Social media's role in disaster response improves overall organizational resiliency," *Forbes*, available at: http://www.forbes.com/sites/sungardas/2013/10/29/social-medias-role-in-disaster-response-improves-overall-organizational-resiliency/.
[12] Erin Skarda. June 9, 2011. "How social media is changing disaster response," *Time,* available at: http://content.time.com/time/nation/article/0,8599,2076195,00.html#ixzz2qJ9mdWr1.
[13] Ibid.
[14] The Department of Homeland Security. 2011. *Secretary Napolitano announces implementation of national terrorism advisory system*. Washington, D.C., available at: http://www.dhs.gov/news/2011/04/20/secretary-napolitano-announces-implementation-national-terrorism-advisory-system.
[15] Federal Emergency Management Agency. January 2012. *Crisis response and disaster resilience 2030: Forging strategic action in an age of uncertainty*. Washington, D.C., at 21.

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> preparing for, responding to and recovering from disasters. We have heard numerous stories from Hurricane Sandy and the Boston Bombings of how citizens used Facebook, Twitter and Instagram to relay information to first responders, communicate with love ones, and request assistance when cell phone service was unavailable.[16]

Social media platforms have changed the central structure of disaster response. They provide knowledge and power to not only disaster management personnel, but also to the general public through P2P interactions.[17] However, with the swift growth of social media, new challenges have also accompanied its power and influence.

Challenges Facing Social Media

Social media use is growing rapidly, and security concerns are prevalent. In the absence of checks and balances that regulate social media channels, privacy violations can occur. For example, past disasters have driven individuals with malicious intent to solicit contributors who wish to donate for a good cause. Moreover, the credibility of the sources and the accuracy of the information found on social media platforms are sometimes questionable. Many social media users with high privacy settings may also limit information to those in their circle of family and friends.

It is easy to spread misinformation and false rumors that can compromise public safety. For instance, during Hurricane Sandy many social media outlets began to spread a fake photo of the New York Stock Exchange under three feet of water. The New York City Fire Department eventually refuted the image on their Twitter page,[18] but such misinformation can lead to mass confusion and panic. In instances where individuals have malicious intent, how should they be held accountable? Many argue that those responsible for the false rumors regarding the New York Stock Exchange should have been held liable.[19] However, narrowing attribution and quantifying damages is extremely difficult under current legal regimes.

Another major challenge is the resilience of power and communications infrastructures. Disasters often cause the loss of electric power, resulting in an inability to communicate via phone or the Internet.[20] However, because social media has become an integral part of disaster management, the infrastructure that social media platforms operate on must be robust. The exact cost to implement and maintain resilient infrastructure that ensures social media capabilities for disaster management is unclear.

Conclusion

In today's technologically advanced age, social media is an excellent disaster management tool to support public safety by raising awareness, improving communication, disseminating information, and providing aid during the recovery process. While social media improves many disaster management capabilities, existing challenges require further examination and research to enhance its effectiveness.❖

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[16] Congresswoman Susan W. Brookes (R-IN), Chairman of the House Subcommittee on Emergency Preparedness, Response and Communications. June 2013. *Subcommittee Hearing: Emergency MGMT 2.0: How #SocialMedia & New Tech are Transforming Preparedness, Response, & Recovery #Disasters #Part1 #Privatesector,* available at: http://homeland.house.gov/hearing/subcommittee-hearing-emergency-mgmt-20-how-socialmedia-new-tech-are-transforming.

[17] Mark E. Keim and Eric Noji. 2011. Emergent use of social media: A new age of opportunity for disaster resilience. *American Journal of Disaster Medicine* 6, no. 1 (January/February) : 1-8, at 4.

[18] Natassa Antoniou and Mario Ciaramicoli. 2013. Social media in the disaster cycle – Useful tools or mass distraction?, *Secure World Foundation*, available at: http://swfound.org/media/119739/IAC-13.E5.5.3_NA.pdf, at 4.

[19] Ibid., at 6.

[20] Ibid., at 5.

Disaster Recovery Preparedness as a Community Confidence Builder

by Amanda Phan, MPA, CEM

Introduction

Over the last several years, beginning with the 9/11 attacks and Hurricane Katrina, post-disaster recovery has become a critical focus in the emergency management community. With devastating disasters occurring more frequently around the country, such as Hurricane Sandy (2012); an EF-5 Tornado in Moore, Oklahoma (2013); and major floods in Colorado (2013), there is heightened public interest in government's ability to address recovery needs quickly and effectively.

Post-disaster decisions made by individuals, households, and businesses in terms of whether to rebuild or relocate are largely based on the community's potential for future long-term economic stability. Government cannot, at any one level, determine whether a community will return to or improve upon its former state of economic viability after a major disaster. However, local government leaders can take action towards rebuilding community confidence, which influences community member's decisions about whether to stay or go.

What does it take to rebuild community confidence?

The Natural Hazards Center in Boulder, Colorado states it best:

Local leaders must define a vision of the future, provide the direction to get there, and establish the priorities to make it happen. They must develop and create a will that is infectious among community politicians and constituents alike. ***Disaster recovery managers must juxtapose short-term and long-term community needs against the quick and easy fix or the perceived rights of select property owners.*** *They must protect the health, safety, and welfare of the community from the desires, power, and influence of those who promote short-sighted solutions. They need to foster personal and community responsibility for recovery decisions that will affect their community* ***for years to come.***[1]

Yet, to government leaders this often seems an insurmountable task. Immediately after a disaster they are faced with two significant and time-consuming challenges: 1) getting organized; and 2) effectively leveraging funding. These efforts can take several months to a year, and community stakeholders cannot put off decisions to rebuild or relocate for that long.

In the weeks after a disaster, local leaders struggle to meet urgent community needs such as providing temporary housing and reestablishing transportation routes and utilities, while also beginning to realize that long-term community recovery involves more than restoring the built environment and requires leadership and stakeholder support from non-traditional partners outside of the emergency management community.

State leaders in Louisiana experienced these challenges with the Hurricane Katrina catastrophe. Katrina made landfall in Louisiana on August 29, 2005, yet it took nearly two months until the Louisiana Recovery Authority (LRA) was established through executive order[2] and that was just the beginning of the attempt to organize the massive recovery effort. In fact, prior to the implementation of the Federal Emergency Management Agency's (FEMA) 2011 National Disaster Recovery Framework, long-term recovery operations were a function of Emergency Operation Plans

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[1] Natural Hazards Center, Boulder Colorado, *Holistic Disaster Recovery- Ideas for Building Local Sustainability after a Natural Disaster*, 2005, p. 21, available at http://www.colorado.edu/hazards/publications/holistic/ch2_recovery.pdf.

[2] Louisiana Recovery Authority, accessed March 12, 2014, at http://www.lra.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&nid=23&pnid=13&pid=6&fmid=0&catid=0&elid=0&ssid=0.

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(EOP) with primary responsibility for restoring the built environment. Often, EOPs task local and state emergency management coordinators to lead response and recovery operations, which can either impede readiness for the next disaster when resources are solely focused on recovery efforts, or much worse, demobilize resources once short-term recovery needs are addressed and require government agencies to address unmet needs along with regular day to day operations.

The impact major disasters have on a community's economic viability requires significant involvement from economic and community development experts, housing and workforce development agencies and organizations, tax administrators, and business advocates. These stakeholder groups can "provide the direction" and help "establish priorities" to prevent businesses and employees from relocating, find ways to influence homeowners to rebuild, and create incentives through tax breaks that encourage developers, landlords, and business owners to rebuild.

In addition to the pressure to quickly organize a long-term recovery effort, local leaders are beginning to explore recovery funding options and consider ways to effectively leverage resources. Though funding for emergency services is common in local communities to ensure public safety, there is rarely a dedicated disaster recovery fund that provides resources for financial losses to individuals, households, and businesses. Local governments rely heavily on federal and state grants and loans and nonprofit contributions. Leveraging those funds to address strategic and long-term challenges is difficult due to strict spending limitations, deadlines, and decentralized fund management.

Federal funding is offered in the form of grants, loans, etc. Some familiar federal programs include FEMA Public Assistance, Individual Assistance, and Mitigation grants; Small Business Administration (SBA) loans; and the Department of Housing and Urban Development (HUD) Community Development Block Grant (CBDG) program.

These programs have strict qualification guidelines, potential grant matching requirements, and spending limitations. For example, determining eligibility for FEMA Public Assistance requires a handbook and is offered in most cases with a 25 percent cost share. Though funds are allocated to local communities for specific projects, they are managed by the state, which adds a layer of bureaucracy that can slow recovery and make it difficult to coordinate projects with other funding sources. The SBA offers homeowners, renters, businesses, and nonprofit organizations low interest loans to repair or replace damaged or destroyed property. However, if homeowners have become unemployed or are unsure if other property owners in their community will rebuild they may be slow to utilize this option.

The HUD CDBG program offers disaster recovery funds to states for "significant unmet recovery needs."[3] These funds can be used for various housing and infrastructure projects, but requires an extensive action plan with a list of priority projects. It can take several months for funding to be appropriated; in the mean time priorities can change or no longer align with newly established recovery objectives. Also, since state housing or economic development agencies manage CBDG funds, there is little coordination between them and those leading recovery.

Besides the traditional federal recovery funding sources, there are many other federal funding opportunities not specifically created to address disaster needs but that can nonetheless be applied to various projects such as infrastructure, housing, and community development needs. There are two searchable databases with more information on specific programs, the National Disaster Recovery Program Database (NDRPD) and the Catalogue of Federal Domestic Assistance (CFDA).

Furthermore, state agencies, private business, and charitable organizations are excellent resources for recovery support. State housing, economic development, workforce services, tax administration, and transportation agencies often have existing funds that can be utilized. They may also be able to provide incentives through tax breaks to allow businesses and employees to remain in the community. Private

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[3] U.S. Department of Housing and Urban Development, "CDBG Disaster Recovery Assistance," accessed March 12, 2014, at http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/drsi.

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businesses, foundations, and associations can offer support in creative ways without red tape, and non-profit organizations such as the American Red Cross and Habitat for Humanity will often partner with other organizations to provide recovery resources.

Despite numerous options, a successful recovery funding strategy takes a considerable amount of time and as community members wait, the pressure to meet community needs builds—forcing local leaders to promote short-sighted solutions. Over time community confidence is diminished and the local economy remains stagnant for several years.

How can leaders inspire and rebuild community confidence while facing these challenges in a post-disaster environment?

The public's attention, always short and impatient, is significantly more so in times of crisis. Local leaders are better prepared to meet public demands when they have a plan in place prior to a disaster. A thoughtful, inclusive approach to recovery allows leaders to address potential political and bureaucratic challenges when there is time to consider options that fit within a community's culture and demographic.

States often look to the LRA as a best practice for establishing a recovery organization. It included the appointment of 17 board members, 13 appointed by the Governor and confirmed by the Senate and four ex-officio members (the speaker and speak pro tempore of the House of Representatives and the president pro tempore of the Senate).[4] It stood up several recovery task forces: housing, economic and workforce development, infrastructure, and transportation to name a few. The LRA was staffed with temporary or contract workers and functioned in the same way as any government agency. However, creating a governor appointed board that requires senate confirmation and staffing a recovery organization may take several months. This delays community efforts to develop a working strategy to effectively identify and meet recovery goals.

Fairfax County, Virginia is one of few local communities nationwide to comprehensively plan for recovery from a major disaster. The Fairfax County Pre-Disaster Recovery Plan (January 2012)[5] is a high level strategic plan that includes a pre-identified management structure and guidance for leveraging recovery funding. The plan development took just over two years to complete. It was widely supported in the county and throughout the National Capital Region and will no doubt streamline long-term planning efforts in the face of a major disaster.

Planning ahead provides the opportunity for communities to identify the right leaders and organize in a way that fosters partnerships. A comprehensive understanding of potential funding sources along with qualification and spending guidelines saves time and can prevent overlap and missed opportunities. Leaders are then able to get to work immediately post-disaster and focus on establishing a shared vision for the future that encourages economic growth sustainability and resilience.❖

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[4] Louisiana Recovery Authority, accessed March 12, 2014, at http://lra.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&nid=46&pnid=13&pid=84&fmid=0&catid=0&elid=0&ssid=0.

[5] Fairfax County Pre-Disaster Recovery Plan, January 5, 2012, available at http://www.fairfaxcounty.gov/oem/pdrp/pdrp-complete-doc-march2012.pdf.

The Center for Infrastructure Protection and Homeland Security (CIP/HS) works in conjunction with James Madison University and seeks to fully integrate the disciplines of law, policy, and technology for enhancing the security of cyber-networks, physical systems, and economic processes supporting the Nation's critical infrastructure. The Center is funded by a grant from the National Institute of Standards and Technology (NIST).

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