

Catastrophe Beyond Disaster:

Learning from Katrina

by Thomas J. Murphy

Hurricane Katrina was one of the worst natural disasters in our Nation's history and has caused unimaginable devastation and heartbreak throughout the Gulf Coast Region. A vast coastline of towns and communities has been decimated.

***President George W. Bush
September 8, 2005***

Hurricane Katrina was the most destructive natural disaster in U.S. history. The destruction by the large and powerful hurricane, as well as the catastrophic flood that followed, vastly exceeded that of any other major disaster before it. The area affected exceeded 90,000 square miles and left over 118 million cubic yards of debris. The subsequent flooding after the levees were breached inundated the majority of the city, displaced hundreds of thousands of people, and killed hundreds in the New Orleans metropolitan area. And within the first six months, the estimated cost in damages exceeded \$96 billion.¹

Over the past one hundred years, the breadth and degree of impact on communities and the nation from natural and man-made disasters has grown and given rise to categories heretofore unused: Incidents of National Significance (INS), Spill of National Significance, and Complex Catastrophe.² In 1988, The Robert T. Stafford Disaster Relief and Emergency Assistance Act provided definitions for an emergency incident and a major disaster, which the Department of Homeland Security (DHS) incorporated into the National Response Plan (NRP). The DHS also added its own definition for a catastrophic incident.

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Any natural or man-made incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption affecting the population, infrastructure, environment, economy, national morale, and/or government functions. A catastrophic event could result in sustained national impacts over a prolonged period of time; almost immediately exceeds resources normally available to State, local, tribal, and private sector authorities in the impacted area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened. All catastrophic events are Incidents of National Significance.³

Applying this definition, Hurricane Katrina's destruction and disruption of life across several state borders was more than a major disaster, it was a national catastrophe and an INS.

Although responders may have understood these definitions conceptually, they did not clearly recognize the evolving magnitude of the incident. Consequently, appropriate and timely elements of the local, state, and federal response did not occur in preparing for or responding to Hurricane Katrina. Jeff Smith, Deputy Director for Emergency Preparedness with the Louisiana Office of Homeland Security and Emergency Preparedness, later testified to a Congressional committee about the failure to recognize the incident's magnitude and respond properly. "The single biggest failure of the federal response was the Department of Homeland Security's failure to recognize that Katrina was a catastrophic event and implement the catastrophic incident annex to the National Response Plan." If it had, federal assistance would have arrived days earlier.⁴ Clearly, leaders at the operational level must have "indicators" that enable them to provide timely input to the strategic-level assessment that will trigger a proactive federal

response to an incident that grows from a major disaster to a catastrophe.

"The single biggest failure of the federal response was the Department of Homeland Security's failure to recognize that Katrina was a catastrophic event..."

"Déjà vu All Over Again"

Katrina may be the most significant national catastrophe to befall the U.S., but it is not the first. At 5:12 a.m. on April 18, 1906, a magnitude 7.9 earthquake struck San Francisco. The earthquake collapsed hundreds of buildings, ruptured gas and water lines throughout the city, and caused numerous fires. The few remaining fire crews could not move through the rubble-strewn streets and the fires quickly spread. More than 500 square blocks burned and 28,000 buildings were razed, leaving over half the city's residents homeless. An entire city was destroyed. In the aftermath of fire and disease, brought on by crowded, unsanitary camps and shelters, over 3000 people died; hundreds more died in towns surrounding San Francisco. The U.S. Mint was saved; however, 37 banks were lost, and the monetary losses to government, commercial, and private properties exceeded \$6 billion. Today, the population and urban development of the San Francisco Bay Area is more than 10 times as large, and a similar earthquake could result in tens of thousands killed and a financial loss of over \$260 billion in damages to residential and commercial properties alone.⁵

The "Spanish" influenza pandemic of 1918 is estimated to have killed approximately 675,000 people across the U.S. The name, "Spanish Flu"

is attributed to Spain being the first nation to report large losses of life from the influenza; however, the first wave of the influenza in the U.S. can be traced to military camps in Kansas as early as the spring of 1918. The disease spread from person to person, from patient to care-giver, across the country more rapidly than medical authorities could respond. The pending national catastrophe was not recognized, and subsequent preventative actions were so limited that by the early winter of 1918, the epidemic affected the entire nation. Millions were ill, the

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medical healthcare system was overwhelmed, and the railroad transportation system, upon which every aspect of the national economy depended, would not accept passengers without certificates verifying their good health.⁶ In less than one year, the “Spanish” influenza took more lives and did more economic damage to the U.S. than World War I.

Both of these major disasters quickly exceeded the resources and capabilities of first responders and local and state governments. In fact, the emergency personnel and government entities rapidly became part of the disaster, often struggling to rescue themselves and unable to request or direct assistance from the federal government. Eighty-seven years later, Hurricane Katrina was no different in spite of the Federal Emergency Management Agency’s (FEMA) hurricane simulation exercise conducted during the summer of 2004.⁷ The local authorities, state government, and federal government, with its representative Principal Federal Officer and Federal Coordinating

Officers on the scene, fell behind in anticipating and providing the necessary resources to prepare for the impending major disaster or respond to the national catastrophe.

Progress After Hurricane Katrina

Hurricane Katrina was a watershed event for lessons on planning and preparing for, responding to, and recovering from catastrophic incidents. In the seven years since Katrina, the legislative and executive branches of the federal government undertook numerous actions to improve the nation’s preparedness for future catastrophes. Congress passed the Post-Katrina Emergency Reform Act of 2006 and amended the Stafford Act in 2007, establishing new leadership positions and requirements within FEMA and amending the Homeland Security Act of 2002. And most recently, the National Defense Authorization Act for Fiscal Year 2012 authorized a dual-status command construct when the armed forces and the National Guard are employed simultaneously in support of civil authorities in the US.⁸ President Barack Obama signed the Presidential Policy Directive 8: National Preparedness (PPD-8) aimed at strengthening “the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the Nation, including acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters.”⁹ The DHS through FEMA replaced the NRP with the National Response Framework (NRF), developed and published in 2008, and overhauled roles and responsibilities and the national preparedness capabilities. The Department of Defense (DoD) began revising doctrine for Defense Support to Civil Authorities, issued DoD Directive 3025.18 for such support, and established a complex catastrophe work group, whose recommendation resulted in the Secretary of Defense’s memorandum for Actions to Improve Defense Support in Complex Catastrophes.

On April 20, 2010, a blowout at the Macando 252 well caused a major explosion that resulted in fire and the sinking of British Petroleum's Mobile Offshore Drilling Unit Deepwater Horizon, approximately 45 miles off the coast of Louisiana. The discharge of oil continued for almost three months and affected every state along the Gulf of Mexico. As an oil spill, the Federal Water Pollution Control Act was the applicable legislative statute for actions. The federal government responded by applying the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), which is described as an "operational supplement" to the NRF in the Emergency Support Function #10, Oil and Hazardous Materials Response Annex.

Unfortunately, the state and local governments were not familiar with the top-down oriented NCP. Because they expected operations to be conducted along the "bottom-up" orientation of the NRF, there was some confusion over who was in charge. The NCP designates a National Incident Commander, while the Homeland Security Presidential Directive 5 designates the DHS Secretary as the Principal Federal Official for incident management within the U.S. Overall, the National Incident Management System (NIMS) showed improvement in execution over Hurricane Katrina and execution may further improve as DHS and other federal departments continue to implement PPD-8.

Super Storm Sandy has been the latest test of the National Preparedness System. As the super storm grew from a tropical storm in the Caribbean Sea, worked its way north along the eastern seaboard, and made landfall in New Jersey on 29 October, 2012, a whole community approach was applied in preparation. Under the direction of DHS, FEMA coordinated with other federal departments and authorities within the state, local, and tribal governments to poll military and civil organizations on preparedness and to stage resources. This proactively set the

conditions for a rapid response to emergency needs and assistance. FEMA and DoD employed a dual-status command structure for the joint task forces in New Jersey and New York, merging active and National Guard forces in one staff under an Army National Guard brigadier general. This merger enabled a better integrated structure, leveraging the expertise of both forces to achieve a more seamlessly coordinated response than in previous incidents.

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Planning and Response

Historically, the process for planning and responding to emergencies and disasters occurs at three successive levels: local, then state government, then federal government as required. This is because most "first responders" are from the local authorities. They are the first to arrive and last to leave, and additional support is provided when it becomes clear that local capabilities will be insufficient or have been exceeded or exhausted. When a state and federal response is initiated, it is at the request of and in support of the local authorities. Ultimately, the intent is to manage the incident at the lowest, supportable level of authority.

The foundation for this delineation of state and federal powers began with the U.S. Constitution and has been periodically reinforced through legislation and Presidential action. And, this delineation worked well. The state and local governments, because of

proximity and daily interaction, knew their jurisdictions, knew their local populace, and knew their capabilities and requirements in the event of a disaster. The federal government, providing a central and unifying capability was best suited for a supporting role that recognized and sustained the authority of the state and local governments.

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However, this process of delineation also developed “cultural obstacles” that resulted in inefficiencies for planning and response. Across the federal government, planning occurred at all levels with minimal coordination or synchronization. The response to a disaster was then predicated on a “pull” technique of each local and state government exhausting or anticipating exhausting its resources before requesting a federal response. This process was codified into law with the Stafford Act of 1988. Essentially, a local official notified the state government that assistance was needed; when the state’s resources were exhausted, the Governor requested assistance from the federal government. At the federal level, FEMA would request and coordinate assistance from other federal agencies. Complicating this process were the requirements to ensure that assistance rendered did not violate federal statutes, such as the Posse Comitatus Act of 1878.

After experiencing dissatisfaction with the state and federal response to Hurricane Andrew in 1992, seventeen southern states developed the Southern Regional Emergency Compact, which

led to the national Emergency Management Assistance Compact in 1996.¹⁰ However, these actions were focused on natural disasters, and it was the terrorist attacks on September 11, 2001, that brought to the forefront the need to integrate state and federal planning in order to ensure a more effective response to all disasters. In July 2002, the White House released the *National Strategy for Homeland Security*, and President George W. Bush proposed the creation of the Department of Homeland Security, which came into being with the Homeland Security Act signed into law on November 25, 2002. Shortly following this, the President issued Homeland Security Presidential Directive 5 (HSPD-5) that directed the Secretary of Homeland Security to develop and administer a comprehensive management system that provides a consistent nationwide approach for federal, state, and local governments to work effectively together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity and an integrated response plan that integrates federal government domestic prevention, preparedness, response, and recovery plans into one all-discipline, all-hazards plan.

Through a set of standardized organizational structures, the NIMS provides a consistent, flexible, and adjustable national framework with which government and private entities at all levels can work together to manage domestic incidents. The NRP established a comprehensive, all-hazards approach to domestic incident management across a spectrum of activities including prevention, preparedness, response, and recovery by incorporating the best practices and procedures from various incident management disciplines and organizations in order to provide interagency and multi-jurisdictional mechanisms for federal government involvement in domestic incidents. The NRP also introduced the term “Incidents of National Significance” and based its definition

on situations related to the following four criteria set forth in HSPD-5:

- A federal department or agency acting under its own authority has requested the assistance of the Secretary of Homeland Security.
- State and local resources are overwhelmed and federal assistance has been requested by the appropriate state and local authorities.
- More than one federal department or agency has become substantially involved in responding to an incident.
- The Secretary of Homeland Security has been directed to assume responsibility for managing a domestic incident by the President.¹¹

These criteria were intended to serve as a “trip-wire” for declaring an INS and enacting the NRP Catastrophic Incident Annex, which would provide the overarching strategy for implementing and coordinating an accelerated, proactive, national response to a catastrophic incident.

“Pull” versus “Push”

This process, however, contained two basic flaws. The process was essentially a “pull” system in that local and state governments had to exhaust local resources before requesting federal assistance unless it was declared an INS. The INS trip wires, however, were conceptually formulated in alignment with the existing, non-INS process. One of the trip-wire criteria was the Stafford Act, and two other criteria were basically variations of the Stafford Act, in that federal departments or agencies will not become engaged until the state governments exhaust their resources. The fourth criteria offered the possibility of a proactive process with the President directing the DHS Secretary to assume responsibility for managing the

domestic incident and thereby triggering an INS situation, but there were no associated sub-criteria or indicators that provided the President an objective assessment upon which to base this decision.

The second flaw was that the annex was proactive in planning but not execution. The intent of the annex was to plan for incidents in which the federal response posture would switch, upon declaration of an INS, from the traditional “pull” system to a system that includes a proactive “push” process for employing assets and resources in the incident area. Once the annex was activated in the aftermath of a catastrophic incident, the standard procedures outlined in the NRP regarding requests for assistance may be expedited or, under extreme circumstances, temporarily suspended. This would enable the federal departments and agencies to provide assistance without waiting

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for local and state requests; it would keep the response ahead of the need. However, as written, the general operating presumption was that federal, pre-deployed resources would remain at staging areas outside of the incident area until requested by the state and local incident command authorities. Therefore, though the support was established, it wasn’t employed until the state requested it, and the process of providing federal assistance to local and state incident commands and even other federal departments and agencies remained a “pull” system.

The NRF superseded the NRP in 2008. It was an evolutionary growth to previous federal planning documents and incorporated both structural and substantive changes to improve usability and nation-wide whole community applicability. Similar to the NRP, the NRF is a companion document to the NIMS and retains revised versions of the Emergency Support Function Annexes, Support Annexes, Incident Annexes, and Partner Guides as supporting documents. It identifies response doctrine, encourages a higher level of readiness by drawing a sharper focus on preparedness activities, and provides a guide for government, business, non-government leaders, and emergency management personnel for responding more effectively to incidents¹²

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The efforts for national preparedness continue to evolve and grow with discussions on the concepts of complex catastrophe and whole community. First termed “mega-catastrophe” by Dr. Paul Stockton, he characterized these incidents as “very low probability, ultra-high consequence events where multiple, geographically dispersed, and near simultaneous incidents produce mass casualties on a scale, way beyond the scale of what we saw in Katrina or 9/11.”¹³ A complex catastrophe, theoretically, could overwhelm the NIMS, lead to a breakdown in public order, and necessitate DoD taking the lead in the emergency management response. As evidenced by the Secretary of Defense memorandum Actions to Improve Defense Support in Complex Catastrophes, the DoD is examining ways to leverage a broader

range of DoD forces and capabilities to develop plans, policies, and force management tools for complex catastrophes and enable a unity of effort and broader use of DoD forces in complex catastrophes. Simultaneously, FEMA is developing a whole-community approach to emergency management in support of PPD-8. This approach is a means by which residents, emergency management personnel, organizational and community leaders, and government officials collectively understand and assess their respective community needs and determine how to best organize and strengthen their assets, capacities, and interests.¹⁴ When realized, a whole-community approach to emergency management is intended to achieve the integrated, all-of-nation, capabilities-based preparedness for threats to the U.S. as described in PPD-8.

Incident Assessment and Indicators

Fundamental to any incident or operation are assessments. Referred to as staff estimates in military organizations, these are integral to mission analysis and planning. For the NRF, the process of assessment begins at the National Operations Center (NOC) which maintains daily situational awareness to identify and monitor threats or potential threats to the territorial U.S. This awareness comes from reports and information provided to the NOC by federal, state, and local authorities and forms the basis of an incident assessment. The NOC provides the Secretary of Homeland Security and other principals with information necessary to make critical national-level incident management decisions and initiate the appropriate warnings, bulletins, and actions.¹⁵ In a similar manner, the Incident Management Assessment Team (IMAT), an interagency, regionally-based response team, may conduct assessments to provide information necessary for decisions and direction on providing support to the affected incident area.

For both the NOC and the IMAT, these organizations use information and reports as “indicators” to develop their assessments. By definition, mechanical indicators are any various meters, gauges, or instruments that monitor the operation or condition of an engine, furnace, electrical network, reservoir, or other physical system. Applying their experience, operators use these indicators to assess what is happening in the system and what needs to be done to maintain, improve, or correct the system. Thus, in a broader context, an indicator can be the measurement of a system condition that points to a future outcome or effect. For example, the indicator for the FEMA simulation exercise of Hurricane Pam, was a Category 3 or higher hurricane making landfall within a specific distance of the New Orleans levee system, and the outcome or effect would most likely be a breach instead of an over-topping¹⁶ Ironically, after applying effects-based analysis to the potential situation, responders to Katrina assumed these indicators and outcomes for planning purposes.¹⁷

Associating Effects with Indicators

It is one thing to associate effects with indicators. It is another to apply them. Many organizations prepared for and responded to the devastation wrought by Katrina. Some local, state, and federal organizations did poorly or failed because they did not recognize the effects, especially the second- and third-order effects the hurricane would have on the area. Less than 24 hours before Katrina made landfall, the Mayor of New Orleans changed the designation of the New Orleans Superdome from a “shelter for special needs” to a “shelter of last resort” for the general population, which significantly shifted the possible location and increased the potential number of evacuees from the city.¹⁸ Poor prior planning combined with poor situational awareness resulted in haphazard evacuation support marked by a lack of evacuation routes,

transportation assets, communications, and coordination of local, state, and federal efforts. The second- and third-order effects were tens of thousands of displaced people overcrowding a shelter from which they could not initially be evacuated.

At the same time, other organizations, such as JTF-Katrina, reviewed and updated existing plans using effects-based analysis applied to NRP emergency support functions and then war-gamed scenarios to identify requirements and needs. In effects-based operations, an organization applies a methodology of planning, executing, and assessing operations designed to attain specific effects in order to achieve a desired outcome or objective. For Hurricane Katrina, the task force reversed the viewpoint to observe what effects the hurricane’s wind and tidal surges would have on the affected areas. The resulting matrix enabled the staff to “see first” and develop assumptions and potential tasks for the task force.

This same process can be applied to other potential incidents using the emergency support functions found in the NRF. Planners use these functions because they are the basic capabilities and services needed to respond to an incident

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and the primary operational-level mechanisms for providing assistance to state, local, and tribal governments or to federal departments¹⁹ Whether the incident is a hurricane, an earthquake, a pandemic virus, or a terrorist attack using a nuclear device, applying effects-

	Emergency	Major Disaster	Catastrophe
Emergency Support Function (ESF) #7 Logistics Management and Resource Support	<ul style="list-style-type: none"> • Pre-positioning of supplies by air and land disrupted due to deteriorating weather conditions and evacuations • Stockpiling will empty stores of food, bottled water, batteries, sanitary supplies, plywood, plastic, and portable generators 	<ul style="list-style-type: none"> • No incoming resources until cause of incident has cleared the area • Damage assessment and humanitarian aid assessments restricted until lines of communication are restored 	<ul style="list-style-type: none"> • Distribution of resources severely impacted due to impassable road networks and citizens' inability to get to the distribution points • Distribution may be restricted to the most affected areas until additional resources become available
ESF#8 Public Health and Medical Services	<ul style="list-style-type: none"> • Local hospitals, nursing homes, and rest homes evacuated/patients transferred to treatment facilities outside predicted incident area • Emergency treatment capability degraded 	<ul style="list-style-type: none"> • Local hospital sustain severe damage • Hospitals that are open are overwhelmed with patients requiring emergency care • Medical capability severely degraded • Local clinics and nursing/rest homes will be without power 	<ul style="list-style-type: none"> • Thousands are homeless • Public health threatened by shortage of drinking water, food that is in short supply and spoiling due to lack of refrigeration, damaged sewage treatment plants, dead animals, and other hazardous chemicals and materials • Public health threatened due to sanitary conditions in rural areas, small communities, and emergency shelters
ESF#9 Search and Rescue	<ul style="list-style-type: none"> • Search and rescue teams respond to initial calls for assistance 	<ul style="list-style-type: none"> • Search and rescue operations severely degraded by impassable roads, downed power lines and trees, and debris fields 	<ul style="list-style-type: none"> • Search and rescue only possible by helicopter and/or all-terrain vehicles until roads are cleared • Officials overwhelmed with requests for assistance

Figure 1. Incident-Level Indicators

based analysis to a potential, affected area can determine the effects of that incident. As shown in Figure 1, these effects can be aligned with incident levels and become an indicator for the potential incident level.¹⁹

The incident-level indicators become an enabling factor to a proactive, decision-making process by the IMAT and the NOC. The IMAT incorporates this process into its mission analysis to identify needs and requirements that are briefed for action or forwarded to another agency. The process, however, is not a simple emergency support functions matrix but rather a system of matrices that are cross-referenced.

Base matrices, such as Figure 2, are also needed to determine the level of damage and destruction. For example, using Figures 1 and 2, the IMAT can quickly identify that an earthquake of magnitude 7.9, similar to the one in 1906, would result in several effects that exceed the response capabilities of an emergency or major disaster while an earthquake of magnitude 6.7 may still only result in effects equal to a major disaster.

	Magnitude 6.6 to 7.0	Magnitude 7.1 to 7.5	Magnitude 7.6 to 8.0
Highways/ Primary Roads	<ul style="list-style-type: none"> Major structural damage on most overpasses and bridges; minor structural damage on most tunnels Downed power lines and trees on non-highway roads; debris on most roads 	<ul style="list-style-type: none"> Major structural damage on all overpasses, bridges, and tunnels; some highways and roads buckled Downed power lines on non-highway roads; debris on most roads Low-lying roads may be flooded from broken water and sewage lines 	<ul style="list-style-type: none"> Major structural damage on all overpasses, bridges, and tunnels with many collapsed Cross-bay bridges not structurally sound for use and may be collapsed Downed power lines on non-highway roads; debris on most roads Low-lying roads may be flooded from broken water and sewage lines
Secondary Roads	<ul style="list-style-type: none"> Minor structural damage from cracking and buckling Downed power lines and trees on roads; debris on most roads Landslides on Coast Highway 1 possible Low-lying roads may be flooded from broken water and sewage lines 	<ul style="list-style-type: none"> Major structural damage from cracking and buckling Downed power lines and trees on roads; debris on most roads Landslides on Coast Highway 1 probable with sections impassable Low-lying roads may be flooded from broken water and sewage lines 	<ul style="list-style-type: none"> Major structural damage; cracking and buckling of most roads Downed power lines and trees on roads; debris on most roads Landslides on Coast Highway 1 probable with sections impassable Low-lying roads may be flooded from broken water and sewage lines
Water and Sewage Systems	<ul style="list-style-type: none"> Hetch-Hetchy Water System pipeline disrupted Some city and county water lines broken; some pumping stations non-operational; system disrupted Some city and county sewage lines broken; system disrupted; some waste treatment facilities non-operational 	<ul style="list-style-type: none"> Hetch-Hetchy Water System pipeline disrupted; some sections of pipeline may be destroyed Some city and county water lines broken; some pumping stations non-operational; system disrupted Some city and county sewage lines broken; system disrupted; some waste treatment facilities non-operational; breach of waste containment tanks possible 	<ul style="list-style-type: none"> Major sections of Hetch-Hetchy Water System pipeline destroyed Some city and county water lines broken; most pumping stations non-operational; system non-functional Most city and county sewage lines broken; system non-functional; waste treatment facilities non-operational; breach of waste containment tanks probable
Crystal Springs Dam	<ul style="list-style-type: none"> Minimal effect Water release gates require operational check Structural integrity checked required 	<ul style="list-style-type: none"> Moderate effect Water release gates require operational check Structural integrity check required 	<ul style="list-style-type: none"> Structural engineering specifications exceeded; structural breach is possible Water release gates cannot be operated until dam structural integrity confirmed

Figure 2. Earthquake Effects for San Andreas Fault on Peninsula of San Francisco (Partial Table)²⁰

The previous example is intentionally a reactive scenario. Earthquakes cannot be predicted with any precision that would warrant the alert and pre-positioning of federal assistance prior to its occurrence. However, the scenario illustrates how an IMAT can quickly move from a reactive process to a proactive process. Using known facts, such as a 7.9 magnitude earthquake, cross-referenced with expected effects and incoming information and reports, the IMAT does not have to wait for local or state authorities to request potable water because it can assess that the water system is already disrupted.

Moving Forward

Historical traditions and the Stafford Act resulted in a cultural mindset and legal precepts that hindered the response to major disasters and incidents of national significance. In spite of the establishment of the DHS, the creation of the NIMS, and the development of the NRP, which were all intended to provide a nationally-unifying framework and mechanism for coordinating federal assistance, the execution in response to Hurricane Katrina was one of reactive “pull” instead of proactive “push.” This led to delayed and often uncoordinated responses to the assistance needs of local and state authorities. Simultaneously, the local and state authorities lacked a sufficient process for proactively determining their needs for assistance and sometimes compounded the scale of the catastrophe through slow decisions or ill-advised actions.

Since Hurricane Katrina, the nation has made tremendous strides toward improving preparedness for the threats and hazards that pose the greatest risk to the U.S. Congress amended the Stafford Act and other related legislation, passed new legislation, and amended authorities within national security. These actions are streamlining leadership authorities, improving coordination across whole-of-community, and enabling a more proactive response to incidents. President Obama issued Presidential Policy Directive 8: National Preparedness in order to guide how the nation can “prevent, protect against, mitigate the effects of, respond to, and recover from” threats that pose the greatest risk to the country. And, DHS, DoD, and other federal departments have updated doctrine and procedures and engaged in discussions to develop concepts that will improve emergency management processes.

In spite of the significant progress made to improve national preparedness, decision-makers still need a process that indicates and enables them to recognize the transition from emergency to major disaster to national catastrophe or complex catastrophe and respond proactively. DHS supported by DoD and working with other agencies at the local, state, and federal levels can apply effects-based analysis to incident scenarios and determine the resulting effects based on known information. If an earthquake of “X” magnitude occurs along this portion of the San Andreas Fault, the effects will be “Y.” With an effects-based analysis process, operational-level leaders can better recognize and understand the future effects from a potential or on-going incident. These leaders can then provide timely input to the strategic assessment and enable strategic leaders to be proactive in their decision making.

While the destructive catastrophe of Hurricane Katrina was overwhelming and seemingly a once in a generation event, a national catastrophe will occur again within the U.S. Whether it is a natural or man-made is irrelevant. The DHS can and should develop incident-level indicators for the emergency support functions and incorporate these into the NRF-Crisis Incident Annex or Crisis Incident Supplement in order to provide the operational-level commanders and leaders with a proactive tool with which to assess and respond to the next national catastrophe. **IAJ**

NOTES

- 1 “The Federal Response to Hurricane Katrina Lessons Learned,” The White House, Washington, 2006, p. 7. This estimate is for physical property and durable goods and does not include personal property or injury.
- 2 The term Incident of National Significance was introduced in the National Response Plan (NRP) in December of 2004 and rescinded in 2008 when the National Response Framework replaced the NRP. Spill of National Significance originated with the Deepwater Horizon incident in 2010. The Department of Defense is currently developing a definition for complex catastrophe.
- 3 “National Response Plan,” December 2004, p. 63.
- 4 Colonel Jeff Smith, Deputy Director for Emergency Preparedness with the Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP), written statement submitted for the Hearing on Hurricane Katrina: Preparedness and Response by the State of Louisiana before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, U.S. House of Representatives, 109th Congress, 1st Session, December 14, 2005.
- 5 Patricia Grossi and Robert Muir Wood, *The 1906 San Francisco Earthquake and Fire: Perspectives on a Modern Super Cat*, Risk Management Solutions, Inc., Newark, CA, 2006, p. ii-9, <http://www.rms.com/Publications/2006_SF_EQ_SuperCat.pdf>, accessed on April 15, 2006.
- 6 Molly Billings, “The Influenza Pandemic of 1918,” Stanford University webpage, February 2005, <<http://www.stanford.edu/group/virus/uda>>, accessed on April 15, 2006.
- 7 Federal Emergency Management Agency (FEMA) conducted a disaster simulation exercise in July 2004 in which a fictional Hurricane Pam struck the New Orleans area as a Category 3 hurricane. In the scenario, the storm surge overtopped levees, destroyed over 500,000 buildings, and caused the evacuation of over 1 million people. The simulation exercise involved more than 50 federal, state, and local agencies and volunteer organizations and was intended to help officials develop response plans for such a scenario should it occur. Robert Longley, “FEMA’s ‘Pam’ Simulation Foretold Katrina Disaster: Preparedness Action Plans Not Implemented in Time,” About.com, U.S. Government Info webpage, April 2006, <<http://usgovinfo.about.com/od/defenseandsecurity/a/femapam.htm>>, accessed on April 15, 2006.
- 8 “National Defense Authorization Act For Fiscal Year 2012,” Public Law 112-81, 125 STAT 1394, 12304a.
- 9 Barack Obama, “Presidential Policy Directive-8: National Preparedness,” Office of the President of the United States ,Washington, March 30, 2011.
- 10 “The Federal Response to Hurricane Katrina Lessons Learned,” p. 31. Approved by Congress in 1996, the Emergency Management Assistance Compact is an interstate mutual aid agreement among member states to provide assistance after disasters overwhelm the affected state’s capacity. This agreement provides the legal structure for states to request assistance from one another, such as temporary shelters, aircraft support, and the National Guard while under state control.
- 11 “National Response Plan,” p. 4.
- 12 “National Response Framework–Fact Sheet,” Department of Homeland Security web page, <<http://www.fema.gov/pdf/emergency/nrf/NRFOnePageFactSheet.pdf>>, accessed on January 9, 2013.
- 13 Dr. Paul Stockton, “The Department of Defense and the Problem of Mega-Catastrophes,” in *Threat at Our Threshold*, U.S. Army War College, Carlisle Barracks, PA, 2007, p. 28.

- 14 Federal Emergency Management Agency, *A Whole Community Approach to Emergency Management Principles, Themes, and Pathways for Action*, Washington, December 2011, p. 3.
- 15 “National Response Framework,” p. 55.
- 16 U.S. House of Representatives, “A Failure of Initiative: Final Report of the Select Bipartisan Committee to Investigate the Preparation and Response to Hurricane Katrina,” p. 82. The FEMA simulation exercise used a computer modeling program designed by Professor Ivor van Heerden of Louisiana State University that generated an over-topping scenario instead of a breach. However, severe flooding with large-scale evacuations was the result in this situation, too, and the overall flooding pattern was very similar to what occurred following Hurricane Katrina.
- 17 Lieutenant General Russel L. Honore and Colonel (retired) Barney Barnhill, “Joint Task Force Katrina: See First-Understand First-Act First,” *Journal of the Department of Operational Art and Campaigning*, Spring 2006, p. 8.
- 18 “National Response Plan,” pp. 26–29. A “shelter of special needs” is intended for people who have medical or disability needs that cannot be provided at the normal facility because of the on-going incident. A “shelter of last resort” is intended as a location for people to move to if their home or other shelter becomes unusable; it is an evacuation point in most incidents.
- 19 “National Response Plan,” p. 65. The emergency support functions are transportation; communications; public works and engineering; firefighting; emergency management; mass care, housing, and human services; logistics management and resource support; public health and medical services; search and rescue; oil and hazardous materials response; agriculture and natural resources; energy; public safety and security; long-term community recovery and mitigation; and, external affairs.
- 20 Figure 1 is identical to Figure 2: Effects Based Analysis of Emergency Support Functions in “Joint Task Force Katrina: See First-Understand First-Act First,” modified only to replace direct references to Hurricane Katrina and to replace the Effects headings with Incident headings.
- 21 This is a fictitious table using fictitious data. However, it should be noted that the Hetch-Hetchy Water System and Crystal Springs Reservoir Dam do exist and provide all of the potable water for San Francisco. Furthermore, a significant breach in the dam would most likely close the Interstate 280 Bridge that passes near the dam and flood Highway 101 which would effectively cut off the primary overland routes to San Francisco, leaving Coast Highway 1 as the only overland route into the city.