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REVISITING THE PURPOSE OF DISASTER PLANNING

To the editor:

The impact of Hurricane Katrina and the subsequent response give us ample reason to reflect upon our policies and efforts to improve the important profession of emergency management. Without a doubt, we need to give increased attention to disasters and refrain from making the mistakes of the past.

One of the glaring weaknesses that must be overcome concerns our planning activities. During the Cold War, civil defense personnel hid in underground bunkers and wrote elaborate plans about how they would evacuate communities in case of nuclear war. These plans often failed to include the input of other participants and were often based on faulty assumptions. Other departments and organizations were not incorporated into the planning process, and the strategies listed frequently were based on wishful thinking and unrealistic expectations. Furthermore, civil defense plans did not always result in the development of abilities to ensure successful implementation.

For instance, crisis relocation plans may not have accurately projected how to move millions of people and how to address the long-term needs of evacuees.

Such problems are still evident to this day as illustrated by the case of New Orleans. If there was ever a community (referring to both leaders and citizens alike) that understood risk, it was the Big Easy. Numerous assessments revealed an extremely vulnerable situation, and the Hurricane Pam exercise one year before Katrina suggested that a number of challenges would be presented to response authorities at the local, state, and federal levels. It is amazing to see how accurate these hypothetical projections were on August 29, 2005.

New Orleans did have an emergency operations plan (EOP). However, and without being overly critical, hindsight might suggest that the planning process was flawed. How is it possible that city officials acknowledged that thousands of people had no transportation and would need assistance with evacuation but did not utilize school busses (as outlined in the plan) to help accomplish this task? Katrina was undoubtedly an unusual event, but the failure of the response may be due in large part to the “paper plan syndrome.” Simply put, it appears that a plan was written to comply with preparedness mandates, but little was done to facilitate its implementation.

Today’s emergency managers are recognizing that planning is insufficient in and of itself. Instead of just writing a plan, professionals in this field are spending more time and energy on “capacity building.” Capacity building involves concerted preparedness efforts to ensure successful response and recovery operations. In the case of New Orleans, this would imply that meteorologists, emergency managers, and the media are able to work together to make quick decisions and successfully warn the populous of an impending hazard. A focus on capacity would indicate that bus drivers could be contacted, busses are fueled in advance, and stranded citizens could be picked up and delivered to less hazardous areas.

Strengthening capacity would enable a quick assessment of damages and ensure that alternative methods to communicate with state and federal officials would be present in case they need to be employed. Furthermore, the capability approach would suggest that adequate personnel and supplies would be available at the Superdome, that receiving communities are able to shelter evacuees for extended periods of time, and that recovery can proceed as quickly and effectively as possible.

The emphasis on capabilities is not limited, however, to post-disaster situations. Capabilities need to be developed for mitigation as well. For instance, additional coastal and flood plain managers are needed to monitor development and recommend ways to limit potential damage and destruction. More building code inspectors are required to enforce regulations, and improved presentation skills are required on the part of emergency
managers to convince politicians that disasters must be taken seriously.

The solution to the disaster problem will necessitate more than the strengthening of capabilities though. Specifically, the focus on planning must also have the goal of “liability reduction.” Liability reduction implies the elimination or minimization of factors that lead to disasters. The environment must be protected so that wetlands can act as a buffer between warm gulf waters and inhabitants in the inland area. People and property must be located in safer areas and older buildings must be retrofitted to withstand the destructive forces of nature. Constraining cultural attitudes must be challenged, poverty must be addressed, and personal responsibility must be encouraged.

A focus on capacity building and liability reduction is very different than the traditional disaster planning model that has dominated the field of emergency management for too long. The dual approach outlined here is obviously more aggressive than the paper plan syndrome which assumes that a completed plan is all that is required for preparedness. Hurricane Katrina and countless other disasters reveal the fallacy of inaccurate planning methods and assumptions. Giving priority to capabilities and liabilities will not prevent all disasters nor guarantee there will be no loss of life or property. However, changing our thinking about planning is needed if we are to advance the profession of emergency management and limit the disruption caused by disasters.

David A. McEntire, PhD, Associate Professor
Emergency Administration and Planning
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Emergency preparedness is all local

Osman O. Aloyo, CEM, CBCP

LOCAL EMERGENCY RESPONSE IS ALWAYS FIRST-LINE OF DEFENSE

As we ponder the lessons from the recent hurricane disasters in the Gulf, we have a duty to our citizens and all future disaster victims to become better prepared. Preparedness and emergency management is like what a former US Speaker of the House once said about politics—“it’s all local.” Emergency preparedness is a community-wide effort. We are all responsible—the federal, state, and local governments; all civic and disaster volunteer organizations; the business community, families, and individuals.

State and local governments are responsible for disaster preparedness or emergency management by statute of the communities they serve. Local governments are the first-line of defense and must be ready to safeguard the safety and security of their citizens. All levels of government must ensure that their plans are viable, realistic, flexible, adaptable, and executable. Good, sound planning is not enough, however, as we saw with the federal government’s recent response to Katrina. FEMA and the Department of Homeland Security completed the National Response Plan earlier this year, after a couple of years of coordination with different federal agencies. By all accounts, it is one of the best plans FEMA has ever prepared. Yet, we saw their efforts fail, not because of their planning, but because they failed to follow their own plan. And when they did finally manage to use the established plan, they were ill equipped to carry it out.

The lesson here for local government is that obtaining and maintaining the capability of executing approved plans must follow good planning. People implement plans, a simple concept that oftentimes is ignored or not taken seriously. People need resources to carry out the requirements of any emergency plan. Outside of our first responder community, do we have a viable and comprehensive emergency response team that will lead our community through a disaster, and have all the team members been properly trained for their roles?

State and local government must constantly assess its capabilities to fulfill its emergency responsibilities, especially in the fastest-growing communities in the country. We should ask ourselves: do we have the resources to respond to disasters? What are our shortfalls? Where can we get the resources we know we will need and do not currently have? Are our elected and community leaders knowledgeable about our plan? Do we have viable inter-agency and inter-governmental coordination, and have we practiced our plan under actual emergencies or exercises? Have we taken advantage of state-of-the-art technologies that can improve the way we communicate and respond during an emergency? Has our emergency management infrastructure, systems, facilities, and organization kept up with our population growth?
Has our planning been comprehensive enough to account for every possible resource we may need? Emergency management is no different from any other program in that the true measure of a community’s commitment to preparedness can be directly linked to the level it is funded. Our state and federal partners are there to supplement and not to supplant our local response. Emergency preparedness and response is, indeed, all local.

Just like a government plans for emergencies, so should our business community, civic and volunteer organizations, families, and individuals. We all should know the hazards that are present in our communities and be prepared to take action to protect our families and ourselves. The private sector has an obligation to its investors, employees, and local communities. Businesses should complete continuity plans not just for business survival purposes but also for employee safety. History has shown that an overwhelming majority of businesses that fail to plan for disasters either never recover or recover to only go under shortly afterwards. Civic and volunteer organizations can be extremely important contributors to both the preparedness of a community and in the assistance to our first responders after disasters occur. A clear example of this is all the Community Emergency Response Teams (CERT) that have been organized throughout the country and are now part of some city response plan. Here again, emergency preparedness, just like politics, is all local.

These are just a few easy lessons that we can now draw from Hurricanes Katrina and Rita. But emergency management should never simply be about what has happened before; this business is about being able to respond quickly to anything that may endanger the safety and security of our citizens today, tomorrow, or five years from now. It’s about being prepared to manage any major emergency, imagined or not. The public deserves nothing less than that.

Osman O. Aloyo, CEM, CBCP, former Director, Maricopa County Emergency Management, Miami, Florida.
From the locals:

“Well, it looks like we’re going to have to work with the state and feds more closely!”

From the feds:

“Well, now that we have those people, we have to provide for them. Jeez! I wish they could take care of themselves better and know what they want. And I wish they would stop changing their minds!”

From the state agency:

“We can’t seem to make anyone happy! Everyone wants different things in spite of all we do for everyone.”

How many times has this scene, or a similar one, taken place? When various agencies try to work together, many things seem to get in the way. Much progress has been made in the area of emergency management and response, including agencies working together collaboratively. Unfortunately, we have gotten a great deal of experience recently through events like Katrina, Rita, the New Hampshire flooding, and many others—all of which point out that we still have a ways to go. The most critical factor for successful interagency work is the ability for groups of people assigned to work together to accomplish their goals. The “social system” of each agency—the way each organization uniquely works—is often a major impediment to the overall group’s ability to work together.

We have much experience working together in a “command and control” environment. In a classic command and control situation, such as with fire, we know that the on-scene fire chief is the “one.” He or she calls the shots and takes the responsibility for the final outcome. But, what if a situation is not a “command and control” one? What if the situation calls for various groups or agencies to work closely together in a collaborative manner? How is that different? How do you organize the interagency workforce? What type of “social contracts” among the agencies needs to be developed? What sort of preparation needs to be done before such collaborations are routinely successful?

This article is the first in a series to explore the “people factors” that need to be addressed when agencies attempt to work together in a collaborative environment.

**WHAT IS COLLABORATION?**

Often, organizations that try to work together begin by selecting certain individuals from the different organizations, placing them in a room, and giving them a set of specific goals to meet. This traditional approach often leads to the situation where someone within this initial group is appointed leader (or
chooses to take control) who, through his/her particular approach, is responsible for the success of the overall group. This is the common way of “getting the job done.”

The objective in interagency collaboration is for the various organizations to work closely together, share resources (knowledge and information, tools, and technologies), and achieve a better result than can be achieved by any one organization working alone. This type of collaboration, however, needs to be handled differently than the more traditional approach outlined above. If we want different outcomes, we need different approaches.

A successful collaborative approach requires developing organizing principles to help the new organization come together and organize itself to achieve its desired goal(s). In addition, group members need to create a structure in which to function that equitably supports and engages all the affiliated groups.

Fundamental to a successful collaborative experience is the ability for all involved to openly share information that will assist with the achievement of the outcomes. In order for this to occur, the collaborators need to create an environment of trust. Trust is creating reliable, credible, and consistent bonds and communications with individuals so behavior can be predicted. Each individual and organization must gain from the collaborative relationship. Without these fundamental factors, the foundation for a successful collaborative relationship can not develop.

By themselves, these above statements are nothing but pleasant platitudes. So how do we make them happen? How do we create this environment of trust? How do we create this spirit of collaboration and fair play? The number one challenge in any collaborative endeavor is that of communication. A very useful tool to overcome this challenge is something called “dialogue.”

### THE BASICS OF “DIALOGUE”

Introduction to “dialogue” as a technique for improved communication

A singular technique or tool called “dialogue” has emerged, which addresses a fundamental communication need of organizations. In today’s world, “good” communication is required for the success of any organization. But communication involves much more than simply talking; it involves perception, comprehension, and understanding of an explicit communication event and its concurrent, clarifying feedback.

The “dialogue” technique is a means for improving our understanding of a communication event. “Dialogue” is defined as a genuine, authentic, and open interchange of ideas. In contrast, “discussion” is seen as competition, whereby the “debater” attempts to convince the “audience” that “I’m more right than you.”

<table>
<thead>
<tr>
<th>Table 1. Comparison between dialogue and discussion</th>
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<tbody>
<tr>
<td><strong>Dialogue</strong></td>
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<tr>
<td>Individuals take the time to compare their</td>
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<tr>
<td>assumptions about what it is they think and believe.</td>
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<tr>
<td>Opens individuals in the organization to one another</td>
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<tr>
<td>and allows for divergent thought.</td>
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<tr>
<td>People are open and sharing.</td>
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<tr>
<td>Purpose involves gaining a greater understanding</td>
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<td>of a problem and exploring the deeper concepts</td>
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<td>and assumptions underlying an issue.</td>
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<td></td>
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<tr>
<td>Seeks to reveal, in constructive ways, any lack</td>
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<tr>
<td>of continuity of thought in the logic process.</td>
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<td>Systemic and process oriented.</td>
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Vol. 4, No. 1, January/February 2006
Both “dialogue” and “discussion” need to occur within an organization for it to be successful. But, a balance between the two helps in optimizing this success. Table 1 offers a comparison between “dialogue” and “discussion.”

Individuals who practice “dialogue” find that they begin to observe the processes of people engaged in communication. These processes relate to an overall “nature of thought.” By studying communication as a process, we can begin to appreciate the difference between the act of thinking and actual individual thought “outputs.”

The process of “dialogue” leads to an interactive exchange of perceptions and beliefs around common issues. “Dialogue” enables core beliefs to surface and causes us to analyze the differences between one’s self and others. It also challenges us to look at the assumptions from which we live and navigate our lives. The process of exchanging information and underlying beliefs helps clear the “fuzziness” of thought, while providing us with opportunities to explore information in multiple ways.

The successful use of “dialogue” creates an ability to deal with issues in many ways and to appreciate the ways other people utilize facts and beliefs. As members of the group appreciate each other in this deep, meaningful way, there is an alignment of concepts and a higher probability for success.

**PRINCIPLES OF “DIALOGUE”**

There are several principles involved in the “dialogue” process. The following is a review of these basic principles as they apply to the business world.

*Getting the “group” to function as a “team”—the concept of alignment*

In order for a group to accomplish its intended goals, the group must have a set of common issues that act as a glue, making the group cohesive. If the group is cohesive, a focus is often created. This focus pulls the group together, and if a process of “dialogue” occurs, balanced with “discussion,” a common direction emerges and individuals’ energies harmonize.

“Dialogue” assists in the development of a common purpose, a shared vision, and creates an environment in which people begin to complement each other’s efforts. By utilizing the “dialogue” process, members do not sacrifice their personal interests but instead contribute to the effort of the whole team.

**Creating the foundation of the team process**

“Dialogue” allows the team to choose a desired outcome. “Dialogue” and its inherent benefits creates an environment in which individuals can tap and capitalize on the diversity of its group; it utilizes the potential of a multitude of thoughts, beliefs, and experiences.

By going through the process, members “connect” with one another and a relationship evolves. This relationship then yields a level of trust between members. As people get to know one another, (how they think, act, reference material, etc.) they can quantify and depend on a contribution from each member’s particular point of view (i.e., structural, experiential, analog, and digital). A complementariness can be developed, which is manifested in team behavior and “team intelligence.” This “team intelligence” is more profound than an individual or ruling group view.

**Fostering creative exploration**

In learning “dialogue,” we learn to listen deeply to another while putting our own views aside. Engaging in “dialogue” fosters creative exploration of complex and subtle issues, an exploration that is predicated on trust, care for one another, and the feeling that all contribute equally. In order to experience “deep listening,” we have to suspend our own views and “tune in” to the other person’s “frequencies.” This tuning in, even if only momentary, allows for personal growth and appreciation of another’s “way.” This appreciation creates an empathy and sensitivity within the group so members relate to each other more significantly and work more closely as a true team.

There are three conditions the group must meet in order to have effective “dialogue”:

1. Members must be willing to share assumptions with the group and be willing to observe, listen, and question in a non-defensive manner. An underlying trust develops during this process.
2. Each member of the group must be perceived as an equal, a colleague, an equally contributing partner, regardless of title or formal “rank.”

3. The investment of the partners must be one of equal giving and taking (sharing). Risks must be taken (getting rid of the fear), and there must be a willingness to entertain new and different concepts and theories (suspension of judgement).

_Sustaining the “dialogue”_

A retraining process is often required to assist groups in achieving the state of “dialogue.” Until trained, an independent facilitator needs to assist the group. The facilitator is responsible for developing a set of “dialogue” norms and rules for the group and, once done, contracts with the group to make sure they maintain the “dialogue” process.

The facilitator must focus on assisting people with owning their behaviors, how they work, and their underlying assumptions. The facilitator is the “keeper of the process” and should avoid becoming an active part of the “dialogue.” The facilitator is the tactful enforcer who maintains the “dialogue” focus.

**CONCLUSION**

In practice, much of the above may seem like common sense. However, it is very important that you have some knowledge of the skills outlined above to ensure your capabilities as a team member and effective leader. The benefits of practicing these skills will assist greatly in the development of a truly collaborative team.

Neil Simon, BS, MA, Managing Partner, Incident Mitigation LLC, Southfield, Michigan (njsimon@incidentmitigation.com).

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Concern that the nation required a common method for management of incidents led the Congress, in the Homeland Security Act of 2002,¹ to require adoption of the Incident Management System (IMS).² In response to the congressional directive, the Department of Homeland Security (DHS) released the National Incident Management System (NIMS) on March 1, 2004.³

A bit of confusion over terminology has resulted. Unlike the traditional incident management system, NIMS is a universal approach to emergency management, as opposed to an incident-specific structure. This brief discussion deals with the parameters of the traditional incident management system, which will be referred to as “incident command” for purposes of clarity.

The concept of incident command (more recently and commonly referred to as incident management)⁴ originated in the early 1970s, when a group of innovative California fire department and federal agency heads began working on a new system to organize, deploy, and care for the significant resources needed to fight big wildland fires.⁵ In many incidents before adoption of the Incident Command System (ICS), lack of interagency teamwork resulted in dangerous conditions and unsuitable distribution of resources. The managers noted several specific difficulties:

1. lack of communication due to incompatible radio codes;
2. no command system in place—every organization hinged on the personality of the leader in charge at any particular moment;
3. lack of common language—even when communication was achievable, errors arose;
4. resources not managed centrally—logistics was a result of luck; and
5. no clear designation of roles or how different functions related to one another.

ICS arose in response to these issues. ICS evolved into the commonly accepted way of integrating response to emergencies.⁶ The accomplishments of the newly created ICS resulted in its being adopted by many players, including law enforcement, public health, public works, and the private sector.⁷ Emergency management groups also adopted the system⁸ and advocated in 2000 that all levels of government make use of it for response to events involving weapons of mass destruction (WMD).⁹ Credentialing bodies have unanimously embraced ICS as the pattern for integrating emergency response.¹⁰ Despite ICS’ established worth, however, not all emergency response groups have adopted it.¹¹
A further development, used so far only in California, is the Standardized Emergency Management System (SEMS). SEMS encompasses ICS, multi- and inter-agency coordination, mutual aid, and an operational area concept for flexible response to very large incidents. SEMS has been predicted to be the accepted standard for the future.

Use of ICS is required by both NFPA 1600 and NIMS. As mentioned above, the emergency manager is, therefore, obligated to ensure that it is utilized in emergency responses. OSHA’s Hazardous Waste and Emergency Response standard (HAZWOPER) has been in existence for over 20 years, so its mandates for use of ICS are valuable for the emergency manager thinking about how best to adopt ICS.

The HAZWOPER model requires all HAZMAT responses to make use of ICS. A good ICS contains the following attributes: modular organization, integrated communications, common terminology, a unified command structure, consolidated action plans, a manageable span of control, designated incident facilities, and comprehensive resource management.

HAZWOPER includes essential supplementary and very particular requirements for ICS. It requires that the senior emergency response officer responding to an emergency becomes the individual in charge of site-specific ICS (henceforth “incident commander” or IC). The HAZWOPER model acknowledges that incidents change and that the person in charge may change as added assets arrive. One unfortunate feature of the September 11, 2001, attack in New York was the termination of the New York Fire Department’s incident command structure when the towers fell. A significant lesson learned from that calamity is the necessity to put in place back up command structures at terrorism responses. A defined command transfer process must be established well before an incident to avoid possible chaos and hazard to responders and the public.

The IC must categorize, to the extent possible, all hazardous substances or conditions at hand and address site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies. The IC’s duties at this point consist of identifying the substance and controlling the hazard.

The IC must put into practice suitable emergency operations and ensure that the personal protective equipment (PPE) worn is appropriate for the hazards present, such as the particular requirements for breathing equipment. “[T]he number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards . . . , [must be limited] to those who are actively performing emergency operations.”

The “buddy system” in twos or more must be used. This necessitates that one is available to observe and, if required, save the other. Back-up workers must be prepared to provide support or rescue. Advance emergency medical personnel must also be present with medical equipment and transportation.

Perhaps the most imperative obligation is naming a safety officer who is well-informed about operations at the emergency response location. He or she has the specific responsibility of identifying and evaluating hazards and providing direction regarding the safety of operations. The safety officer has the power to alter, suspend, or terminate those activities and must immediately inform the IC of any action required to rectify hazards at an emergency scene. Case law demonstrates that the safety officer must be an individual other than the IC.

The lessons learned over the past 20 plus years from use of ICS at HAZMAT scenes will be invaluable for implementation of the standard in the wake of NFPA 1600’s and NIMS’ requirements to do so.

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2. Id. at § 501 (5) The HS Act requires “[b]uilding a comprehensive incident management system with Federal, state, and local government personnel, agencies, and authorities, to respond to . . . [terrorist] attacks and disasters.”
4. Incident Command is a system that uses a "command" model, while incident management uses a "management" model. Paul M. Maniscalco & Hank T. Christen, Understanding Terrorism and Managing the Consequences 24 (2001). Experienced responder leaders, however, do not see a difference other than in terminology between the two. Scott Baltic, ICS For Everyone, 3 Homeland Preparedness Professional No. 1, 22 (January/February 2004).


7. West P, Senior Ed.: NIMS: The Last Word on Incident Command? Fire Chief on Line (March 5, 2004) Found at: http://firechief.com/ar/firefighting_nics_last_word/index.htm (Last consulted March 9, 2004). "What we've said now with the NIMS document is that it's not just a fire service issue. We're expanding (incident management) to include all the agencies involved in response to emergencies — beyond police, EMS and fire — to include all the government agencies that will respond to a disaster as well as some private organizations."


9. Id.


13. Id. "The goal of SEMS was to organize the response to any incident starting with the lowest level of resources and support required . . . SEMS incorporates . . . [the] Incident Command System. . . ." Id.

14. NFPA 1600 § 5.8.

15. NIMS at 1-2.

16. 29 C.F.R. § 1910.120(q)(3)(i) requires that during an emergency response the most senior emergency response official becomes the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer. Id. 17. See, e.g., William C. Nicholson, Beating the System to Death: A Case Study in Incident Command and Mutual Aid, 152 Fire Engineering at 128, 129-30 (Oct. 1999).

18. 29 C.F.R. § 1910.120(q)(3) requires these characteristics at all HAZMAT response sites.

19. 29 C.F.R. § 1910.120(q)(3)(i). NFPA 472 requires use of IMS and contains detailed competencies for the IC at 472-22 to 472-25. 20. Note to (q)(3)(i) specifies that the "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. That person is the senior officer on the first-due piece of responding emergency apparatus to arrive on the incident scene. Id. More senior arriving officers (i.e., battalion chief, fire chief, state law enforcement official, site coordinator, etc.) assume the position, which is passed up the previously established line of authority. Id.


22. 29 C.F.R. § 1910.120(q)(3)(iii) requires personal protective equipment to "meet, at a minimum, the criteria contained in 29 CFR § 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for . . . [the] incident."

23. 29 C.F.R. § 1910.120 (q)(3)(iv).

24. 29 C.F.R. § 1910.120(q)(3)(v).

25. 29 C.F.R. § 1910.120(q)(3)(v).


27. 29 C.F.R. § 1910.120(q)(3)(vii). "The individual in charge of the ISC shall designate a safety official, who is knowledgeable in the operations being implemented at the emergency response site. . . ."


29. See Victor Microwave, Inc., 1996 OSHA RC LEXIS 57, at *44-47. Failure to designate a separate safety officer was found to be a serious violation.
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SETTING THE STAGE

Most of the problems jeopardizing our national security today have answers; we just don’t always know how to get to those answers. For example, we know that to contain the nuclear threat we need to secure all of the existing fissile material and prevent the creation of nuclear fuel-enriching facilities; we just don’t currently have the capital—monetary or political—to do it right now. But then there are problems entirely devoid of solutions either because we have yet to conceive of how to accurately approach them or we simply haven’t had the imagination to reconcile the dilemmas they create.

Biological threats fall into this unappetizing category of unanswered problems. Of all the weapons of mass destruction (WMD), biological agents have been around the longest, and we are no closer to eliminating them than we were a thousand years ago. We may be less likely today to die from specific agents like smallpox or polio, but the overall threat of new diseases emerging is no less than it has ever been. The diseases that these agents create have threatened mankind since before civilization existed, and the more complex and interconnected society gets, the more vulnerable it becomes. Terrorists can’t create hurricanes and Mother Nature doesn’t build nuclear weapons, but biological events have the macabre distinction of spanning both realms.

Only five years old, the 21st century has already been a bountiful testing-ground for the disaster community. September 11th dramatically brought terrorism—and with it disasters—to the forefront of the American psyche. Its aftermath inspired the creation of the Department of Homeland Security along with some serious self-reflection in both the intelligence and disaster communities. A few weeks later anthrax reminded us of ancient biological threats, and two years after that SARS introduced a novel one. In the past year alone tsunamis and earthquakes have struck all corners of the world, reminding us of the logistical hurdles inherent in any disaster response. Most recently, hurricanes have pounded both the US coastline and our confidence that much has really changed with all of the reforms in the disaster community.

The response to Hurricane Katrina failed because authorities didn’t appreciate advance warnings and were unable to quickly adapt response capabilities when the levees gave way. Today a much more complex and potentially devastating threat is looming, and instead of hours to days, we have months to years worth of warning. The H5N1 strain of Influenza A is brewing in Southeast Asia, along with other potential culprits, and we may discover eventually that the index case for the United States is already here.

With a global pandemic waiting in the wings, what is preventing us from really preparing for it? Perhaps we aren’t convinced that the threat is real, or we think it is too far away. Maybe the cost of preparing is prohibitive, and we believe it would be less expensive to clean up the mess in a particular location afterwards rather than prepare everywhere beforehand. Or, more likely, we’re just not sure what exactly needs to be done. The new HHS Pandemic Influenza Plan released on November 2, 2005, is not the kind of answer we are looking for.²

Losing lives isn’t the whole problem, and stockpiling Tamiflu isn’t the whole answer. So what is? This is a paper about asking the right questions, defining
the real problems, and appreciating their implications. This paper will communicate the urgency, provide a greater understanding of what is at stake, and, in doing so, lay the groundwork for real solutions. It is designed to give some very difficult answers to some very simple questions and ultimately move us closer to answering: how do we respond to a threat with infinite potential without infinite resources?

**WHAT DOES BIO REALLY MEAN?**

All disasters are not created equal. They can be small or large, and they can be short or long, as shown in Table 1.

The size element relates directly to the amount of response resources required. While the specific geographic distribution is significant, it is simply a question of supply versus demand. The time issue, however, is far more complex. On September 11, 2001, the first plane hit the north tower of the World Trade Center at 8:45 AM. By 10:30 AM both towers had collapsed, and the event was over. It was only a recovery mission after that.

If an explosion is a photograph, then a pandemic is a movie, and the camera starts rolling before we even realize that a disaster is unfolding. It will begin quietly with a single person anywhere in the country—or the world—who gets infected but shows no symptoms for two to 14 days, during which time the individual can cross any border undetected and even infect others while asymptomatic. When it finally presents in the form of a sick patient, it will look like any other seasonal flu, so no suspicion will be aroused. A slew of differential diagnoses will be posited before the real diagnosis is made, and many others will be infected during the process. If a train derails in the countryside, responders must be sent to the crash site. A pandemic, on the other hand, comes to the healthcare system. In fact, it walks in the door.

A pandemic is a story that grows more complex with every new infection. It is a dynamic process that begins at one end of the world and flies to the other in a matter of hours. Unlike any other disaster, a pandemic will continue to grow exponentially until it is stopped or it burns itself out like a forest fire, but people are destroyed, not trees. But after the Black Plague had “burned out” in the 14th century, one quarter of Europe’s population was gone. A biological event is also different from all other events because citizens themselves become threats, and this greatly complicates the policy decisions. When citizens become weapons, self-defense becomes self-mutilation, and the requisite decisions are politically unsavory.

When we think of WMDs, we think of states or terrorists who wish to harm the United States’ citizens and redirect its foreign policy. We assume a human actor with a purpose, but while nuclear and chemical attacks must be orchestrated, biological attacks can just happen. Pandemics are Mother Nature’s WMDs, and while the term has become popularized recently, the relevant issue is more disruption than destruction. Destruction is harder to create, geographically limited, and easy to clean up. Disruption, on the other hand, is very easy to create, can expand indefinitely, and drains numerous resources. Destroying every gas station in the country is hard to do; driving up the price of gas at all of those facilities is not.

In a platoon of soldiers diarrhea is worse than death. While in either scenario a soldier’s performance is lost, in the former more resources are required. Put simply, a dead soldier is a loss of one; a wounded soldier is a loss of up to six or seven: one wounded and the others to rescue him. In a pandemic, a million deaths is less disruptive than a million sick people and 10 million “worried well.”

Disasters result in three types of impact: casualties, terror, and economic damage. While all three are interrelated, it is important to divorce the concept of strategic significance from numbers of casualties. The media likes to focus on casualties, but our reaction to death varies widely by context. Over 42,000 people...

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**Table 1: Size and Time Element**

<table>
<thead>
<tr>
<th>Event</th>
<th>Size Element</th>
<th>Time Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane</td>
<td>Small</td>
<td>Weeks</td>
</tr>
<tr>
<td>Tornado</td>
<td>Small</td>
<td>Hours</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Large</td>
<td>Days</td>
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<tr>
<td>Volcano</td>
<td>Large</td>
<td>Months</td>
</tr>
<tr>
<td>Flood</td>
<td>Large</td>
<td>Months</td>
</tr>
<tr>
<td>Tsunami</td>
<td>Large</td>
<td>Months</td>
</tr>
</tbody>
</table>

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**Numbers tell the truth**

6-8 months—Time required to manufacture a new vaccine.

25 million—Number killed worldwide in first six months of the 1918 flu pandemic.

48 hours—Time after onset of flu symptoms that Tamiflu must be administered.

13.5 days—The mean time it took to collect specimens to diagnose SARS in Hong Kong.1
died in motor vehicle accidents last year, but no one drives any slower. When five people died from inhalational anthrax in 2001, however, thousands of people consulted their physicians and everyone started stockpiling Cipro. So when we talk about the 1918 flu pandemic killing more than 500,000 Americans, bear in mind that we lose 2.5 million people every year and life goes on. Death is undoubtedly tragic, but it can be ignored, or interpreted, or rationalized. The economy, however, is what holds the country together. Eliminate the American economy and 300 million people would be affected, and the entire world economy would waver. Suddenly, we are out of the tragedy realm and into the strategic “Fall of the Roman Empire” arena. It took Europe hundreds of years to recover from the Black Plague. Irreversibly crippling the US economic base could change the global balance of power, and this is no secret to our enemies.

**WILL IT HAPPEN?**

The simple answer is: probably! Capitol Hill, however, is not so dichotomous. When decisions of policy and funding are made, everything must be qualified and quantified. The poignant question is: *when* will it happen? Without a crystal ball at our disposal, we are left with applying a clear understanding of what is happening right now to our experience from the past.

It could happen soon. Threat assessments calculate potential impact from a given threat by taking into account three things: 1) our vulnerability, 2) the likelihood of a threat, and 3) the consequences of that threat being visited on our nation. An exact likelihood is difficult to calculate, but with consequences potentially so great, even a remote likelihood should prompt earnest preparations.

It has happened before. Influenza pandemics have traversed the globe on four occasions in the last 150 years: 1890, 1918, 1957, and 1968. The most devastating—and thus most memorable—was the 1918 “Spanish Flu,” which killed more people in 24 weeks than AIDS has killed in 24 years and ultimately killed three times as many people as the Black Plague. Even the coincident carnage in the trenches of WWI paled in comparison.

While new research in molecular genetics has shed some light on the origins of the 1918 H1N1 strain of influenza, we still don’t have a clear understanding of why it appeared so quickly, why it disappeared just as quickly, and why it left so many dead in its wake. Without that understanding, we are left to assume that an equally if not more deadly virus may appear at any moment. The potential of biology has not changed significantly in the last 100 years, but the environment in which it operates has. So, how has the world changed since 1918? Can we assume that healthcare has improved? Surely advances have been made, but are they relevant? Undoubtedly our ability to provide supportive respiratory care has improved, and we have a myriad of antibiotics for secondary bacterial infections. Our progress in the world of viruses, however, has been much less significant. And while we have vaccines and antivirals, the real question is: will they work?

If they don’t work, and they may not for reasons discussed later, then not much in healthcare has effectively changed. The global transportation system, however, has changed significantly. The 1918 flu circled the globe several times in 18 months, and commercial air travel didn’t even exist yet. Recently, SARS traveled from Hong Kong to Toronto in a matter of hours. Advances in healthcare, including some cancer and autoimmune

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**Ten common misconceptions regarding the threat of avian flu**

1. We know when it will happen.
2. We know why it will happen.
3. We know what will happen.
4. We know how to stop it.
5. We have a plan.
6. We are better off than we were in 1918.
7. Pandemics aren’t such a threat: look at SARS.
8. We have vaccines and antiviral drugs that we know will work.
9. Investing in flu vaccine is a waste of money if a pandemic never happens.
10. We know basic things like why the flu comes in winter.
therapies, along with AIDS, have created a much larger, vulnerable population of immunocompromised people. Finally, whether or not American society has become less inclined to collectively mobilize for such an event—because of a further cultural fragmentation and growing distrust of the government—is a distinct possibility. So too is the willingness of the American people to forgo their mobility, temporarily, as part of quarantine.

How do we know it will happen? Anyone who has wandered through a chicken market in rural Southeast Asia can appreciate the challenge inherent in preventing the jump from birds to humans. In order to believe that we will never be threatened, we must be confident in one of two facts: 1) that the global healthcare system is strong enough all over the world to prevent an attack from occurring, or 2) that our domestic response system is pervasive and agile enough to handle any outbreak after it has started. We talk about containing an outbreak as if it were a one-time occurrence. Unlike disrupting a terrorist cell with aspirations to build a nuclear device, stopping one pandemic does not make it any less likely that another one will occur—especially if the infection organism resides in an animal reservoir. Yet, of the $7.1 billion requested of Congress for the influenza plan, only $250 million is allocated to assist foreign countries in improving their disease detection and surveillance systems.

As of November 2005, the World Health Organization (WHO) has declared that we are currently in the third stage of the six stages of a pandemic, which puts us at the beginning of the Pandemic Alert Stage. This means that a new virus strain has been identified in humans, but we have yet to see any human-to-human transmission. Human cases of avian flu have been officially confirmed in five countries: Indonesia, Vietnam, Thailand, Cambodia, and China. Cases in birds, however, extend from Japan to Croatia and include 16 countries along the way. It is impossible to know how many cases have yet to be identified or which one will be the tipping point. Most likely, human-to-human transmission has already occurred somewhere and has just yet to make itself known. This is not to say that the pandemic has already started; any pandemic probably has a number of false starts that are never identified. But the seasonal trend over the last few years is ominous.

**WHAT IS PROTECTING US NOW?**

The history of our national disaster response system is an alphabet soup of undulating acronyms, consolidating and dispersing in endless cycles like so many universes expanding and contracting. But it is still useful to examine the motivation behind the creation of successive organizations to understand the capabilities and limitations of our current system. In short: the main reason our existing disaster response system is not very well equipped to handle a biological disaster is that it was never designed for one.

Two hundred years after its founding, the United States did not have a singular federal organization in charge of disasters. The 1960s and 1970s were punctuated by a series of earthquakes and hurricanes across the country that highlighted the need for such a central body. The pivotal moment, however, came in 1978 when the Department of Defense (DOD) staged a classified worldwide deployment exercise called Nifty Nugget. The results were disastrous. Had the exercise been an actual conflict there would have been 400,000 troop casualties, and between 200,000 and 500,000 trained combat troops would not have arrived at the combat zone on time.4 Appreciating the logistical nightmare, the following year the military created the Joint Deployment Agency and would later form USTRANSCOM to coordinate multimodal—air, sea, and land—transportation. On the civilian side, President Carter created the Federal Emergency Management Agency (FEMA) to consolidate disaster-related responsibilities from a number of disparate organizations. (FEMA assumed responsibilities from the Federal Insurance Administration, the National Fire Prevention and Control Administration, the National Weather Service Community Preparedness Program, the Federal Preparedness Agency of the General Services Administration, and the Federal Disaster Assistance Administration from the Department of Housing and Urban Development.)
Three years later President Reagan formed the Emergency Mobilization Preparedness Board, and its recommendations became part of National Security Decision Directive 47, which created the National Disaster Medical System (NDMS). The NDMS was originally conceived as a joint venture between the Department of Health and Human Services (HHS), the DOD, FEMA, and the Veterans Affairs (VA) hospital system. In the event of a disaster, HHS would provide medical supervision, DOD would provide transportation to evacuate casualties, VA would provide hospital beds to receive the casualties, and FEMA would oversee the whole process and help pay for the aftermath. In addition, Disaster Medical Assistance Teams (DMATs) were created to provide mobile teams of emergency medical professionals that could be deployed to a disaster site and be self-sustaining for 72 hours.

Originally designed for nuclear attacks, FEMA was heavily criticized for its response to Hurricane Hugo in 1989 and Hurricane Andrew three years later. It was accused of bureaucratic delay and became known as a political dumping ground for friends of the president. In the mid-1990s, reforms were able to streamline the organization, and it received much praise after its response to the Oklahoma City bombing in 1993. But, after September 11, 2001, FEMA was swallowed by the newly created Department of Homeland Security (DHS) and its focus shifted to terrorism. In 2004 the National Incident Management System (NIMS) was created, and the National Response Plan (NRP) was drafted to consolidate pieces of a number of competing plans. (The NRP primarily replaced the Initial NRP [INRP], the Federal Response Plan [FRP], the US Government Domestic Terrorism Concept of Operations Plan [CONPLAN], and the Federal Radiological Emergency Response Plan [FRERP].) Apparently, these reforms were a step backwards because a year later, after Hurricane Katrina, FEMA was once again accused of bureaucratic delay, and its leader, Michael Brown, was castigated as a political friend of the president with no disaster management experience.

There are three phases to disaster response: 1) prevention, 2) mitigation, and 3) relief. FEMA is primarily designed for disaster relief: what happens after the disaster is over? It is very effective as a mechanism for distributing federal loans and grants to help rebuild an area after a disaster, but its ability to mobilize resources during a crisis has repeatedly come into question. The
main difference between disaster relief and disaster mitigation is the time element, and time is the defining feature of a biological disaster event.

Katrina demonstrated how difficult it is to respond to a hurricane even after decades of similar events, and yet a biological event is much more complex. Katrina had a few days worth of warning; a nuclear strike would have little or no warning but would be obvious enough once it happened. A bio attack, on the other hand, would already be well underway—probably for a few weeks—before being detected. While the mass evacuation for Hurricane Katrina proved problematic, a complex evacuation is much simpler than the opposite: not being allowed to evacuate anyone at all. An evacuation is a luxury compared to a quarantine because most of the people want to leave, and you know when everyone’s out of harm’s way. A bio event can be in multiple locations at once, and new cases can spread as quickly as modern transportation. The disaster enters the healthcare system without warning or control and starts pulling society apart at the seams.

On a broader and more worrisome level, the history of disaster response reveals a reactive culture: the tendency to plan for a disaster after it has already happened. The only thing worse than no plan is a plan that we think will work. The National Pandemic Influenza Strategy was released on November 1, 2005, and the HHS Pandemic Influenza Plan appeared the following day. Health officials began drafting the plan back in 1991, and 14 years later it still is not clear who is in charge of a pandemic response. It emphasizes stockpiling antiviral drugs, assuming they will be effective, and developing vaccines, assuming they will be available in time. It talks about restrictive movement, but if politicians hesitated to admit that we had SARS cases in the United States and failed to evacuate most of New Orleans because of the feared economic impact, what makes us believe they will have the political clout to declare a widespread quarantine? Ultimately, the plan defers most of the responsibility to the state and local governments, ensuring that more time will be spent quibbling over funding than actually preparing.

Every disaster after-action report has the same complaints: lack of clear leadership, poor inter-agency communication and coordination, bureaucratic delay, inadequate infrastructure or loss thereof, and insufficient surge-capacity. New plans always say that they are going to fix those problems, but they never explain how at the operational level. We are currently being protected by fantasy plans: the kind that sit on shelves as “symbols of control, order, and stability. These ‘fantasy documents’ attempt to inspire confidence in organizations, but they are disturbing persuasions, soothing our perception that we ultimately cannot control our own technological advances.” What is a plan anyway? It’s a promise about what will happen. If you could really plan for a disaster, then it wouldn’t be a disaster.

**WHAT HAVE WE LEARNED?**

Skeptical policymakers often cite what SARS wasn’t. It only killed 774 people worldwide, and there was no human-to-human transmission within the United States. But how about what SARS was? SARS was a wake-up call to the global community about the emergence of novel biological agents, and it provided a brilliant in vivo experiment to demonstrate the spread throughout the world of a pathogen for which we have neither vaccine nor treatment. A map alone is sobering: in a matter of months, SARS traversed the entire globe and hit predominantly industrialized nations. The more well connected a country was to the international transportation grid, the more likely it was to be affected. Countries fared differently, however, based on their response strategies. After China, two of the hardest hit countries were Canada and Vietnam. A look at their different experiences reveal, somewhat counter-intuitively, how a very industrialized country with a first-rate healthcare system can fair far worse than a country with comparatively limited resources.

The outbreaks in both Toronto and Hanoi began at the same time in essentially the same way: each city received a single index case of SARS during the last week of February 2003. But from there the responses in each country differed in a number of important ways. In Canada a “Code Orange,” which requires all hospitals to go into emergency mode, was not declared until 30 days after the first SARS case. Vietnam, in contrast, began preparations for a SARS outbreak months before the first case arrived. Back in December of 2002, the Vietnamese Ministry of Health had distributed the “Ten
Measures for Prevention Against SARS to hospitals around the country. In Canada clear recommendations and uniform guidelines were not given to healthcare workers until the outbreak was well underway. The first case to present to Toronto’s Scarborough Grace Hospital on March 7th was the son of the index case, and he spent 18 to 20 hours in the ER where first pneumonia and then tuberculosis were suspected before SARS. In Canada SARS patients stayed where they presented and ended up in 20 different hospitals at once. Early on Vietnam designated two SARS hospitals: the French Hospital of Hanoi and the Tropical Medicine Institute at the Bach Mai Hospital in Hanoi. Neither hospital in Vietnam had negative pressure isolation rooms, while many of the facilities in Toronto did. Individuals exposed to infected persons in Canada were asked to stay in their homes and were loosely monitored, while such individuals in Vietnam were quarantined in specific facilities. After months of screening at airports Canada never quarantined any travelers, but Vietnam quarantined thousands and even quarantined 2,000 Vietnamese students at once who were evacuated from China. Canada followed the WHO guidelines for discharging patients and generally quarantined contacts for 10 days. Vietnam, on the other hand, exceeded the WHO requirements for giving SARS patients a clean bill of health and generally quarantined contacts for up to 14 days. Healthcare workers constituted 40 percent of the SARS cases in Canada, while healthcare workers constituted 57 percent of the cases in Vietnam. On April 28th, 2003, Vietnam declared their SARS outbreak over. All in all, 68 cases were recorded and SARS was never heard from again. On May 17, 2003, Canada declared its SARS outbreak over. By then Canada had 372 cases, and a second outbreak after the declaration would affect 66 more patients.6

So how was Vietnam, a small country with significantly fewer healthcare resources, able to fare so much better than Canada during the SARS pandemic? Vietnam is a communist state with a very centralized healthcare system. Orders from the top are quickly propagated throughout the system, and all elements of the healthcare system respond to the Ministry of Health. Most important, the government openly acknowledged the imminent threat, characterized it as a “political challenge,” and began preparing for an outbreak months before the first case appeared. Specific SARS hospitals were established to concentrate the patients, and SARS Mobile Teams were created to go out to the community and bring patients to these hospitals. They consistently exceeded the WHO requirements for diagnosing, quarantining, and discharging patients in order not to overlook a single case. Border monitoring started early and was extensive with mandatory health checks and thermal cameras in all major airports. Quarantines were strict, enforced, and officials weren’t afraid to institute them. Finally, the central government gave significant financial support to the healthcare system in order to facilitate its recommendations.

In the end, some fortuitous measures and a little practical ingenuity contributed to Vietnam’s success. For example, because the Bach Mai Hospital did not have sophisticated negative pressure rooms for SARS patients, they did something unheard of in other countries: they opened the windows. Bach Mai is one of the few hospitals that did not have a single healthcare worker infection.

In addition to historical lessons, simulations can provide some insight into the efficacy of different response strategies. A group at the Los Alamos National Laboratory adapted a computer model of traffic patterns in Portland, Oregon, for a smallpox outbreak named EpiSims.7 Historically, most simulations either assumed a simple geographic spread like the Black Plague as it moved across Europe in the 14th century, or they made simple, uniform social networks. EpiSims modeled a realistic small-world network with complex connections and so-called “super-spreaders.” The model ran a number of scenarios: 1) no intervention, 2) ring vaccination, and 3) total vaccination. It ran each intervention at different times: after a few days or after a few weeks. The simulation found that regardless of what intervention was done the most important element was time. It also discovered that social distance strategies—like shutting down gathering places such as schools—was almost as effective and more timely than vaccinating everyone. The bottom-line was—a faster response meant fewer casualties. Another simulation modeling an outbreak of influenza in Thailand came to the same conclusion.8
WHAT ARE WE UP AGAINST?

First, a quick biology lesson for the uninitiated. Influenza—from the Orthomyxoviridae family—comes in three forms: A, B, and C, and a typical viral particle ranges from 80 to 120nm. Influenza C causes very little morbidity and is generally disregarded. Both A and B contribute to the endemic flu that traverses the globe every year, but only A infects species other than humans, which complicates matters. Influenza A is further classified based on two surface proteins: Hemagglutinin (H) and Neuraminidase (N) like the current threat “H5N1.” H is involved in viral binding to host cells, and because it is an important antigen for the immune system to recognize it, is a critical part of the flu vaccine. N is involved in the budding of newly manufactured viral particles from host cells. It is also an important component of the flu vaccine and is the target of the popular antiviral drugs Tamiflu and Relenza.

What makes influenza both fascinating and problematic is its uncanny ability to mutate. The reason a new flu vaccine must be manufactured every year is that the virus mutates during its journey around the world every year. For the 2005-6 flu season, for example, the Vaccines and Related Biological Products Advisory Committee of the FDA met on February 16-17, 2005, to decide which strains of flu that were collected from laboratories around the world should be included in the following year’s vaccine. It’s an educated guess that usually includes two As and one B. The 2005-6 cocktail includes: A/New Caledonia/20/99 (H1N1), A/California/7/2004 (H3N2), and B/Shanghai/361/2002.9

The virus has two mutation mechanisms: genetic drift and genetic shift. Genetic drift is the gradual point mutation of ribonucleic acids during viral replication that causes subtle changes in the viral population over time. This propensity was beautifully illustrated in a Nature article where “large-scale sequencing of human influenza [revealed] the dynamic nature of viral genome evolution.”10 The second, and potentially more devastating method of mutation, capitalizes on the fact that the Influenza A genome consists of eight single-stranded negative sense RNA molecules. Genetic shift is the sudden change in the viral genome when two viruses—often infecting the same host simultaneously—actually swap whole RNA segments, allowing viruses to exchange not just simple mutations but whole functions en masse. The classic, feared scenario is a high mortality strain that can only infect birds crossing with a low-mortality strain that can only infect humans to create a high-mortality human strain. These various mutation mechanisms also allow the virus to become resistant to antiviral drugs and render vaccines ineffective.

Besides a history of pandemics, influenza is more feared than other agents like SARS because of what we see the endemic strains do annually. Every year the flu circles the globe and blankets the entire United States in about eight weeks. Every year the flu kills about 36,000 people in the United States, which is about four times as many as AIDS. Worldwide, between 250,000 and 500,000 people die of the flu annually. Compare that to the scare SARS made with 774 deaths. Granted, most of the people who die of flu are either very young or very old—for everyone else it is merely a nuisance. But that is precisely what makes H5N1 so frightening.

The first human case of H5N1 was identified in Hong Kong in 1997, and it has been reemerging during the winter ever since. In 2003 human cases appeared again in Hong Kong and also in China. In 2004 it was identified in Thailand and Vietnam. In 2005 it is currently in Thailand, Vietnam, Cambodia, Indonesia, and China. During these outbreaks, the mortality rate has hovered around 50 percent (as of November 14, 2005, there have been 126 human cases of H5N1 with 64 deaths documented since December 2003), and most of the deaths have been of people under the age of 40. This is precisely what set the 1918 flu apart and made it so devastating. The Spanish Flu had the highest mortality for the 20 to 40-year-old age group and nobody knows exactly why. Perhaps a similar organism had passed through 40 years earlier and provided some protection to the older population, but the records aren’t specific enough that far back. Perhaps World War I, which was unfolding simultaneously, packed 20-year-old soldiers into crowded living conditions and paraded them around the world. Or perhaps it was something inherent to the virus. New research suggests that
H5N1 creates an immune storm which may, in part, account for the age distribution of deaths. We don’t know for sure, but we can see it happening again today.

Right now, regarding H5N1, the “Avian Flu,” here’s what we do know. Unlike the viruses that caused the flu pandemics of 1957 and 1968, which arose when human and avian flu viruses infected the same person at the same time, allowing their genes to mix, recent genetic analysis suggests that the 1918 H1N1 virus came directly from birds. A closer look at the H5N1 genome reveals that it is currently only a few mutations away from looking like H1N1. Looking at the three RNA polymerase genes, only 10 amino acids consistently distinguish avian influenza strains from the 1918 H1N1 strain. Of those 10, four of the mutations have been identified in H5N1 strains, although not all in the same strain. Variations of the other six mutations have been identified in other avian flu strains like H7N7. It would appear that H5N1 is mutating to appear more and more like its deadly cousin H1N1.

At the same time, there are still some important facts about H5N1 that we don’t know—some of which we will never know. We still don’t know exactly which mutations are necessary to make H5N1 able to transmit from human-to-human in a deadly form. We don’t know what mutations are actually happening right now in the H5N1 population, and we don’t know where exactly they are happening. Given what we know about biology, it is likely that the necessary mutations have already happened in a bird somewhere, and it may have already jumped to a human. Suffice to say it will. But luckily there are still a few steps between the killer bug materializing in a bird and a worldwide pandemic.

**WHAT TOOLS DO WE HAVE?**

The current HHS Pandemic Influenza Plan focuses a lot of attention on current countermeasures, so it is worth exploring what our options are at the moment. The goal of any intervention is to disrupt the fundamental SIR epidemic cycle depicted in Figure 1.

For example, vaccines and isolation prevent infection; antiviral drugs hasten recovery. Table 2 categorizes the tools available to us as of November 2005.

Agent specific countermeasures are logistically convenient because they are “fire-and-forget.” A vaccine is a one-time shot that provides immunity thereafter. Project BioShield has spent a lot of time focused on these types of countermeasures. Unfortunately, agent-specific tools must be individualized and some biological agents are moving targets. Already strains of H5N1 have appeared in Vietnam that are resistant to the antiviral of choice: Tamiflu. Tamiflu, which inhibits neuraminidase, must be given within 48 hours of the onset of symptoms, which presents an additional logistical challenge. At the moment, the drug is only manufactured by one Swiss company, Roche, although negotiations are underway for the production of a generic version. In the meantime, with governments stockpiling the drug around the world, major shortages already exist. The drug is also produced from star anise, which is only found in southern China and is in limited supply. Other production methods are currently under investigation. The second-line drug is Relenza, but not enough meaningful data about its use with H5N1 has been collected.

The National Institute of Allergy and Infectious Disease (NIAID) began development of a vaccine for H5N1 in April of 2005, as have a number of groups in China. Early trials show some success although higher doses than expected have been required, which raises production concerns. The vaccine business in general is not a popular one, given the financial incentives (or lack thereof), which is why only a few companies manufacture the vaccine for endemic influenza every year. The fragility of the system was demonstrated by massive shortages last year when
one of Chiron’s plants was shut down. The current method of vaccine production—developed in the 18th century—uses chicken eggs to produce inactivated virus and requires six to eight months of production time. If the mutations required to allow H5N1 to jump from human-to-human also rendered current vaccines ineffective, then a new vaccine would be a long time coming. New techniques using gold-bonded DNA vaccines are being explored but are not at the scale required for serious production. The one logistical benefit of vaccines is that not everyone need be inoculated. A sufficient percentage of the population, known as “herd immunity,” would be sufficient to prevent the propagation of an epidemic. Also, there is some inherent immunity in any population, which is why most of Europe survived the Black Plague, and even a few people with certain mutations are immune to AIDS, but it’s usually not a significant number of people.

The nonspecific countermeasures will work against any threat, but they tend to require constant vigilance. Hospitals with infectious agents employ airborne precautions for a variety of ailments in the form of masks, gowns, and negative pressure rooms. Isolation of sick people and quarantine of contacts is also key to any response. Social distance management is one of the simplest measures, and it involves both the ubiquitous wearing of masks (as in East Asia during the SARS epidemic) and the closing of public spaces like schools and stadiums. The problem with quarantine is the economic impact. We call it the “host response” phenomenon: when the response to the threat, rather than the original threat itself, kills the organism, as in the case of septic shock. This is why politicians hesitate to close borders; it’s a nasty position to be in: to accept casualties or to accept massive economic damage. Neither is a very pleasant choice.

Research into future options includes nonspecific immune system enhancement of the population and competitors. A competitor, which does not yet exist, is similar to a live, attenuated vaccine like the Sabin polio vaccine. A competitor, however, would readily infect a population—jumping from person to person—without causing disease in order to confer immunity to a more deadly cousin. The rationale is that the only thing that travels through a population as quickly as a virus is another virus, so it would be the equivalent of a self-propagating rapid vaccine distribution that only requires a few initial doses.

**WHAT NEEDS TO BE DONE?**

There are two obvious solutions: 1) slap masks on everyone in society at all times, or 2) reconfigure society so that all communication is telecommunication and human contact is eliminated. For obvious reasons, neither of these solutions is very appealing. So what are we left with?

The summer of 2000 was one of the toughest seasons for fire fighting in the United States in years. Over 122,000 fires burned over 8.4 million acres of land. In July, local crews in Montana were overwhelmed, so the National Interagency Fire Center called upon resources from all over. All told, more than 30,000 people, including civilian firefighters, state personnel, National Guard, Army, Marines, rural fire department personnel, and people from countries outside the United States, including Canadians, Australians, New Zealanders, and Mexicans, were on fire lines or filling overhead positions. Why can’t our healthcare system respond to a growing disaster so quickly with a multinational coalition including multiple branches of the military?

The main question is—can we evolve the current NDMS, or does it require a total revolution? The system

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can’t be changed overnight, so what can we do now? Clearly, the old NDMS doctrine of evacuation needs to be updated to include quarantine. When to quarantine is the biggest question. The probable SARS case estimate in the United States fluctuated from 344 to 27, but whatever it was, it wasn’t enough to institute widespread quarantines. But how many would have been enough? How to quarantine is another question. Negative incentives, like bringing in the military to help contain people, should be augmented with positive incentives, like providing the best healthcare available in the hot zone. And, finally, once quarantine is established, then what? How do resources still move quickly in and out of the area? It has been estimated that if the bridges around Manhattan were all closed at once, the supermarkets on the island would have empty shelves in a matter of days. Such just-in-time supply models are typical of most hospitals as well. Quarantining people in their homes is also a quick and simple measure, assuming we can still provide the necessary services. A telemedicine system in conjunction with robotics, however, would be able to operate through and within a quarantine border, and we explore this concept further in other papers.15

Right now we can distribute masks, and other social distance strategies can be implemented in the event of a pandemic fairly easily, like closing schools and other gathering places. Vaccines and antiviral medications can be stockpiled but not at the expense of other more assured strategies. We can also invest more in combating the issue at its source in Southeast Asia with increased epidemiological monitoring and compensation of bird farmers, but, again, these are only temporizing measures. Regardless of what strategies are currently being proposed, the environment in which they are going to be implemented must be considered. Some measures that are doable in the intermediate future are impossible in the urban community and maybe even unnecessary (because of social distance) in the truly rural system, particularly if it is someplace like northern Maine, or even Vermont’s Northeast Kingdom. Distributing a medication within 24 hours, for example, would be an impossibility in New York City but quite feasible in Burlington, Vermont. If the whole country were composed of small communities like Burlington, connected to the grid by telecommunications, then we probably wouldn’t have an epidemic problem at all.

Most people already know what we should be doing right now using what is currently possible. But Katrina reminded us that if we make a plan, we must make sure that we can actually use it in a timely manner. The best plan in the world is useless if it isn’t implemented in time. The political will of individual leaders must be assured, and the culture of bureaucratic obstacles must be circumvented.

In the next 10 to 20 years, we can invest in more flexible technologies like the aforementioned viral competitors. When we discover what molecular components are consistently required by all influenza viruses, then we can develop more universal DNA vaccines that will protect against all influenza viruses and be less affected by mutation. Most of the telemedicine technologies that we discuss in greater detail in other papers already exist, but it will take a few years to implement them. And, whether or not we want to actually use the military itself is a question, for it has a number of useful technologies and lessons that could be applied to the disaster community. The Incident Command System is an adaptation of a military model. An important lesson to learn from the military is that, if they arrive in an area without infrastructure, they build their own. They build airports, provide electricity, and construct bases. The disaster community should make fewer assumptions about local resources, be prepared to provide their own, and definitely be self-sustaining for longer than 72 hours.

Farther in the future, the military’s Future Combat System (FCS) envisions a battlefield medical system that includes portable, individual intensive care units called Trauma Pods. An array of manned and unmanned vehicles connected to a network will transport patients and ultimately provide medical interventions as well. Such a system would take the human vectors out of the loop, maintain the integrity of quarantine, and prevent the spread of disease without sacrificing care. The command and control apparatus must be isolated—before an event—in order to ensure command throughout the event. Aegis cruisers connected to the network could provide an ideal medium for such isolation, but it must happen now. Again, most measures instituted after we have identified that an event is underway are too late.
Ultimately, the healthcare system upon which any biological disaster response is based needs to be transformed. Healthcare and medical services is listed as Emergency Support (ESF) number eight of 12 in the NDMS. Other ESFs include transportation, communication, energy, and the like, but number eight is unique. Healthcare requires every other ESF in order to operate, and every other ESF relies on healthcare. New Orleans cannot be repopulated without a healthcare system in place, but everything else must be in place first. So healthcare must take a more central role in disaster planning. When we were once asked to uncover vulnerabilities in the US healthcare system—to figure out how a terrorist could break it—we immediately realized two things: 1) it’s not a system, and 2) it’s already broken. How can the same system that operates well below capacity and can barely provide healthcare to all of its citizens on a daily basis be expected to suddenly respond to a disaster? Figure 2 depicts the trends that need to happen in healthcare in order for it to be more capable of handling a pandemic.

First, private healthcare, public healthcare, and national security need to be combined into a single entity because any one of them is ineffective without the other two. Second, healthcare capabilities should be more evenly distributed throughout the system using telecommunications and telemedicine. Along these same lines, the majority of healthcare delivery should be moved out of the hospital and into the community and the home.

Federal resources can’t be in a million places at once. FEMA isn’t going to respond effectively to 100 outbreaks of avian flu scattered across the country. The near future requires a rethinking of the way our system is designed. Imagine the human immune system. A newborn’s immune system never receives a list of the numerous pathogens it will encounter in the course of a lifetime, but it adapts. There is no central command, but it remains exquisitely regulated. It is an organic, evolving network whose intelligence is derived from rules and interactions rather than the agents themselves. The details—the unpredictable part—are less critical. The system begins

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**Figure 2. The healthcare system needs to evolve in order to respond to pandemics.**
before the event and evolves as the disaster unfolds. A variety of approaches function simultaneously, and successful ones are reinforced on a fitness landscape. Simple components interact to create emergent behavior much more complex and flexible than a system controlled by a single entity. Foreknowledge is unnecessary; synchrony is built in. Emerging threats are autonomous and self-replicating. Our response system ultimately needs to look more like this to be truly effective.

A paradigm shift is in progress. The old paradigm is to try to conform the disaster to the response: to control. The new paradigm is to conform the response to the disaster: to adapt. The goal is simple: to create a system based on a realistic set of assumptions in order to prevent tactical events from assuming strategic proportions. While it may not be possible to prevent future attacks entirely, it is possible to ameliorate, contain, and mitigate their social and political effects. Doing so is crucial to the preservation of national capabilities and political will and, with them, US leadership both domestically and abroad.

Biological threats are potentially so devastating, in part, because our healthcare system in its current state is itself a strategic vulnerability. Therefore, revolutionizing our response capabilities would necessarily involve improving our delivery of healthcare. Investing large amounts of time and money retrofitting a system that we hope to never use may be politically unpalatable, even if it would serve as a deterrent to attack, since our current system practically invites it. However, reorganizing the dual-use system of healthcare would not only benefit our citizens on a daily basis but also protect the United States from natural pandemics and even biological terrorism.

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Community emergency response teams and community disaster planning

Frank M. Bertone

INTRODUCTION
In the days following September 11, 2001, most emergency managers developed a renewed intensity in their emergency preparedness efforts. Emergency managers have traditionally been vigilant in planning for a natural disaster (i.e., hurricane, flood, snowstorm, etc.). But the new threat of terrorism is now in the forefront of all planning. This is not to say that emergency managers did not learn from prior terrorist acts like the first World Trade Center bombing or the Oklahoma City bombing. The September 11th attacks, however, were on a much larger scale than had ever been seen before in the United States and one which resulted in the greatest loss of life to a civilian population in this country in modern times. Emergency managers are exposed to emergency situations on a regular basis. Some of these emergencies can be handled very quickly and without any mishaps, while others require the emergency manager to call in additional resources to help. In the end, what it comes down to is the planning the emergency manager has done with the involvement of the leadership and members in the community in which he serves.

COMMUNITY DISASTER PLANNING
The emergency preparedness plans that an emergency manager has created are an established organizational structure for how to respond to almost any type of emergency or disaster situation. This structure is designed to assist with the command and control for that particular emergency or disaster situation. As we have learned from past experiences, an emergency or disaster situation can occur at any time, anywhere, and to any community. An emergency manager must, as the Boy Scout motto states, “Be Prepared.” As we all know, an event becomes an emergency because it was unexpected. A “small” emergency can quickly grow and become a “large” emergency if there is inadequate preparation (which includes both equipment and personnel) to respond in a timely manner. This is why every emergency manager has prepared and constantly reviewed their emergency operations plan. This will help to identify what emergencies or disaster situations can be handled locally and when outside help for that emergency or disaster situation will be needed. An emergency manager might have years of experience and feel confident with their own personal response. The unknown factor for the emergency manager is the level of response he can expect from his staff and first responders. Will enough respond? Will they all be able to respond? And if not, the question in the back of the emergency manager’s mind is what does he do then? Preparing an emergency operations plan is only part of the planning for a community emergency or disaster situation. The emergency manager must also seek out a very rare and needed resource in these times, which are volunteers. In times of an emergency or disaster situation, first responders (police, fire, and EMS) will most likely be the first on location, and depending upon the magnitude of the event, these first responders can quickly become overwhelmed. They will quickly need help in order to save lives and property.

In the days following the events on September 11, 2001, state and local government officials realized an increased opportunity for citizens to become an integral part of protecting the homeland and supporting the local first responders. Officials agree
that the formula for ensuring a more secure and safer homeland consists of preparedness, training, and citizen involvement in supporting first responders. It was in this spirit that in January 2002 President George W. Bush launched USA Freedom Corps to capture the spirit of service that has emerged throughout our communities following the terrorist attacks. The primary feature of the USA Freedom Corps was called Citizen Corps, which was created to help coordinate volunteer activities to make our communities safer, stronger, and better prepared to respond to any emergency situation. It provides opportunities for people to participate in a range of activities to make their families, their homes, and their communities safer from the threats of crime, terrorism, and disasters of all kinds. The Citizen Corps program builds on the successful efforts already in place in many communities around the country to prevent crime and respond to emergencies. One key program that originally started through local innovation is the Community Emergency Response Team (CERT). CERT is the foundation of Citizen Corps and emblematic of this national approach toward citizen participation in community safety.

Citizen Corps is made up of five key components. The first program under Citizen Corps is CERT. This program educates people about disaster preparedness and trains them in basic disaster response skills such as fire safety, light search and rescue, and disaster medical operations. The second program is the Fire Corps, which promotes the use of citizen advocates to enhance the capacity of resource-constrained fire and rescue departments at all levels: volunteer, combination, and career. Citizen advocates can assist local fire departments in a range of activities including fire safety outreach, youth programs, and administrative support. The third program is USA on Watch, which is an updated version of the older Neighborhood Watch programs. USA on Watch incorporates terrorism awareness education into the existing crime prevention mission, while also serving as a way to bring residents together to focus on emergency preparedness and emergency response training. The fourth program is the Medical Reserve Corp (MRC). The MRC program strengthens communities by helping medical, public health, and other groups by offering their expertise throughout the year, as well as during local emergencies and other times of community need. MRC volunteers work in coordination with existing local emergency response programs and also supplement existing community public health initiatives such as outreach and prevention, immunization programs, blood drives, case management, care planning, and other efforts. The fifth program under Citizen Corps is Volunteers in Police Services (VIPS). The purpose of VIPS is to enhance the capacity of state and local law enforcement to utilize volunteers. VIPS serves as a gateway to resources and information for and about law enforcement volunteer programs. Of all the organizations that fall under Citizen Corps, CERT is the one program that has the biggest impact in the area of Community Disaster Planning. CERT members are taught basic fire suppression, basic medical treatment, basic search and rescue, an introduction into the incident command system, and an overview of the CERT organization. But the idea of Community Emergency Response Teams has been around for many years before the September 11th attacks.

**HOW DID CERT START?**

The idea to train volunteers from the community to assist emergency service personnel during large natural disasters began in February of 1985. A group of Los Angeles officials went to Japan to study its extensive earthquake preparedness plans. This group encountered an extremely homogenous society that had taken extensive steps to train entire neighborhoods in one aspect of alleviating the potential devastation that would follow a major earthquake. These single-function neighborhood teams were trained in fire suppression, light search and rescue operations, first aid, or evacuation. After the 8.1 magnitude earthquake that struck Mexico City in September of 1985, an investigation team from Los Angeles discovered that while there was no formal training program in place, large groups of volunteers organized themselves and performed light search and rescue operations. These volunteers were credited with more then
800 successful rescues but, unfortunately, more than 100 of these untrained volunteers died during rescue operations. What was learned was that a plan was needed to train volunteers to help themselves and others, and become part of an organized government response and an essential part of the preparedness, survival, and recovery after a large disaster. In 1986, the Los Angeles Fire Department developed a pilot program to train a group of leaders in a neighborhood watch organization. The idea was to develop a multi-functional volunteer response team with the ability to perform basic fire suppression, light search and rescue, and basic first aid. Expansion of the initial program beyond the initial 30 members was not possible at the time due to limited city resources. It was not until the October 1987 Whittier Narrows earthquake, which underscored the threat of an area-wide major disaster, that the city of Los Angeles then took a more aggressive role in protecting its citizens. The objectives included education and training of the public and government sectors in disaster preparedness through the development and training of a network of CERTs. In 1993, the Federal Emergency Management Agency (FEMA), after reviewing the success of CERT in Los Angeles, decided to take this concept to communities nationwide and make it applicable to all emergencies. The CERT program, however, did not gain wide acceptance until after the events of September 11th, when in 2002 it became part of the Citizen Corps. The Citizen Corps thus served as a unifying structure to link a variety of related volunteer activities for expanding a community’s resources for crime prevention and emergency response.

WHAT IS A COMMUNITY EMERGENCY RESPONSE TEAM?

CERTs are a positive and realistic approach to emergency and disaster situations in which citizens will initially be on their own and their actions can make a genuine difference. When the local emergency managers prepare for everyday emergencies, the need for trained personnel who can assist in all hazardous situations is critical not only in preparedness but in planning, response, and mitigation. Such personnel are a resource that every emergency manager needs. Initially, CERT programs were developed to assist communities in taking care of themselves in the immediate aftermath of a major disaster, when first responders are overwhelmed or unable to respond due to communication or transportation difficulties. As the CERT concept has taken hold across the country, however, CERTs have become much more than originally envisioned. CERTs have proven themselves to be an active and vital part of their communities’ preparedness and response capability, thus giving the emergency manager additional resources to call upon.

COMMUNITY EMERGENCY RESPONSE TEAM TRAINING

CERT members nationwide receive the same basic training, including: how to manage utilities and put out small fires; control bleeding and treat for shock; provide basic first aid, including opening airways; set up and work a triage station; do light search and rescue, and to rescue victims safely; and understand how they fall within the incident command structure. The national CERT training material, while being as current as possible, regularly needs to be updated and modified. Due to the wide range of hazards across the country, and the fact that many communities develop their own protocols and procedures, the national training material will always need to be supplemented with the local protocols and procedures in order for any CERT team to function successfully within their community. CERT members must keep their safety in mind as their first priority. CERT members must know their capabilities and the limitations of their training and equipment, and work within those limitations. In addition to the CERT member’s own safety, members are instructed to make sure their family is safe first whenever an emergency or disaster situation occurs. Once CERT members have completed the basic classes, they are then encouraged to continue developing their skills through a variety of training options. These options include online classes through the FEMA EMI website; participating in periodic drills and exercises to keep basic skills sharp; and advanced classes on topics such as American Red Cross Sheltering, the incident command system, and communications.
USING THE CERT TEAM

When working with a CERT team, you need to develop a plan to continue working with the team after they have completed the basic course. You should not just teach them and forget them, which unfortunately is an all too common practice among some emergency managers. Emergency managers should continue to promote and develop their teams, keeping in mind that team members can be used in a wide range of services when disaster strikes. For instance, they can be used in the emergency operations center to answer phones, assist in taking notes at section chiefs meetings, used as runners between the emergency operations center and the incident command post, and to staff and run shelters. In the field, they can assist in the triage areas and help transporting patients. And, if your staging area is set up correctly, you can have them assist or even run it.

The use of CERTs in nondisaster events continues to evolve. Team members can assist during large community events such as parades and concerts by helping direct traffic. CERT members may also assist in missing person searches, provided they have the proper training. In addition, members should assist and participate with other emergency personnel when a large scale drill or exercise is planned. Ultimately, how CERT team members are utilized is up to their supervisor (usually someone within the Office of Emergency Management) who should always remember that his CERT team members are volunteers—unpaid personnel whose work and sacrifice should be appreciated on a regular basis.

LEVEL OF COMMITMENT IS A TWO-WAY STREET

The men and women who join CERT are unpaid volunteers who come from all walks of life. They have completed the 10 weeks of classroom instruction in addition to numerous “hands-on” exercises, culminating with a final exam in which they put all their skills to the test. These CERT members have clearly shown a commitment and dedication to helping others in a time of need and are willing to be away from their families when necessary. Such dedication is a testament to their commitment to help their neighbors and their community during a time of need.

For CERT teams to remain effective, however, there must also be a strong commitment from the municipality and officials who oversee the team. For CERT teams to develop and flourish, ongoing guidance and strong leadership must be present. The emergency manager, for instance, should develop a Standard Operations Procedures (SOPs) manual so that all CERT members understand their role, know what is expected of them, and understand how the organization works. As part of this process, the emergency manager should work closely with the CERT team to develop a clear procedure for activating and communicating with the team when a disaster occurs.

CERT TEAMS AND THE FUTURE

CERTs have become a big part of community disaster planning. Since they provide a committed and trained group of people who not only can assist locally but in another state if needed, these teams have become an important resource for the emergency manager. To illustrate, let me offer a personal note. The township in which I work has a CERT membership of approximately 60 individuals from the community, a membership that is not from years of recruiting but only months. Our CERT program had its first class graduate in March of 2005 and the second class in May of 2005. Members are both young and old, some with businesses in the town. We have worked together to develop a SOP manual for the team. The members have listed the organization with both the federal and state government as a tax-exempt charitable volunteer organization. And they all express a deep desire and commitment to help others in time of need, something they have already demonstrated through several efforts: in helping to search for a missing child, in calling over 240 local senior citizens during heat advisories, and in their willingness to help man cooling centers for these seniors. Our CERT team also helped play a key part in a neighboring community by helping to staff a shelter during recent flooding. With the growth of CERT teams, not just in my township but across America,
these dedicated men and women are now becoming a key component in not only emergency services but in community disaster preparedness and planning. How better to prepare and plan for an emergency than to involve the members of the community who are willing to be trained and help during a time of need.

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REFERENCES
An assessment of retention incentives for volunteer firefighters in Virginia

Steven M. De Lisi, MPSL, CFO
Gary S. Green, PhD
Peter M. Carlson, DPA
Harry Greenlee, BA, MA, JD

ABSTRACT
Volunteer firefighters provide fire protection for the majority of communities in the United States and often receive little compensation in return. In addition to the inherent hazards of firefighting, volunteers are challenged by increasing call volumes, training requirements, and demands from family and careers. As a result, fire department leaders often attempt to retain members through incentives.

The opinions of 108 volunteer firefighters in Virginia about which incentives will enhance recruitment and retention efforts were investigated according to personal factors such as sex, age, and rank. The analysis looked at 12 incentives and five personal characteristics and revealed only six of the 60 possible two-variable relationships as being statistically significant. In particular, younger volunteers were more likely to name training competitions, tuition reimbursement, and the opportunity to fundraise as being important factors in their volunteerism. The most significant finding of the research, however, is that a decentralized management style—manifested in the delegation of authority and participation in decision making—is important to the vast majority of volunteers, regardless of their personal attributes. Although such emphasis on decentralization will likely require a cultural shift in many volunteer fire departments, it is cost-effective and, most importantly, will encourage the recruitment of volunteers and enhance their retention.

Key words: volunteer firefighters, incentives, recruitment, retention

INTRODUCTION
According to the National Fire Protection Association (NFPA) report entitled US Fire Department Profile Through 2003, there are 30,542 fire departments in the United States, with 88 percent of these considered to be volunteer or mostly volunteer organizations that provide fire protection to 39 percent of the US population. Nationally, over 73 percent of all firefighters are volunteers and 93 percent of these are members of departments that protect fewer than 25,000 people.

In Virginia, 25 percent of fire departments employ career firefighters, and of the state’s 21,000 firefighters, 66 percent are volunteers. Similar to national trends, the percentage of volunteer firefighters serving Virginia communities varies by population, so that although only 28 percent of firefighters are volunteers in communities with populations of more than 250,000, communities with fewer than 100,000 citizens rely almost exclusively on volunteers. Many of the volunteers in the larger communities are members of ‘combination’ fire departments, where volunteers are used in conjunction with career personnel.

From 1983 to 2002, the call volume for all fire departments in the United States experienced an increase of over 94 percent. Yet, from 1983 through 2003, the number of volunteer firefighters declined from 884,600 to 800,050, representing an almost 10 percent decrease. In addition, the NFPA has found that “since 1983, a generally upward trend in career firefighters has been more than offset by a generally
downward trend in volunteer firefighters.”9 This trend is mirrored in Virginia, with a report entitled the Virginia Fire Service Needs Assessment published in January 2004 suggesting the presence of a “trend in fire departments of most sizes towards the employment of additional career personnel to meet community expectations and emergency response objectives.”10

The most recent finding by the NFPA of a 10 percent decrease in the number of volunteer firefighters is consistent with the findings from a study conducted earlier by the National Volunteer Fire Summit in June 1998, which determined that “many fire departments across the nation are experiencing more difficulty with recruiting and retaining members than ever before.”11 During the summit, Reade Bush, of TriData Corporation claimed, “The declining level of fire service volunteerism is attributed to many factors.” These include:12

- time demands;
- training requirements;
- higher emergency call volume;
- increased demands within departments;
- changes in sociological conditions;
- leadership problems;
- increasing use of combination department;
- higher cost of housing in affluent communities; and
- aging communities.

Although the decline in the number of volunteers may itself be cause for concern, the impact of this decline is far greater. A document prepared for the National Volunteer Fire Council and the United States Fire Administration entitled Recruitment and Retention in the Volunteer Fire Service–Final Report states that “Some of the departments represented in the regional workshops indicated that their towns could not afford to hire paid firefighters, and that the services of firefighters would not exist if their departments folded.”13

James Fisher and Kathleen Cole, authors of Leadership and Management of Volunteer Programs, remind fire chiefs that “development and implementation of a comprehensive plan to address the motivational needs of all volunteers are integral components of the volunteer administrator’s role.”14 Kathleen Brown offers a suggestion to supervisors for selecting incentives, stating, “Supervisors should realize that a volunteer job is seldom one’s first priority.”15 Fisher and Cole cite McCurly and Lynch, who claim, “The needs common to most people are belonging and autonomy, but that the needs for recognition, achievement, control, variety, growth, affiliation, power, fun, and uniqueness also influence decisions to engage in volunteer activities.”16 The two basic research questions of the current study, then, are: 1) are there any incentives that are particularly important to maintaining positive attitudes about being a volunteer firefighter? and, 2) if there are important incentives, to what extent are they idiosyncratic to volunteers with certain attributes?

**METHODOLOGY**

*Development of the study*

Development of a questionnaire for use during the study involved satisfying the requirements of the Christopher Newport University Review Board for the Protection of Human Subjects (RBPHS), including fair selection of subjects and anonymity. Informed consent and anonymity required that respondents knew they had been selected at random, and that they would not be required to provide their name nor would any effort be made to identify them or the fire department to which they belonged.

Anonymity was enhanced by labeling the ‘return addresses’ on the return envelopes for each questionnaire as the researchers’ address, eliminating the possibility that subjects would include identifying information. Efforts to assure freedom from coercion
were based upon the fact that the researchers did not have a professional or personal relationship with any subjects, and questionnaires were distributed to respondents by a third party (usually an instructor) who was not privy to whether the questionnaire was returned.

The questionnaire included the five independent variables related to a respondent’s sex, age, years of service as a volunteer firefighter, current rank, and years of service in that rank. The selection of independent variables for age and years of service was based in part on research conducted by Herzburg, who, according to Fisher and Cole, “helps to place in proper perspective the various components of a volunteer’s motivation by distinguishing between aspects of a position itself, which provides intrinsic satisfaction, and aspects of the context in which the job is performed.”17 Fisher and Cole expand on this point by stating that “a person’s needs and expectations may change during and as the product of a volunteer experience” and that “although it may not be feasible to assess and respond to the needs of all volunteers on an individual basis, it is usually possible to distinguish between new and experienced volunteers in an organization.”18

The selection of the 12 dependent variables included in the study was based in part on results contained in The Final Report but also supported by the work of researchers and those with experience in the field of volunteerism, including Fisher, Cole, Lee, Herzberg, McGregor, McCurly, and Lynch. Respondents were requested to evaluate the degree to which these variables could influence their decision to remain as a member of their volunteer fire department.

The dependent variables were categorized as “Department Incentives,” “Financial Incentives,” and “Activity Incentives,” and the degree of influence for each of the incentives were ranked as none, low, moderate, high, and very high. A complete list of incentives is included with the questionnaire in Appendix 1. The questionnaire also allowed respondents an opportunity to answer two open-ended questions to identify if there were additional incentives other than those included in the survey, as well as their reason for joining a volunteer fire department. Selected responses to these questions are included in Appendix 2.

Selection of subjects

The selection of subjects for this study was accomplished in cooperation with the Virginia Department of Fire Programs (VDFP) and involved the distribution of relatively short questionnaires to students enrolled in various training classes conducted for Virginia’s volunteer fire departments. The sampling frame consisted of classes scheduled for delivery statewide from September through December 2004.

Selection of classes was accomplished using systematic random sampling from a list of 64 classes pre-arranged in random presentation. Once this list was arranged in random presentation, systematic random sampling was accomplished by selecting every third class following an impartial random start.

For each class selected, the assigned instructor was requested to distribute a package to each student present in their class (up to 20 students) and encourage them to complete the questionnaire at their earliest convenience, but outside of class in order to ensure anonymity and to minimize peer influences. In addition, each instructor was asked to remind students that there would be no effort to identify respondents or their departments.

RESULTS

A total of 108 questionnaires were returned by the deadline of December 31, 2004, which represented approximately 27 percent of the questionnaires distributed. However, the actual response rate was greater and was calculated based upon ‘adjusted’ enrollment figures provided by VDFP for each of the classes selected to participate in the study. While figures from VDFP indicated actual total enrollment of 364 students, the ‘adjustment’ was made to account for classes with enrollment in excess of 20 students. This adjustment was necessary to exclude as non-respondents those students who did not receive a questionnaire in classes where enrollment exceeded the maximum number of questionnaires available for distribution. As a result, the adjusted enrollment figure
### Table 1. Frequency distributions for independent and dependent variables (percent)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Current rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Current rank</td>
</tr>
<tr>
<td>Male</td>
<td>Firefighter</td>
</tr>
<tr>
<td>Female</td>
<td>Officer or other</td>
</tr>
<tr>
<td>Age</td>
<td>Years in current rank</td>
</tr>
<tr>
<td>16 – 25</td>
<td>1 – 2 years</td>
</tr>
<tr>
<td>Over 25</td>
<td>Over 2 years</td>
</tr>
<tr>
<td>Years of service</td>
<td></td>
</tr>
<tr>
<td>1 – 2 years</td>
<td>42.1</td>
</tr>
<tr>
<td>Over 2 years</td>
<td>57.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Social events</td>
<td>Pension plans</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Delegation of authority</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>7.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>31.1</td>
</tr>
<tr>
<td>High</td>
<td>61.2</td>
</tr>
<tr>
<td>Involvement in decision making</td>
<td>Training competitions</td>
</tr>
<tr>
<td>Low</td>
<td>6.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>16.5</td>
</tr>
<tr>
<td>High</td>
<td>76.7</td>
</tr>
<tr>
<td>Pay per call</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>56.7</td>
</tr>
<tr>
<td>Moderate</td>
<td>11.5</td>
</tr>
<tr>
<td>High</td>
<td>31.7</td>
</tr>
<tr>
<td>Tax exemptions</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>32.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>10.7</td>
</tr>
<tr>
<td>High</td>
<td>57.3</td>
</tr>
<tr>
<td>Fundraising activities</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>35.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>11.7</td>
</tr>
<tr>
<td>High</td>
<td>53.4</td>
</tr>
<tr>
<td>Health club memberships</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>44.1</td>
</tr>
<tr>
<td>Moderate</td>
<td>17.6</td>
</tr>
<tr>
<td>High</td>
<td>38.2</td>
</tr>
<tr>
<td>Training competitions</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>25.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>32.7</td>
</tr>
<tr>
<td>High</td>
<td>42.3</td>
</tr>
</tbody>
</table>
was 318 students, and with 108 questionnaires returned, the actual response rate was determined to be 34 percent. There is no reason to believe that the respondents' characteristics or responses would differ significantly from those of the entire sample, but the non-responses nevertheless introduce a potential bias into the analysis.

A data set was created using Statistical Package for the Social Sciences (SPSS) software. Due to the low response rate, the original data were recoded to create fewer values for certain variables that would be more likely to ensure sufficient distribution of responses across cells required by various statistical measures. In particular for dependent variables, responses of none and low were combined and recoded as low, responses of moderate were unchanged, and responses of high and very high were recoded as high.

Gamma was selected as a means to determine the strength of association between the dependent variables and all independent variables with the exception of gender. Strength of association between the ordinal dependent variables and the nominal variable of gender was determined using Pearson's $r$. Data analyses included tests for statistical significance.

Frequency distributions for independent and dependent variables are presented in Table 1. Respondents were predominantly male (84 percent), and a little more than half (56 percent) were older than 25. Almost three in five (58 percent) possessed more than two years of service, about one sixth (13 percent) of whom reported more than fifteen years of service.

Of all respondents, three-quarters reported their rank as firefighter, with the ranks of chief officer and company officer reported at 9 percent and 8 percent, respectively. When comparing an individual’s rank with their years of service at that rank, a fifth of respondents with no more than two years of service were officers, while a quarter of respondents with more than two years of service were officers.

Regarding the dependent variable frequency distributions, incentives ranked most often (more than 50 percent) as high—relative to their degree of influence—were involvement in decision making (77 percent), delegation of authority (61 percent), tax exemptions (57 percent), training competitions (56 percent), and tuition reimbursement (53 percent).

The pay per call incentive was the least popular, ranked not only as being a high influence by the fewest number of respondents (32 percent) for any incentive in the study but also ranked as having a low influence by the largest number of respondents (57 percent).

Child care and gift certificates were ranked by a majority of respondents (54 and 51 percent, respectively) as having a low influence, while responses were mixed regarding the value of health club memberships, with 44 percent of respondents indicating a low influence and 38 percent ranking its influence as high.

Using gamma and Pearson’s product moment correlations of the 60 possible two-variable relationships (five independent and 12 dependent), only six were statistically significant at the .05 level (Table 2). The strongest relationship of these was the age of a respondent as it relates to the positive influence of participation in training competitions ($\gamma = -.432; p = .006$)—a desire to participate in training competitions is most associated with being a younger volunteer. Younger volunteers also believed that participation in fundraising activities was more important than did their older cohorts ($\gamma = -.361; p = .019$). The variable of years in current rank was inversely related to perceptions about the importance of tuition reimbursement ($\gamma = -.385; p = .024$), health club memberships ($\gamma = -.372; p = .026$), and training competitions ($\gamma = -.416; p = .010$), indicating that these three incentives are more important for younger volunteers.

It was determined that pay per call was slightly more favored by males ($r = .194; p = .049$).

**DISCUSSION**

Based upon the absence of statistical significance for 54 of the 60 two-variable relationships, we infer that knowing a firefighter’s personal characteristics will generally not predict the degree to which incentives will influence their decision to remain as a member of their volunteer fire department. The value of this finding for fire service leaders is that popular incentives appear capable of maintaining their
popularity regardless of who the individual is and should, therefore, be easier to implement and manage for the benefit of all members of their organizations. Administrators are best advised to promote delegation of authority and involvements in decision making. If there is one prescription implied by the results that is specific to volunteers’ individual characteristics, it is that younger volunteers appreciate training competitions, tuition reimbursement, and the opportunity to participate in fundraising activities.

With regards to financial incentives, as noted, tax exemptions and tuition reimbursement were popular with a majority of respondents. Gift certificates, while not ranked as low as pay per call, were still ranked as a low influence by 51 percent of respondents. In open-ended responses, some did suggest financial incentives beyond those specifically posed to them, such as providing volunteer firefighters with free vehicle registrations and driver licenses, as well as health insurance and discounts at local businesses. Other respondents, however, countered these suggestions with statements such as “firefighting should be in your heart—pay is the appreciation from your community.”

In terms of other financial incentives, although the vast majority of respondents were 26 to 45 years of age, responses to the incentive offering child care were mixed, as were those for the incentive to provide members with pension plans. However, since the survey did not attempt to determine whether respondents were responsible for the care of children, and if so, if there were perhaps others available to provide for this care in the absence of the respondent, it was difficult to fully assess responses to the child care incentive. Likewise, since no attempt was made to determine if respondents were already covered by one or more pension plans elsewhere, the full extent to which they valued the pension plan incentive as a volunteer firefighter could not be determined.

### Table 2. Strength of association and statistical significance

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Age of respondent</th>
<th>Years of service</th>
<th>Current rank</th>
<th>Years in current rank</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>γ</td>
<td>Sig.</td>
<td>γ</td>
<td>Sig.</td>
<td>γ</td>
</tr>
<tr>
<td>Social events</td>
<td>-.106</td>
<td>.513</td>
<td>-.139</td>
<td>.396</td>
<td>-.035</td>
</tr>
<tr>
<td>Delegation</td>
<td>.100</td>
<td>.588</td>
<td>-.059</td>
<td>.752</td>
<td>-.040</td>
</tr>
<tr>
<td>Decision making</td>
<td>-.123</td>
<td>.582</td>
<td>-.208</td>
<td>.349</td>
<td>.051</td>
</tr>
<tr>
<td>Pay per call</td>
<td>.018</td>
<td>.922</td>
<td>.077</td>
<td>.673</td>
<td>.058</td>
</tr>
<tr>
<td>Tax exemptions</td>
<td>.132</td>
<td>.465</td>
<td>.058</td>
<td>.744</td>
<td>.200</td>
</tr>
<tr>
<td>Tuition reimbursement</td>
<td>-.097</td>
<td>.581</td>
<td>-.305</td>
<td>.074</td>
<td>-.066</td>
</tr>
<tr>
<td>Pension plans</td>
<td>.095</td>
<td>.585</td>
<td>.084</td>
<td>.628</td>
<td>.067</td>
</tr>
<tr>
<td>Gift certificates</td>
<td>-.180</td>
<td>.294</td>
<td>-.073</td>
<td>.668</td>
<td>.031</td>
</tr>
<tr>
<td>Training competitions</td>
<td>-.432</td>
<td>.006**</td>
<td>-.112</td>
<td>.521</td>
<td>-.150</td>
</tr>
<tr>
<td>Child care</td>
<td>-.008</td>
<td>.963</td>
<td>.071</td>
<td>.695</td>
<td>.139</td>
</tr>
<tr>
<td>Health club membership</td>
<td>-.138</td>
<td>.408</td>
<td>-.267</td>
<td>.097</td>
<td>.158</td>
</tr>
<tr>
<td>Fundraising activities</td>
<td>-.361</td>
<td>.019*</td>
<td>-.091</td>
<td>.575</td>
<td>-.099</td>
</tr>
</tbody>
</table>

* p ≤ .05; ** p ≤ .01.
The results clearly support the popularity of training activities. Not only was the incentive of training competitions ranked as either a high or very high influence by a majority of respondents, comments provided by respondents regarding their reason for joining and remaining as a member of their volunteer fire department include statements such as “gain experience and knowledge for a career,” and simply, “more training.” It is important to note that efforts to make training more enjoyable were cited in The Final Report as one of several “fun factors” of being a volunteer firefighter. The Report indicated that training which is “fun and challenging helps retention.” Training competitions found to be popular in the current study certainly fall into that category.

It should also be noted that despite the apparent popularity of some forms of training, it can not be overlooked that training demands were also cited as a reason for declining levels of volunteerism in The Final Report. Therefore, the influence of training on volunteer retention, which was not thoroughly investigated by this study, may be affected by other factors. These may include whether training is mandated by an outside entity or is at the discretion of the fire department. Whether training is conducted in the spirit of competition and as part of a positive culture in the department, or whether there are negative consequences for failure that may affect one’s future role as a firefighter, may also be important in this regard.

Many respondents believed that helping their community was still a major factor in their decision to join a volunteer fire department, with some claiming that being a volunteer firefighter was a “family tradition” that offered a “sense of belonging to an elite organization,” and that when more than one family member belonged, fire department activities actually provided more time for their family to be together. Incentives that encourage and support family memberships in volunteer fire departments appear to offer a solution to retention.

CONCLUSION

Despite receiving only a 34 percent response rate to this study, there is no reason to believe that the results are not representative of volunteer firefighters across Virginia, and perhaps even elsewhere. The two most popular incentives promoting decentralized management styles—delegation of authority and involvement in decision making—are ones that should not inflict a financial burden on fire departments, thereby providing opportunities for cost-effective and long-term solutions to retention. Yet, the degree to which incentives such as these are sustainable will likely be dependent upon a cultural shift in volunteer fire departments to ensure a supportive management style that is consistent across changes in department leadership, which for many volunteer organizations occurs on an annual basis. As stated by Fisher and Cole, “Volunteer retention is a consequence of doing things right.” The real challenge for most volunteer fire departments is selecting the right thing to do.

ACKNOWLEDGMENTS

The authors would like to acknowledge the Christopher Newport University Office of Graduate Studies for technical and financial support of this research, and the Virginia Department of Fire Programs for allowing their instructors to distribute the survey forms during scheduled training classes. Without the cooperation of these institutions and their employees, successful completion of this research project would not have been possible.

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Harry Greenlee, BA, MA, JD, Christopher Newport University, Department of Government and Public Affairs, Newport News, Virginia.

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3. Ibid., p. 1.
5. Ibid., p. 3-21.
6. Ibid.
12. Ibid., p. 2.
17. Ibid.
19. Babbie E, Halley F, Zaino J: Adventures in Social Research. Thousands Oaks, CA: Pine Forge Press, 2000. According to the text, “Gamma is a measure of association based on the logic of proportionate reduction of error (PRE) and is appropriate for two ordinal variables.” The authors state that the logic of PRE “means that two variables are related to one another to the extent that knowing a person’s attribute on one will help you guess his or her attribute on the other, or in other words, the extent to which one variable is ‘associated’ with, affects, or has an impact on another variable.” Regarding Pearson’s r, the authors state that this is a measure of association that “allows for the fact that the relationship between variables may not be completely consistent, but nevertheless it allows discovery of any prevailing tendency in that regard,” and as is the case with this study, “when you calculate correlations among several pairs of variables the resulting r’s will tell which pairs are more highly associated with one another than is true of other pairs.” Both gamma and Pearson’s r indicate the strength of association with a numerical value, where “the closer to -1.00 or 1.00, the stronger the relationship between the two variables, [and] the closer to 0.00, the weaker the association between the variables.” Gamma and Pearson’s r both also indicate the direction of association, where “a negative sign indicates a negative association (the items change in opposite directions) [and] conversely, a positive sign indicates that both items change in the same direction (they both either increase or decrease).”
20. Findings associated with the dependent variable of years in current rank, and the independent variables of Health Club Memberships, Training Competitions, and Tuition Reimbursement indicate a negative association, meaning that as years in current rank increase, the influence of these incentives appear to decrease. While the findings of this study are generally inconclusive as to the influence of age or years of service related to these three incentives, findings do indicate a positive association between the independent variables for rank, age and years of service. With this positive association, it may be possible to conclude that rank, age and years of service are directly related to years in current rank, and if so, the negative association between years in current rank and the above-mentioned incentives may also mean that as rank, age, and years of service decrease, the influence of these incentives increases.
APPENDIX 1
CHRISTOPHER NEWPORT UNIVERSITY - GRADUATE STUDIES
A SURVEY OF INCENTIVES OFFERED TO VOLUNTEER FIREFIGHTERS

You have been selected for participation in a survey to determine your opinion of how various incentives offered to volunteer firefighters could influence your decision to remain a member of your department. Respondents in the survey are not required to provide their name and there is no effort to track respondents or their departments. The survey form should take only a few minutes to complete. Once you have finished, please return the completed survey form in the envelope provided. Thank you in advance for your participation.

PART 1  FIREFIGHTER PERSONAL PROFILE

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 to 17</td>
<td>18 to 25</td>
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</table>

<table>
<thead>
<tr>
<th>Years of service as a volunteer firefighter:</th>
<th>1 to 2</th>
<th>3 to 5</th>
<th>6 to 10</th>
<th>11 to 15</th>
<th>16 or more</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Current position</th>
<th>1 to 2</th>
<th>3 to 5</th>
<th>6 to 10</th>
<th>11 to 15</th>
<th>16 or more</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Years of service in current position:</th>
<th>1 to 2</th>
<th>3 to 5</th>
<th>6 to 10</th>
<th>11 to 15</th>
<th>16 or more</th>
</tr>
</thead>
</table>

PART 2  HOW MUCH OF AN INFLUENCE COULD THE FOLLOWING INCENTIVES HAVE ON YOUR DECISION TO REMAIN A MEMBER OF YOUR VOLUNTEER FIRE DEPARTMENT?

<table>
<thead>
<tr>
<th>DEPARTMENT INCENTIVES</th>
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<th>Moderate</th>
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<td>3</td>
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<tr>
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<tr>
<td>Involvement in decision making</td>
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<td>2</td>
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<tr>
<td>Gift certificates</td>
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<tr>
<td>Fundraising</td>
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<td>4</td>
<td>3</td>
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PLEASE ANSWER THE FOLLOWING QUESTIONS ON THE REVERSE SIDE

1. What was your reason for joining a volunteer fire department?
2. Are there incentives other than those listed above that would influence your decision to remain a member?
APPENDIX 2
RESPONSES TO OPEN-ENDED QUESTIONS

1. What was your reason for joining a volunteer fire department?

To help the community/give back to the community/help others in time of need
Best way to start a career/gain experience/gain knowledge for a career
Enjoy firefighting/fire apparatus/taking care of the trucks
Family tradition [born into firefighting]/Allows family members to be together
Volunteer fire departments keep taxes low
Gain experience and knowledge for a career
More training
Sense of belonging to an elite organization/gain respect/attention
Excitement/to explore new interests
Prove that women can do the job

2. Are there incentives other than those listed that would influence your decision to remain as a member?

No incentives—firefighting should be in your heart—pay is appreciation from your community
Availability of state-of-the-art equipment
No smoking during meetings
Free vehicle registration and drivers license
Way to get teenagers off the streets [by seeing tragedies faced by others]
Have the state stop mandating things
Respect from career firefighters [in combination departments]
More state assistance on grants and equipment
Discounts at local retail businesses
The quinary pattern of blast injury

Yoram Kluger, MD, FACS
Adi Nimrod, MD
Philippe Biderman, MD
Ami Mayo, MD
Patric Sorkin, MD

ABSTRACT

Objective: Bombing is the primary weapon of global terrorism, and it results in a complicated, multidimensional injury pattern. It induces bodily injuries through the well-documented primary, secondary, tertiary, and quaternary mechanisms of blast. Their effects dictate special medical concern and timely implementation of diagnostic and management strategies. Our objective is to report on new clinical observations of patients admitted to the Tel Aviv Medical Center following a recent terrorist bombing.

Results: The explosion injured 27 patients and three died. Four survivors, who had been in close proximity to the explosion as indicated by their eardrum perforation and additional blast injuries, were exposed to the blast wave. They exhibited a unique and immediate hyperinflammatory state, two upon admission to the intensive care unit and two during surgery. This hyperinflammatory state was manifested by hyperpyrexia, sweating, low central venous pressure, and positive fluid balance. This state did not correlate with the complexity of injuries sustained by any of the 67 patients admitted to the intensive care unit after previous bombings.

Conclusion: The patients’ hyperinflammatory behavior, unrelated to their injury complex and severity of trauma, indicates a new injury pattern in explosions, termed the quinary blast injury pattern. Unconventional materials used in the manufacture of the explosive can partly explain the observed early hyperinflammatory state. Medical personnel caring for blast victims should be aware of this new type of bombing injury.

Key words: terrorism, blast injury, hyperinflammation

INTRODUCTION

Bombings and explosions are the hideous tool of terrorism. Their simple manufacture and easy concealment ensure that they will remain the main weapon of terrorists. Using suicide bombers, terror groups can reach and explode within crowded areas filled with unprotected civilians. In his Presidential Address in September 2001, President Bush stated that war on terror would not cease until every terrorist group of global reach was found, stopped, and defeated. But since then the number of terrorist bombing attacks has steadily increased, and during 2003 it has reached the level of global epidemic.

In past years at the Rabin Trauma Center, we have experienced the aftermath of a long series of terror attacks. The most complicated trauma victims are those admitted after bombing. Explosions involve more bodily regions than other kinds of trauma and affect the release of greater quantities of cellular mediators.1 Therefore, increased in-hospital mortality is encountered in these events (6 percent vs. 2 percent for conventional trauma).2

Mellor explored the causes of death among victims of bomb explosions and found that 14 percent had disrupted bodies, 39 percent suffered multiple injuries, 11 percent chest injuries alone, 12 percent head injuries alone, and 21 percent combined head
and chest injuries.\textsuperscript{3} From this important work it was concluded that the main factor affecting mortality in an explosion is the proximity to the center of detonation. Bodies of victims who had suffered only minor external injuries imparted greater knowledge of the devastating effects of the blast.\textsuperscript{4} The explosive material is composed of trinitrotoluene (TNT) or other explosives from military, commercial, or homemade sources. Detonation is triggered by an electrical current, and the solid explosive is transformed into gas to create a very high-pressure wave of air that emanates radially at the speed of sound. This creates a peak of over-pressure, a shockfront that is only 3 to 5 mm thick, and is followed by the blast wind. For example, 25 kg of TNT produces a peak over-pressure of 150 psi (10.5 kg/cm\textsuperscript{2}). These pressures last 2 ms and traverse at a speed of 3,000 to 8,000 m/sec. Greater explosives produce longer duration of the front shock wave and more damage results.

There are four injury patterns related to the blast. The primary blast injuries occur from the blast wave passing through the victim. The human body is remarkably resistant to the blast wave, and the tissues will respond according to their composition, with air-containing organs suffering the most. Three putative mechanisms, spalling, implosion, and acceleration and deceleration are associated with the primary blast injury. Spalling occurs as the blast wave passes through organs filled with gas and fluid and generates high velocity bubbles that hit the wall of the organ and damage it. Implosion originates from the blast passing through air-filled organs, initially compressing its air-filled spaces and then inflating them rapidly, damaging the surrounding tissue. Acceleration and deceleration are similar to what is seen in conventional trauma. The hallmarks of the primary blast injuries are eardrum perforation and blast lung injuries. Perforations of hollow abdominal viscera are rare (\textless 1.2 percent). Solid organs are rarely damaged by the blast itself, and acceleration and deceleration mechanisms are the true cause of injury to these organs.

The secondary blast injury results from the casings, debris, and particles added to the bomb that are energized by the wave of air. Metal particles are usually added to the charge to increase the wounding potential. Steel balls, nails, and other sharp particles are the terrorists’ favorites. The velocity of these missiles depends on their shape and distance of flight, and they are influenced by yaw and drag, just like classic missiles. Peppering of the skin is the distinctive sign of this ballistic effect. Multiple penetrations of the skin are common and often represent only the tip of the iceberg.

The tertiary blast injury is the result of overpressure. It is responsible for total body destruction in some patients and, for others, can cause amputation of limbs. The blast wind alone can accelerate the body and thrust it against stationary objects.

The quaternary blast injury is related to the thermal effects of the blast. Burns are caused by ignition of flammable materials. Thermal lung injury can develop directly from the very high air temperatures created at the site of the explosion.

Following we report on some unique clinical observations of patients admitted after a recent bombing. Their clinical picture may be attributed to a new, quinary pattern of blast injury.

**CASE REPORTS**

On April 30, 2003, a suicide bomber exploded in a Tel Aviv nightclub. Twenty-seven patients were evacuated to the Rabin Trauma Center; two of them were dead on arrival. Five patients were rushed to the operating theatre due to life-threatening injuries, where one of them succumbed to his injuries.

All the victims arrived at our hospital 20 to 30 minutes after the event. They were evaluated in the emergency department by trauma teams guided by the medical director and team leaders. Advanced Trauma Life Support (ATLS) protocols and the hospitals’ mass casualty protocols were applied.

We present four cases of victims who were very near the center of the explosion (e.g., Patient 4 was one meter away from the suicide bomber). Two patients (Patients 2 and 3) were admitted to the intensive care unit (ICU) one hour after arrival. Patients 1 and 4 had surgical interventions and were admitted to the ICU two and four hours after admission, respectively. In the
immediate post-trauma phase, these four patients developed a unique clinical state that was manifested in increased heart rate, fever, and increased fluid demand, and was unrelated to the severity of their injuries (Table 1).

Patient 1
A healthy 27-year-old male was conscious on admission, hypoxemic and in hemodynamic shock. A left pneumothorax was relieved by tube thoracostomy, and fluid resuscitation was started. He also suffered from first and second degree burns of the face and chest (7 percent) and from bilateral eardrum perforation. A positive diagnostic peritoneal lavage (DPL) resulted in exploratory laparotomy. Colonic wall perforation led to ileocecectomy with anastomosis. No other injuries were found.

Upon termination of the surgical procedure, the patient was hypotensive with wide pulse pressure and signs of peripheral vasodilatation. Despite central venous pressure (CVP) guided aggressive fluid therapy, the patient remained hypotensive. A pulse index contour cardiac output (PICCO) monitor was introduced (Pulsion Medical System, Munich, Germany). The measured cardiac index was 6 l/min, and the calculated systemic vascular resistance was low (400 mm Hg · dyne · min · lit -1). Vasopressor support with noradrenalin was started and the patient’s blood pressure stabilized. No signs of bleeding were noted. Although fluid therapy was at room temperature, the patient’s fever rose to 39°C. The white blood cell count was slightly elevated with moderate left shift. The hyperdynamic circulatory state resolved after 24 hours, the cardiac output and systemic vascular resistance normalized, and noradrenalin was withdrawn. All blood and sputum cultures were negative, and the patient’s fever gradually decreased over the next four days.

Patient 2
A 32-year-old male was hemodynamically stable upon arrival with Glasgow Coma Score of 15. Physical examination revealed second degree burns of the face and hands, bilateral eardrum perforation, and carbonized blackening around the nostrils and mouth. Preventive intubation was preformed and the patient was admitted to the ICU. He was sedated with midazolam and fentanyl, and ventilated. At this stage, cardiorespiratory parameters, initial laboratory results, chest x-ray, and electrocardiogram were all normal. A few minutes after his admission he had a fever of 39.6°C, tachycardia (>150 beats/min). His blood pressure was 90/40 mm Hg, and wide range pulse pressure was recorded for several hours. No evidence for missed or obscured hemorrhage was found. CVP monitoring was introduced and fluid resuscitation

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Injury complex</th>
<th>HR (beats/min)</th>
<th>BP (mm Hg)</th>
<th>T (°C)</th>
<th>Leu (per μl)</th>
<th>SVR (dynes · s · cm⁻²)</th>
<th>pO₂/F (lO₂)</th>
<th>Lung compliance (L · cm H₂O⁻¹)</th>
<th>ISS</th>
<th>AIS</th>
</tr>
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<tr>
<td>1</td>
<td>27</td>
<td>Lung, colon, burn 7%</td>
<td>120</td>
<td>90</td>
<td>39</td>
<td>9,000</td>
<td>120</td>
<td>31</td>
<td>33</td>
<td>Lung-4 Skin-1 Colon-4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>Burn 9%</td>
<td>130</td>
<td>110</td>
<td>39</td>
<td>8,700</td>
<td>400</td>
<td>242</td>
<td>28</td>
<td>9 Skin-3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>Lung, burn 3.5%</td>
<td>170</td>
<td>138</td>
<td>39</td>
<td>8,300</td>
<td>138</td>
<td>40</td>
<td>10</td>
<td>Skin-1 Lung-3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>Colon, amputation, burn 7%</td>
<td>125</td>
<td>90</td>
<td>39</td>
<td>11,700</td>
<td>233</td>
<td>43</td>
<td>29</td>
<td>Colon-4 Skin-2 Extremity-3</td>
<td></td>
</tr>
</tbody>
</table>

HR, heart rate; BP, blood pressure; T, temperature; Leu, Leukocytes; SVR, systemic vascular resistance; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale.
with crystalloids started. During the following 24 hours, despite aggressive CVP and urinary output-guided fluid resuscitation and a positive fluid balance of 3500 ml, the patient continued to exhibit hyperdynamic circulatory response and hyperpyrexia up to 40.6°C. This hyperdynamic state gradually resolved over the next 48 hours, although fever continued for five days following hospital admission. White blood cell count was normal with slight left shift, which improved within a few days. All blood cultures were negative, careful skin wound inspection revealed no active infection, and sputum cultures resulted in normal upper airway flora.

**Patient 3**

A 24-year-old male with previous history consistent with mild asthma was admitted with severe hypoxemia due to bilateral lung contusion. He was conscious and hemodynamically stable. Physical examination revealed left hemiparesis, bilateral eardrum perforation, and 3.5 percent second degree burns of the chest. Head computerized tomography demonstrated small subdural and pontine hematomas. On arrival to ICU he was intubated and ventilated. He was hemodynamically stable but hypoxemic, with $\frac{\text{PaO}_2}{\text{FiO}_2}$ of 140 and measured lung compliance of 28 L · cm H₂O⁻¹. A few hours later the patient’s temperature reached 39.4°C, and the fever continued for the next five days and resolved after three days. The white blood cell count was normal and blood, urine, and sputum cultures were negative.

**Patient 4**

A healthy 38-year-old male was conscious but hypotensive on admission. His right hand was mangled, and first and second degree burn injuries of the head and neck (7 percent) were noticed. The patient was intubated and underwent emergency exploratory laparotomy due to positive DPL. Laparotomy revealed intraperitoneal blood from a minor liver laceration and right colonic perforation that resulted with right colectomy. The right hand was amputated. Upon termination of the operation, the patient was hemodynamically unstable with wide pulse pressure and peripheral vasodilatation. His hemoglobin level was 10 g/dl. A positive fluid balance of 5500 ml of crystalloids was reached on the first ICU day. His temperature reached 39.4°C a few hours after admission and above 40.0°C on the second day. The hyperdynamic state gradually resolved in the next 72 hours, although the fever continued for seven days. The white blood cell count was normal. Blood cultures were negative and sputum cultures revealed normal flora.

**DISCUSSION**

Compared to its predecessors, this suicide bombing in a nightclub in the city of Tel Aviv was unique. The explosive belt carried by the suicide bomber was devoid of metal additives and consisted only of explosives. This resulted in pure blast energy emanating from the site of explosion, injuring people crowded in a radius of 20 m from the explosion center. The explosive was estimated to be 1.5 kg of “DETA-sheet.” This material is composed of pentaerythritol tetranitrate (PETN), a highly unstable, easily detonative substance, equivalent to 140 percent TNT. It is used in a variety of military and civilian applications but was never used before in a suicide bombing in Israel. In previous bombings, we have noticed increased mortality among those injured at close proximity to the explosion. This was magnified if the explosion occurred in confined spaces, and even more so in ultra-confined spaces such as buses. The inclusion of metal projectiles embedded in the explosive further increased the injuring potential of the charge, resulting in increased mortality. In the present event described above, the charge was small, metal objects were absent, and the explosion occurred in an open space. Therefore, it resulted in greater patient survival and in lighter injuries at the center of detonation compared to what is usually seen. This enabled us to monitor patients who were in close proximity to the explosion during their immediate hospital stay. Such patients usually do not survive explosions or are so severely injured that their hemodynamic instability can be attributed to the complex injury.

In the patients described above, we have noticed a unique early hyperinflammatory state that did not correlate to the complexity of the sustained injury.
Putatively, this unique hemodynamic behavior may indicate the presence of toxic substances absorbed by the casualties through their injuries or via inhalation. This early hyperinflammatory manifestation was not present in those injured further from the explosion or among patients who suffered no skin injury. This could indicate that the toxic substances were very short-lived, and that their absorption was most probably through the disrupted skin, perhaps in a dose-dependent nature with dose related to the distance from the center of the explosion.

This was the first bombing incident in Israel that we have observed in which PETN was used. Upon its chemical modification for increased stability, the PETN becomes a potent vasodilator. Although we could not demonstrate abnormal levels of nitrates in the patients’ sera, this could explain our observation of hyperinflammatory state even among lightly injured patients. Late awareness of the clinical entity resulted in delayed blood sampling and could, therefore, explain the normal serum nitrate levels. The need for special laboratory techniques for measurement of these metabolites also delayed the pursuit of the initiating mediator of hyperinflammation.

The hyperinflammatory state must be differentiated from missed injuries that may express with hemodynamic instability. The use of all investigative means necessary for this differentiation is recommended.

The hyperinflammatory behavior, unrelated to the patients’ injury complex and trauma severity, constitutes a new injury pattern in bomb explosions that we term “the quinary blast injury pattern.” The use of toxic materials in the manufacture of the explosive, or the use of uncommon explosives, could explain, to some extent, our unique clinical observation. Medical personnel caring for bombing victims should be aware of this pattern of injury and, when this pattern is detected, should direct management to reduce its complications.

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REFERENCES
ABSTRACT
This article reviews several alternatives in ethical theory available as possible criteria for the development of ethical principles for the emergency management profession. It also examines the basic elements (core values) of existing codes of professional ethics for emergency managers in the context of these criteria. The developing emergency management profession, it is suggested, requires more scholarship directed to the establishment of a more complete ethical theory and a more clearly articulated set of ethical principles for emergency managers. The discussion concludes with a suggestion as to what a more comprehensive, informative, and functional statement of ethical principles for the emergency management profession might look like. But this proposed formulation, offered for discussion purposes, assumes the need for more effort at defining the moral criteria that will give these principles their ultimate meaning.

Key words: ethics, administrative ethics, emergency management ethics

INTRODUCTION
The moral and ethical dimensions of emergency management, while increasingly recognized as important, remain unexplored and underdeveloped. A paucity of scholarly work in this area makes it difficult to adequately consider the moral foundations of public emergency management policy and, equally important, to establish principles of ethics for the developing emergency management profession. Progress has been made of course, but movement toward a definitive theory and a set of more precise ethical principles is required for the emergency management profession and its continued development.

The purpose of this essay is to pick up some of the threads of ethical theory that are available and to suggest a more inclusive statement of ethical principles for the emergency management profession. It will not be possible in the space of this article to resolve all questions and all ethical issues relevant to the profession, but it will be possible to provide a foundation for further analysis and discussion.

ETHICS AND EMERGENCY MANAGEMENT
It is clearly established and largely agreed upon that emergency managers are ethically responsible under a specific set of conditions:

- They have knowledge of or are able to predict an emergency or disaster.
- They have the capability of making a decision and acting on it.
- They have free choice; that is, they could have chosen otherwise.
- Their decision has value consequences; it affects lives, welfare, and rights of other persons.\(^1\)

An analysis of these “conditions” is certainly a place to begin articulating the nature and scope of ethical responsibility for emergency managers. But what are the moral criteria for this analysis? Several alternatives have been suggested.

Among the basic alternatives for moral criteria are: utilitarian rationales, the concept of basic rights, culpability and prevention of harm standards, the imperative of knowledge, and public service rationales.\(^2\) Let us briefly examine each of these alternatives to
highlight their implications as moral criteria for emergency management. Without any attempt to analyze in detail or to choose from among these alternatives, it is possible to see that each has had some impact on ethical thinking in relation to emergency management and, perhaps, some influence on ethical codes developed in the profession.

Utilitarian philosophers such as Jeremy Bentham and John Stuart Mill evaluate the desirability of an action based on its usefulness for creating the greatest good for the greatest number.5 With respect to public disaster policy and emergency management functions, the preferred or ethical action seeks, from the utilitarian perspective, to maximize net social benefits.2 The utilitarian approach has been institutionalized in the public sector through the implementation of cost-benefit analysis and, whether emergency managers are explicitly aware of it or not, many emergency management policy decisions are driven by it. Of course utilitarianism has limits for its critics. At what point does the social cost become great enough (i.e., exceeding benefits however quantified) to justify tolerating risks, including life-threatening ones, that place the public at greater danger? The utilitarian focus on costs and benefits may lead to outcomes that are morally unacceptable. Hence utilitarianism is often tempered by some notion of a basic right to safety.

The basic rights argument suggests that every individual has certain basic rights, including the right to physical security.6 Individuals have the right to a basic minimum level of public safety that cannot be compromised even where the costs would exceed the social benefits. In the emergency management context, this would suggest that it is not morally acceptable to allow a “significant loss of life from a disaster, without taking public actions to prevent or minimize it, simply because such an outcome would, in the long run, be socially inefficient.”7

The basic rights argument is compatible with the Lockean concept of Life as a property right and the associated notion that government may not violate or allow to be violated “lives, liberties, and estates.”7 It also embodies the Jeffersonian notion of Life as one of the unalienable rights that serve as the foundation for American culture. Given the value placed upon human life, the saving of lives and the prevention of human suffering would be the primary goals and moral objectives of emergency management.3 This argument often includes the recognition that the impact of devastating natural disasters is often greatest on poor or disadvantaged populations, which are the least capable of coping without public intervention.

The basic right of personal protection from disasters leaves undecided the status of the protection of property. While questions such as the protection of property, the prevention of economic displacement, and the preservation of lifestyle are necessarily critical issues to be factored into risk calculations, policy decisions, preparedness planning, and mitigation, their status as basic rights might be disputable and are not clearly covered by the basic rights argument.2,3,8 But the concept of Life is a foundation that supports the development of prevention of harm or prohibited risk standards.

Beginning with the agreement that a basic right of individuals and the basic function of emergency management is connected to the right of personal safety, the premise of prohibited risk is that the preservation of life and the prevention of harm figures into every moral calculation of risk. Risks are defined along the following lines: the potential harm is physical and life-threatening; the potential harm is possibly fatal, and the harm is not reversible (i.e., its consequences are permanent). The risk is prohibited when the potential harm is undetectable by potential victims; there is avoidable unpredictability, and policy or emergency management experts are able to predict the risks or harms; and the probability of incurring the harm is, in fact, very high.3,9 Under the conditions set forth in this argument, the concept of prohibited risk becomes a moral imperative for emergency policymakers and managers because individual citizens or impacted populations cannot perceive or predict a threat to life or safety and pursue their own best interests in a complex disaster scenario.8

At its crux, the notion that it is not allowable for one party or parties to inflict risk of damages and loss of life onto others or onto the public at large is commonly accepted in both the Lockean basic right to life
formulation and in John S. Mill’s classic treatise, *On Liberty*. Much emergency management policy and implementation activity, especially with respect to mitigation and prevention, would seem compatible with this justification. As a rationale it has applications under the guise of preventing harm that may relate to protecting people, communities, economies, and structures against the devastation of a natural disaster as a means of preserving life and the conditions that support it.

The prevention of harm, or the prevention of prohibited risks that threaten basic rights, or even the utilitarian cost-benefit alternative, all have one thing in common that may be a critical component in any formulation of ethical principles in emergency management: the assumption of knowledge and a central role for it in meeting any professional responsibilities.

Emergency managers and disaster policymakers must know present situations, predict risks and harms, develop appropriate technical and organizational responses, anticipate outcomes, and be capable of reducing risks to human life and safety. The development of knowledge, including predictive or anticipatory knowledge, required for competent performance of their duties, should be perceived by emergency managers as a professional duty. Beyond that, whatever moral criteria might be employed, it is increasingly clear that without the appropriate knowledge base there can be no ethical responsibility. In fact, it could be said that (much like the medical profession, for example) knowledge is an imperative for ethical responsibility in the field of emergency management. Whether maximizing social benefits in some utilitarian calculus, identifying and preserving some basic right to personal safety, or preventing a prohibited harm, knowledge would seem to be a requirement that is necessary for the meeting of any of the alternative criteria for ethical action.

Finally, ethical criteria from the literature in public administration may also apply to the emergency manager as a public manager. Ethical analysis in the context of public service, in the context of public administration, and in the context of public integrity is certainly applicable to the professional work of the emergency manager. The cultivation of responsibility for public resources and public well-being, serving the public interest, the improvement of the moral cognitive capacities of public managers, the creation of ethical awareness, and the development of moral responsibility toward public service are all components in what might be called a public service ethic for the emergency manager as public servant.

Having conducted a quick review of ethical criteria for emergency management, one might raise the question of whether any of the alternatives presented have in fact shown up in the ethical codes of the profession. Most state emergency management associations, following the lead of the International Association of Emergency Managers (IAEM) among others, have fashioned fairly similar ethical statements or codes. These reflect some basic statement of principles and general agreement about core values of the profession. They follow a format that utilizes an agreed upon formula, which presents a fairly unified statement of professional ethical principles. Insofar as they go, these codes do embody some of the alternatives we have reviewed, but they also seem to be lacking something. We shall discuss what it is that is lacking in these codes and propose a slightly more focused statement of ethical principles for emergency managers.

**CURRENT ETHICAL STANDARDS**

Existing codes of ethics developed and adopted by the IAEM and many state emergency management associations adhere to the core values of respect, commitment, and professionalism. These core values are presented in a code of ethics that “reflects the spirit and proper conduct dictated by the conscience of society and commitment to the well-being of all.” They are said to constitute the standards for ethical and professional conduct. What follows is a representation of these values in the Alabama Emergency Management Association’s (AAEM) code of ethics:

- **Respect.** Respect for supervising officials, colleagues, associates, and most importantly, for the people we serve is the standard for AAEM members. We comply with all laws and regulations applicable to our
purpose and position, and responsibly and impartially apply them to all concerned. We respect fiscal resources by evaluating organizational decisions to provide the best service or product at a minimal cost without sacrificing quality.

- **Commitment.** AAEM members commit themselves to promoting decisions that engender trust for those we serve. We commit to continuous improvement by fairly administering the affairs of our positions, by fostering honest and trustworthy relationships, and by striving for impeccable accuracy and clarity in what we say or write. We commit to enhancing stewardship of resources and the caliber of service we deliver, while striving to improve the quality of life in the community we serve.

- **Professionalism.** AAEM is an organization that actively promotes professionalism to ensure public confidence in emergency management. Our reputation is built on the faithful discharge of our duties. Our professionalism is founded on education, safety, and the protection of life and property.15

Each state utilizes pretty much the same language in articulating these principles in their code of ethics. Let us briefly examine this language in relation to the alternative criteria we have discussed for ethical standards in emergency management.

The value of respect includes the sort of language that may be associated with some of the public service criteria (public integrity) and emphasizes the conduct requirements for public servants who interact with other public individuals and organizations, who manage public resources, and who must be responsible to the public. The language about the best service (high quality at minimal cost, etc.) is ripe for the application of the utilitarian criteria to maximize social value, etc.

The value of commitment emphasizes public service concerns (trust, honesty, stewardship, etc.) but can also be said to introduce a knowledge-based criteria (impeccable accuracy and clarity). Nevertheless, the primary emphasis is on the professional, administrative, and public service component.

It is the value of professionalism, with its added emphasis on safety, protection, and protection of life and property, that connects to the basic rights criteria and the personal safety or protection rights. Once again, and this time more directly, education is mentioned and knowledge is alluded to as a criterion.

Naturally, the connections noted between existing codes and the alternative ethical criteria we have discussed are not explicitly detailed, and certainly it would be a stretch to suggest that there was a clear agreement on what the exact criteria is for ethical responsibility. The agreed upon principles (respect, commitment, and professionalism) undoubtedly stem from these criteria, but the relationship is almost too general (or implicit) to provide the emergency management professional much practical guidance; this is to say that, as general statements, these ethical codes are okay as far as they go. As more explicit guides to professional and ethical conduct, they are lacking.

**PROPOSED REFINEMENTS OF ETHICAL PRINCIPLES**

As the emergency management profession continues to develop, more attention and scholarship must be directed to the establishment of a more concrete, agreed upon, and clearly articulated set of ethical principles for emergency managers. This work must include a more elaborate assessment of, and clearer choices made from, the alternative moral criteria available and applicable to emergency management. It would also be desirable for the articulated ethical principles to be correlated with the four major components of the emergency management function (mitigation, preparedness, response, and recovery). The currently accepted values of respect, commitment, and professionalism need to be seen as a foundation on which to build as opposed to the finished structure for ethical codes.

Ideally, a more complete statement of ethical principles would include several other components. These would include the public service ethic and the building of relationships based on integrity. They
should include some notion of the public and/or individual right to safety. They should probably also indicate that those who are disadvantaged or poor are almost always disproportionately impacted by natural disasters and other hazards and, thus, because of their greater vulnerability, create a special responsibility for the emergency manager. The ethical principles should include some direct language on responsibilities related to preparedness, response, recovery, and especially mitigation. The development of each component would derive from some basic analysis and choices made from among the moral criteria thought to be relevant and would be compatible with the already commonly accepted values (respect, commitment, and professionalism).

Above all else, given the technical and the human dimensions of the function, any statement of ethical principles for emergency managers must emphasize knowledge as an ethical imperative. Given the nature and scope of emergency management, its ethical context moves well beyond the mere immediate dealings with people and organizations. It involves decisions and actions that have an impact on or causal reach into the future. This being the case, knowledge, the ability to predict or anticipate, and understanding the long-term consequences of action or inaction must be included in any articulation of ethical responsibility in the field of emergency management. This may be especially true in relation to the hazard mitigation function.

The centrality of mitigation as a strategy for the prevention of harm or the reduction of the effects of hazards on people and communities requires the application of predictive and anticipatory knowledge. Given the economic and human costs associated with hazardous events, mitigation becomes both a practical (utilitarian ethic) and human (prevention of harm criteria) necessity. Indeed, a deeper analysis could well suggest that the core of the emergency manager’s ethical responsibilities is most directly connected to the task of hazard mitigation.

Based on the principles agreed to (respect, commitment, and professionalism) and the general discussion of moral criteria herein, one can begin to imagine what a more comprehensive and informative statement of ethical principles might look like. I suggest the following as an illustration worthy of discussion and analysis:

- **Principles of ethics for emergency managers.** Emergency managers assume specific ethical obligations that arise out of the special features of professional emergency management practice. The principles listed below express fundamental moral responsibilities of emergency managers as professionals and as public servants.

- **Emergency managers shall:**

  1. embrace the public welfare as their primary responsibility;
  2. strive in all professional activities to protect the best interests of all in their communities, but particularly those most vulnerable and unable to cope with the impact of a disaster or hazard;
  3. deal fairly and honestly with colleagues, other organizations (governmental and nongovernmental), and the public while promoting professional competence, informed policy, and sound practices;
  4. act as responsible stewards of the public resources entrusted to them;
  5. respond promptly, expertly, and without prejudice or partiality to all community needs associated with a disaster or hazardous incident;
  6. promote the development of hazard resilient and sustainable communities;
  7. foster hazard mitigation efforts that contribute to sustainability, including those linked to the natural resource environment that will maintain or enhance its protective features;
8. work cooperatively with other community leaders to insure that emergency planning is effective and that community development planning does not shift potential disaster risks to other communities, to at risk or vulnerable populations within the community, or to future generations;

9. support and provide leadership as appropriate for all efforts to build a consensus among all people and groups having a stake in the outcome of all hazard mitigation, planning, response, and recovery operations; and

10. engage in continuing study and education to maintain and/or enhance the knowledge and skills necessary to provide high quality emergency management services.

While perhaps not a perfect statement of ethical principles for emergency managers, the 10 principles listed above contain the possibility of directing discussion and analysis to clarify moral criteria for the emergency management profession. The public service criteria are implicated in most of these principles (1 to 9) I’ve listed. Certainly, utilitarian criteria are included for consideration (4), the prevention of harm (6 to 8), knowledge (3, 5, and 10), and the basic right to personal security (2, 3, 5, and 8) are all available for analysis and clarification in the principles presented. More importantly, a statement of principles in this fashion seems to touch more directly upon the activities and responsibilities of the emergency manager. Finally, these principles are compatible with the values of respect, commitment, and professionalism. In fact, they are illustrated quite nicely in the form of more specific job related responsibilities.

Perhaps the emphasis on hazard mitigation and sustainability and the concept of responsibilities spanning generations and communities are the themes that will generate much discussion and disagreement, but they are among the more compelling concerns in the profession today and are particularly ripe for analysis and consideration in the ethical context.

CONCLUSION

We have briefly discussed some of the moral criteria that may be considered relevant for emergency managers and examined the code of ethics that is, more or less, the current standard for the profession. But it is clear that additional scholarship and refinement are necessary to resolve the need for greater clarity and precision in the selection and application of criteria, and to inform the construction of a more precise set of ethical principles for the emergency management professional. The proposed statement of principles with which this discussion has concluded is but an attempt to suggest what a more comprehensive, informative, and functional statement of ethical principles might look like. But this proposed formulation assumes the need for more effort at defining the moral criteria that will give these principles their ultimate meaning.

The premise that the ethical dimension of the emergency management profession is unique would be incorrect. All professions and all social organizations ascribe to a set of beliefs and values. Doctors and lawyers sign an oath and commit to upholding the ethical rules of their profession. All professions have a unified commitment to develop the most professional organizations possible. A part of that development, especially in professions impacting lives, health, safety, and the public welfare requires a well-constructed and universally-implemented set of ethical principles that establish the standards for performance and define the responsibilities to be met.

The existing codes of ethics are a sign of progress, a sign that emergency management is becoming a profession. The building of a more precise set of principles, the effort to clearly connect these principles to the work of the profession and to the training and development of its practitioners, requires that analysis and discourse continue. In fact, the ongoing analysis and discourse will be more important than any proposed set of ethical principles that may evolve. It is the struggle to define the moral criteria by which
its work may be judged and to understand more precisely the scope of its responsibility that defines the profession of emergency management.

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REFERENCES

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**EQUIPMENT**
- Access flooring
- Air cleaning equipment
- Air conditioners, dehumidifiers
- Air testing equipment
- Alarms, earthquake
- Alarms, radiation
- Alarms, water
- Continuous up-time computers
- Cooling equipment, mobile
- Dispatch systems
- Drying & dehumidification equipment
- E-mail backup systems
- Environmental clean-up equipment
- Evacuation equipment
- Fireproof safes, files, & containers
- Furniture rental: commercial/residential
- Generators, electric
- Heating equipment, mobile
- LAN/WAN network equipment
- Lighting, emergency
- PCs
- Printers, plotters, misc.
- Radios & walkie-talkies
- Shelters, portable
- Smoke & odor counteracting products
- UPS-uninterruptible power supplies
- Water chillers, temporary
- Water testing equipment

**BACKUP SITES & MOBILE FACILITIES**
- Hot sites/Warm sites/Cold sites
- Mobile Buildings
- Mobile administrative offices
- Mobile bank branches
- Mobile cargo storage space
- Mobile classrooms
- Mobile computer rooms & data centers
- Mobile homes

**SERVICES**
- Demolition specialists
- Disposal, hazardous waste
- Drying & dehumidification
- Fire & water damage restoration
- Food & sanitary services - mobile
- Forensic engineers
- Furniture restoration
- Business continuation services
- Business recovery planning
- Crisis management
- Risk Analysis: Information Systems
- Data recovery from damaged media
- Liquidators & Salvage buyers
- Recover water-damaged books/documents
- Trauma/crisis counseling & management
- Conservation: art, library & museum
- Legal issues, disaster-related
- Tree removal services

**SOFTWARE**
- Disaster Recovery Planning Software
- Erased & Damaged File Recovery Utilities
- File & Data Backup/Recovery Software

**SUPPLIES**
- Cots, beds, blankets, tents, etc.
- Fasteners: earthquake-proof
- Fireproof containers & bags
- Food, water, in emergency rations
- Gas Masks, Smoke hoods, personal
- Sandbags

**TRAINING & CONFERENCES**
- Certification: emergency management
- Disaster planning & emergency management
- Workplace violence control, training

**MATERIALS & PUBLICATIONS**
- Films/Videos
- Books, journals, newsletters, etc.
- Online & Electronic
- Crisis response kits
- Planning & "how-to" manuals
- Training materials

**ASSOCIATIONS**
- Computer security associations
- Emergency preparedness associations
- Public information & awareness
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