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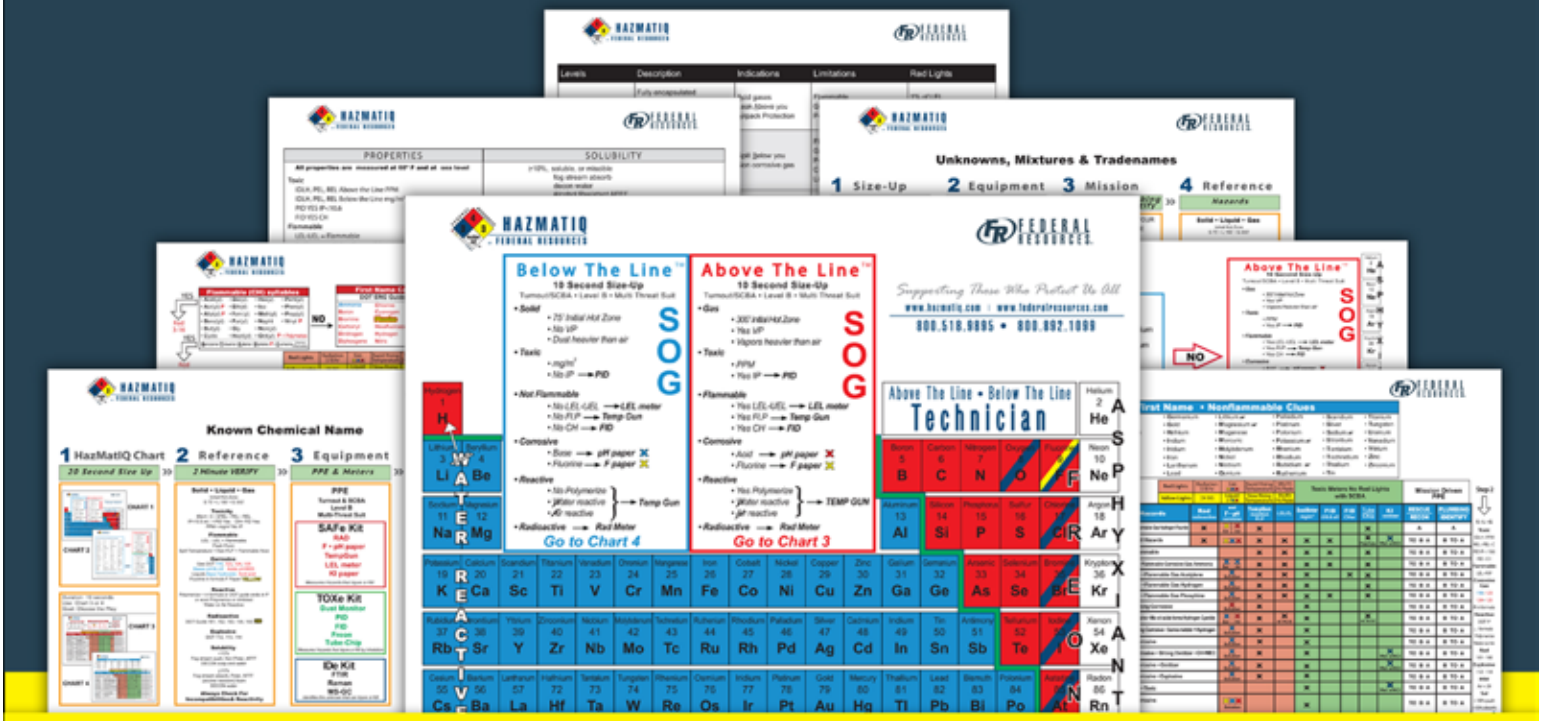

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Featured in This Issue

Pictured on the Cover: (top row) Samaras, Source: Arthur Samaras, 2017; Goss, Source: Drone Pilot Inc., Air Boss Gene Robinson, 2017; (second row) Englander, Source: John Englander, 2017; Thomas, Source: CNA, 2017; (third row) Schoeberl & Scherr, Source: ©iStock.com/Michal Oska; Williams, Source: ©iStock.com/sangaku; (bottom row) Greene, Source: Schlage Lock Company LLC (part of Allegion plc); Thomas, Source: ©iStock.com/juststock

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Education – The Ultimate Personal Protective Equipment

By Catherine L. Feinman

A firefighter would not run into a burning building without turnout gear and self-contained breathing apparatus. A paramedic would not treat and transport a patient without proper body substance isolation precautions. A hazardous materials technician would not attempt to contain a highly toxic chemical spill without donning a Level A protective suit. Personal protective equipment (PPE) is standard issue for these professions. Responding to a disaster without sufficient education on the type of incident, the warning signs, the tools available, and even themselves would be like running into one of the above scenarios without the proper level of PPE.

Whether planning for a natural or human-caused disaster, it is critical to understand the disaster and its possible consequences as well as the actions and tools that could prevent or mitigate these consequences. Responding to natural and human-caused disasters requires significant levels of preparedness both physically and mentally. Like training for a marathon, responders need to understand what to expect and what they need to adequately prepare themselves and their teams. The physical and psychological needs of survivors also must be understood and prepared for to prevent issues such as opioid addiction from hindering care for other patients in critical need.

Next, understanding the threat and identifying the signs can help mitigate the consequences. With five different forms of flooding, for example, a flood is no longer just a flood. Equipped with this knowledge, efforts can be made to mitigate floods within built environments. The same is true for hurricanes, as has been evidenced by the very different consequences and responses from recent Hurricanes Harvey, Irma, and Maria. Lessons from these storms provide insight into what may be yet to come. Human-caused disasters may seem more difficult to predict, but signs do exist to help recognize lone wolves and terrorist threats before they occur.

Finally, identifying the tools and resources available in advance of a disaster can facilitate the response efforts and reduce response times. For example, some school security programs can prevent intruders, but some of these security measures may pose life-safety concerns. Similarly, unmanned aerial systems may hinder response operations, but they also could help assess damages, locate survivors, and provcide other valuable information.

Luck is not what a responder wants to depend upon when faced with a natural or human-caused disaster. However, without proper education before a disaster, the response effort would be reactionary and luck would need to play a key role. Plenty of educational resources exist in the *DomPrep Journal* and elsewhere to learn from past incidents, recognize potential incidents, and respond with the proper physical and psychological PPE needed for any incident.

Surviving the First Disaster Deployment

By Arthur Samaras

When runners compete in their first marathon or triathlon, they often set goals such as, "I hope to break four hours," or "I want to beat my brother's time." However, a different mindset should be taken for a first attempt at an endurance event. Rather than placing benchmarks or targets, the goal should be to simply finish the first event. This same advice applies to a first-time disaster deployment.

When deploying to the first disaster in a career, it is critical for a responder to focus on just getting through it and reaching the "finish line." During disasters, mistakes are inevitably made and not everything goes as planned, but the goal is to just keep going. The following eight tips acquired from training for high-endurance activities are also helpful for responders who are getting ready for their first disaster deployment.

Do Not Ignore the Impacts

During a crisis, responders may be upset with what they see and experience. It is tempting to put on a strong façade, say that it has all been seen before, or joke about it as a course of action to deal with the images that cannot be forgotten. Yet, each new tragedy is another opportunity to trigger something inside. It can happen to even the strongest and most seasoned responder. A psychological first aid course can help one understand the signs and symptoms of job and disaster-related stress, and recognize personal needs as well as those of colleagues. Talking to someone and encouraging colleagues to do the same can help responders cope with emotions triggered by the incident response. Help lines are another option. For example, the Disaster Distress Helpline is a toll free, multilingual, and confidential service that can be reached by calling (800) 985-5990 or texting TalkWithUs to 66746. It is important to remember that disaster experiences can and will stay with the responders for a long time. They may not go away when the deployment is over.

Maintain Sleep, Nutrition & Self-Care

Disasters can be exhausting, and this may lead to responders not eating properly or taking care of themselves. Few deployments are managed in the normal Monday-Friday, 9 a.m. to 5 p.m. work schedule. Many are managed in operational periods lasting 8-12 hours, and most run 24 hours per day. Responders typically work very hard during a deployment, with long hours for days without a break. As such, they should plan to eat whatever food is available and accept that any normal diet routine will be interrupted. Convenience or mass-produced/shelf-stable food is to be expected, with snacking overtaking regular meals often the norm during a deployment. Interruption or cessation of a normal exercise routine should also be expected. Finally, bad habits such as smoking or alcohol use as a way of dealing with stress may increase. Responders must prepare for these changes and do their best to take care of themselves. Staying hydrated, taking advantage of sleep opportunities, and eating an abundance of healthy food when it is available should all be priorities. The saying, "I picked a bad day to start a new diet," can certainly be said about most deployments.

Set Realistic Expectations

It is not possible to make everybody happy. Attempting to please everyone and gauging success based on others' levels of satisfaction do not work on a disaster site. It is important to suspend this method of measurement during a deployment. It is not possible to perfectly balance the needs of victims, colleagues, families, partner organizations, superiors, and subordinates. At some point, someone inevitably feels slighted, with nothing to remedy the situation. This is just a complication of a disaster, so focus must remain on the execution of tasks to the best of a responder's ability.

Stay Focused on the Purpose

Responders should never forget whom they are there to help. They do not deploy to take a break from their everyday jobs or their families, or to go on vacation. They are there because they answered the call to help survivors of the disaster. This is the guiding principle that should keep responders focused on acting in the best interest of those they are there to help and in dealing with the political, financial, and personality-based pressures they will encounter. One way for responders to navigate these pressures is to ask themselves "Is this [decision/action] in the best interest of those I am here to help?" The caveat to this line of thinking is to never compromise responder safety.

Accept the Inevitable

Responders make decisions based on best guesses that are not always right (in fact, they may often be wrong). Disasters by their very nature are chaotic, unpredictable, and riddled with unknowns (e.g., How many people lost their homes? How many are without heat or electricity? How many need shelter? How crowded have the emergency rooms become? Which way does the wind fan the fires? When will the river crest?). The questions are as endless as the possible answers. Expert advice and historical data can help answer these questions. However, it is also important to accept the inevitable. At some point during a deployment, responders are faced with having to make a decision without solid data. These guesses must come from the gut and require choosing one course of action over another. It may not be the right decision, but it is the best decision that can be made with what is known. Expect and accept that not all decisions are going to be the right ones.

Preparing for Hurricane Irma shelter survivors in the Florida Keys (*Source:* Arthur Samaras, September 2017).

Do Not Work in a Vacuum

No matter what a responder's function is on a deployment, sharing information about what the responder and an organization are accomplishing is critical.

Coordination, cooperation, and communication eliminate duplication of efforts and maximize output. This leads to an increase in the overall efficiency of effort. By understanding an organization's role during a disaster, responders can better stay within their scope of practice and not overstep their roles and responsibilities. Working together and not against other organizations involves sharing information and intelligence and taking direction. A disaster is not the time for personal or organizational gain. Responders must be able to rise above politics, egos, and rivalries to do the greatest good for those in need.

Stay Connected

During a deployment, responders lose touch with what is happening at home. It is easy to forget about everything outside of immediate tasks when on a deployment. Work continues to accumulate at the daily job site, the inbox and voice mail continue to fill, the grass continues to grow at home, and friends and loved ones continue to live their lives. Every day during down time, responders should step away from their tasks and reach out to friends and family. Taking a few minutes to catch up goes a long way to staying grounded and to making the return from the deployment less difficult.

Take Time to Readjust

Returning home and back to normal takes time. Assimilation to everyday life is not easy and cannot happen overnight. Responders are faced with an overflowing inbox of email, delayed tasks at work, and family obligations. There is an emotional transformation from being "in the moment" during the deployment back to the everyday tasks such as picking up a child from soccer practice on time. Everyday life might seem trivial. Responders may or may not want to talk about what they observed and accomplished, and people around them may or may not want them to share. Both views are okay, but finding someone to talk to is essential when a responder is adversely affected by the experience. Before heading back to work, take at least a day or two off to catch up on missed sleep, spend time with friends and loved ones, and reflect on and analyze the experience. Perhaps even write down notes to review before the next deployment, moments of success to replicate, and tasks that could have been done better. It can also be helpful to update contact lists with information about people encountered on the deployment, and to reconnect with them.

Disaster deployments are often mentally, physically, and psychologically draining. After action reports of deployment descriptions include words such as challenging, fulfilling, inspirational, gratifying, impossible, stressful, chaotic, confusing, and successful. Many responders can relate to these words and may have descriptions of their own after their first deployments. In addition to regular training, this list should better prepare responders for their first deployment experience.

Arthur Samaras has worked and volunteered as a professional responder for over 20 years. In that time, he has focused on providing disaster services within the ESF 6 (Mass Care) and ESF 8 (Medical services) arenas for small volunteer agencies, hospitals, large nongovernmental organizations, and the U.S. government. He currently splits his time as a flight paramedic in New Jersey and as a paramedic in Cambridgeshire, England. To maintain a high level of mental, physical, and psychological health between deployments, he enjoys triathlons, sailing, rock and ice climbing, and most importantly traveling and spending time with his wife and three young children.

Unmanned Aerial Systems & Emergency Management

By Kay C. Goss

Long before the invention of drones, emergency managers determined the overall scope of a crisis using information from emergency personnel on the ground, and from the chain of command created through the Incident Command System. Today, drones have many capabilities that could enhance response activities and change the way disasters are managed. Hurricane Harvey demonstrated how this technology is rapidly changing.

Unmanned aerial systems (UAS, referred to here as "drones") empower emergency managers to evaluate a serious disaster situation with the use of a drone, potentially complementing the information they have from personnel. In other circumstances, the use of drones prevents personnel from entering a potentially hazardous scene before emergency managers understand exactly what they are dealing with. As such, fire departments, hazardous materials teams, search and rescue teams, and police departments can use drones, with clever uses (e.g., infrared imaging) depending on the nature of the emergency.

Drones, with near artificial intelligence, can provide a unique perspective and review extensive information for an incident. Used as a complementary tool, drones can provide a large amount of information for a variety of incidents. In some cases, they have assisted with response efforts involving people who may otherwise have been impossible to rescue.

Benefits of Drone Technology After Disaster

Although drones can be expensive to purchase, they can provide invaluable information on scene for an emergency management office, Emergency Medical Services, law enforcement agencies, and fire departments. Additional information provided through this technology enhances life-saving potential when minutes count. Following a disaster, drones can significantly influence the ability to save lives and assess damages.

Lightweight, quadcopter drones outfitted with cameras can send images back to insurance professionals – some in real time. Drones are changing how some insurance companies are conducting inspections. For example, Allstate launched permanent drone damage inspection programs in spring 2017 in Texas, Oklahoma, New Mexico, and Colorado. For major U.S. insurers, this technology saves time while maintaining safety for adjusters and inspectors. The typical amount of inspections per adjuster in a flood zone like Houston, Texas, increases from three homes a day to 10 or more when drone technology is implemented. Similarly, communications companies and power companies have used drones to inspect their equipment.

The expanding drone industry is evidenced by an increasing number of commercial drone pilots. The Federal Aviation Administration (FAA) has granted more than 59,000 U.S. certificates required to pilot drones commercially since they began issuing them in 2016.

Drones have been a prominent presence in the aftermath of Hurricanes Harvey, Irma, and Maria, providing extensive coverage as an emergency response tool – on mainstream media and social media. Emergency response agencies' growing interest in this emerging technology may become a key tool for quicker, more accurate responses with lifesaving benefit.

Hurricane Harvey Response

Hurricane Harvey and its aftermath illustrate the value and perils of drones. Remote-controlled aircraft have been promoted for more than 10 years for dangerous missions, like inspecting damaged and flooded buildings. The FAA authorized 43 drone operators in the wake of Harvey, and prohibited private drone pilots from flying in a broad area around Houston due to concern for emergency aircraft and rescue helicopters as they lifted people from rooftops and searched for survivors.

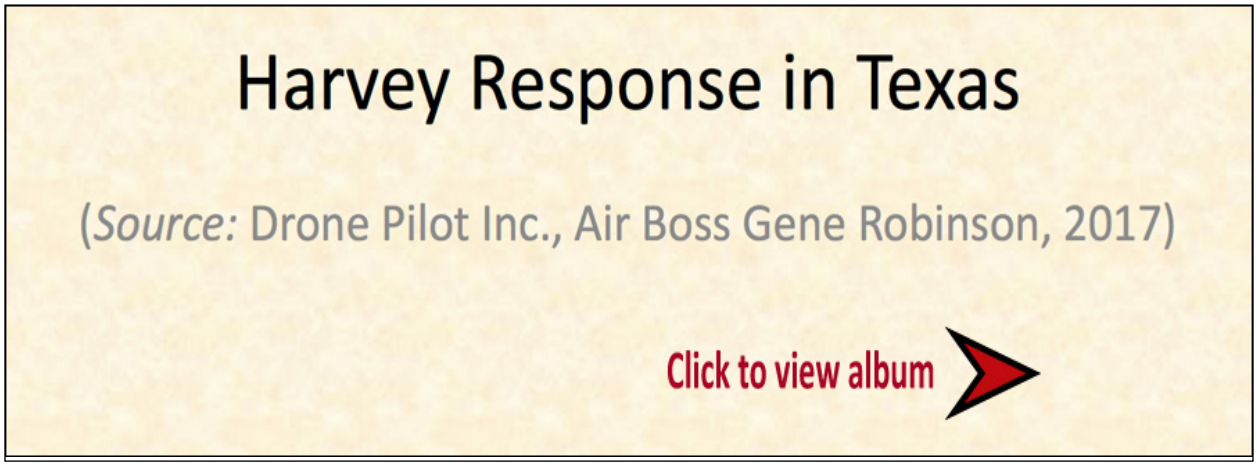
Drones provide invaluable information on a disaster scene that enhances damage assessments and life-saving potential when minutes count.

After Harvey made landfall, the FAA authorized federal, state, and local officials to use drones to assess damage and prioritize recovery efforts. They also informed the public they would fine drone operators if they interfered with government response activities. Houston issued a temporary flight restriction for nongovernment drones within 100 miles of Houston for the first month of the Harvey response and recovery efforts. Many drone advocates began to see the heavy early drone presence in the first hours of Harvey posed the possibility of doing long-term damage to the public's perception of drone usage. These advocates were concerned that private drone use during Harvey could increase government restrictions in the future, as they got in each other's way and as the drones were used by the curious. The Academy of Model Aeronautics, representing 200,000 hobbyists, also urged drone pilots to stay away from Harvey response efforts.

Eight trip approvals, like those for commercial aircraft flight plans, went to a railroad company to survey damage along tracks running through Houston. Five went to oil or energy companies to look for damage to fuel tanks, power lines, and other facilities. As emergency management officials continue checking damage to roads, bridges, and water treatment plants, drones extend their response capability and broaden the area they can assess. Insurance officials are also examining the damage and determining the size of their clients' claims much more quickly.

Leaders in Unmanned Systems

In Virginia, Governor Terence McAuliffe signed Executive #43 establishing the Virginia Unmanned Systems Commission to bring public and private sector experts together to recommend ways to make Virginia the national (and perhaps eventually global) leader in unmanned systems. The Virginia Unmanned Systems webpage highlights Virginia's technology centers working on unmanned technologies, placing the initiative under the Virginia Secretary of Technology's Office.



Other Virginia partner organizations include the Center for Innovative Technology, Virginia Economic Development Partnership, Mid-Atlantic Aviation Partnership, Virginia Automated Corridors, and Virginia Tech Aerospace and Ocean Engineering. Charles Werner – former fire chief of Charlottesville, Virginia, chair of SAFECOM, technology chair at the International Association of Fire Chiefs (IAFC), and now deputy director of the Virginia Department of Emergency Management – leads the Virginia Emergency Response Planning for Unmanned Aerial Systems (UAS), organized the National Council on Public Safety-UAS (the National Council), and now serves as its chair.

Areas of increasing UAS activity and outreach in the United States include, but are not limited to the following:

- *National Council* – The Council was launched in April 2017 in a meeting with the National Fire Protection Association (NFPA) and the Association & Society Management International Inc. (ASMI). With an established partnership with the Association of Unmanned Vehicle Systems Institute (AUVSI), the Council provides input for a public safety track at national conferences and utilizes outreach capabilities to communicate information about the Council and any positions that the Council develops or shares from member organizations.
- *American National Standards Institute (ANSI)* – ANSI has also created an initiative, called the ANSI Unmanned Aircraft Systems Standardization Collaborative (UASSC). This is a collaborative initiative to compile all standards development activities in the field of UAS.
- *FAA* – A group of public safety representatives met in D.C. with all FAA divisions to share thoughts, concerns, and desires on how public safety and the FAA work together to effectively integrate into the national air space on 29 September 2017.
- *Department of Homeland Security (DHS) Science & Technology* – DHS is outreaching to the National Council to develop a strategy to ensure safe,

reliable, and effective integration/deployment of UAS during the various phases of a public safety event. There is also an opportunity to engage with the U.S. Department of Defense and Customs and Border Patrol. Also, there is an effort to engage the Federal Technical UAS Users Group.

- *NFPA 2400, Technical Committee on UAS* – The first draft of the NFPA Technical Committee on UAS is now out for public review and input. Public input will be accepted until close of business on 13 October 2017. NFPA has indicated that the public release of the standard will not likely occur until the first quarter of 2019.

Worldwide Expansion & Uses

Overall, drone engagement has introduced new lessons regarding the practical and progressive roles that drones could play in disasters. Many levels of government and governmental agencies, as well as private and nonprofit sectors are studying, seeking, and deploying unmanned aerial vehicle technologies. The environment is somewhat competitive, with rapid growth due to its many lifesaving applications, as well as sport coverage, professional and personal convenience, and economic development.

With disasters occurring anywhere in the world, there is a lot of potential to incorporate drones into response operations. For example, during the worst wildfire to strike the Southern Cape Coast, South Africa, in over 150 years, drones slowly started coming into play as a local firefighting and disaster management tool. Firefighters issued a call for drones equipped with heat mapping capabilities, which would allow them to identify hot spots at the greatest risk of flare-ups – a task virtually impossible for ground crews working in blinding smoke and dense undergrowth. In years to come, drones will take on an increasingly important role in firefighting and other disaster management activities, reducing the risk to human life during operations, and limiting damage to assets by enabling firefighters and all responders to work proactively, rather than reactively.

Kay C. Goss, CEM®, is an International Association of Emergency Managers (IAEM) featured CEM mentor and IAEM representative for the National Council for Public Safety – UAS. She is president of World Disaster Management, U.S. president of The International Emergency Management Society, president of the Council on Accreditation of Emergency Management Education. She is also part-time faculty online and Go-To-Meeting, as well as in person, in the Executive Master's Program in Crisis and Emergency Management at the University of Nevada at Las Vegas and in the Graduate Program in Emergency Management and Homeland Security at Metropolitan College of New York. Previous positions include: executive in residence at the University of Arkansas; senior principal and senior advisor of emergency management and continuity programs at SRA International (2007-2011); senior advisor of emergency management, homeland security, and business security at Electronic Data Systems (2001-2007); associate Federal Emergency Management Agency director in charge of national preparedness, training, and exercises, appointed by President William Jefferson Clinton and confirmed unanimously by the U.S. Senate (1993-2001); senior assistant to the governor for intergovernmental relations, Governor William Jefferson Clinton (1982-1993); chief deputy state auditor at the Arkansas State Capitol (1981-1982); project director at the Association of Arkansas Counties (1979-1981); research director at the Arkansas State Constitutional Convention, Arkansas State Capitol (1979-1980); project director of the Educational Finance Study Commission, Arkansas General Assembly, Arkansas State Capitol (1977-1979).

Three Storms Demonstrate Five Forms of Flooding

By John Englander

Flooding results from three primary forces: rainfall, coastal storm surge, and rising sea level, made even worse with by runoff and extreme tides. Recently hurricanes Harvey, Irma, and Maria showcased the new environmental conditions the world faces as well as the devastating damage that can occur when any combination of these flood types converges on a built community constructed without adequately addressing the increasing threats.

Category 4 Hurricane Harvey rapidly developed within approximately 36 hours in the Gulf. As Harvey made landfall on 25 August 2017, huge waves struck the coastline, storm surge rose even higher in the bays, and a 40-inch deluge of rain caused massive flooding. Flooding worsened over the next few days on the Texas coast as the storm moved slowly eastward toward Houston and Galveston. The shallow warm waters of the northern Gulf and the extensive bays behind the barrier islands nourished and sustained the downpour. Two weeks later, Category 5 Hurricane Irma, with sustained record winds of 185 miles per hour, killed dozens, destroyed nearly all structures on some Caribbean islands, and then threatened the Florida coasts. Less than two weeks after Irma, Category 4 Hurricane Maria, with sustained winds of 155 mph, struck the island of Puerto Rico, causing widespread damage across all of its communities.

Reasons for Unusual & Unpredictable Storms

One reason for these harder to predict, unusual storms is that 93% of the extra heat being trapped in the atmosphere by increased greenhouse gases is being stored in the ocean. The Gulf of Mexico is a relatively shallow isolated body of water that is particularly susceptible to warming. In simple terms, that is why Harvey hit with minimal notice and produced flooding that exceeded models. Higher heat levels can even alter ocean currents like the Gulf Stream and atmospheric currents like the Jet Stream, causing unpredictable storms and weather systems, outside the historical record. Subtle temperature changes in the deep ocean further complicate the picture obtained from the easily measured sea surface temperatures.

Texas National Guard and the U.S. Military aid victims in the aftermath of Hurricane Harvey in Houston (*Source:* Defense.gov, 27 August 2017).

Unusual weather patterns, including storms and record-breaking rain, are related to the warmer ocean. Although the usual weather forecasts are becoming extraordinarily accurate, many big pattern phenomena like hurricanes

and *el Niños* are getting harder to accurately forecast. Warmer temperatures are melting vast areas of glaciers and polar ice sheets that will raise global sea level far into the future. Since ice melts at an exact temperature, sea level is a good proxy for global average temperature over centuries and millennia. The natural climate cycles are perhaps best exemplified by the ice ages. Sea level reaching levels unknown for more than 100,000 years add a new dimension to the challenge posed by flooding.

Five Forms of Flooding

Solutions to the extreme flooding from recent hurricanes are complex, with three primary flooding forces to consider: storms pushing water in from the sea; record rainfall; and rising sea level and two secondary level forces, runoff and extreme tides. These forces operate somewhat independently, but can combine for a devastating effect. Communities are caught in the triangulation: deluge from above; base sea level rising from below; and waves and storm surge approaching laterally from the coast. In order to design viable communities for the future, it is imperative to understand the dynamics of each of the five flooding forms and why the design solutions can be quite different.

- *Rainfall* – Harvey demonstrated record levels of rain, more than a foot in a few hours. The warmer ocean temperature means more water evaporates, putting water molecules and heat energy into the atmosphere in much higher volumes than "normal," which must come down as more precipitation.
- *Runoff* – Extreme rainfall can trigger the related problem of runoff, causing far greater flooding as water flows to lower elevations in a city, down a valley, or into a stream/river possibly overflowing river banks hundreds of miles away. As the ground saturates and can no longer absorb the rainfall, flooding can suddenly worsen. (Adding to the problem, Houston does not have zoning restrictions to allocate development density and plans for adequate drainage at the scale of a master plan.)
- *Storm surge* – Aside from the wind and rain, the special threats from a major storm are the huge waves at the coast and the storm surge. The cyclone force of a hurricane essentially "sucks" a huge quantity of seawater with its low pressure and pushes a virtual giant wall of water as it moves. That water surge creates a special problem when it is pushed into a confined, or even semi-confined space, such as a bay, harbor, or intracoastal waterway and "piles up" to much greater heights. In Texas during Harvey, this occurred as the large water volume moved behind the coastal barrier islands, and into the bays, canals, estuaries, and harbors from Corpus Christi to Houston/Galveston.
- *Sea level* – Sea level has just started to rise. The primary driver is ice melt on land (i.e., the glaciers and ice sheets largely on Alaska, Greenland, and Antarctica). Rising sea level has been modest to date, but will soon start to rise at an increasing rate, in fact, almost certainly an exponential one (for further explanation, read "Beware the Doubling Time for Rising Seas"). The key difference with sea level rise from the other two primary flood factors is that it is slow and stealthy. It is often overlooked as communities focus on the big events of storms and heavy rainfall. Yet, as sea level rises over the coming decades, it will essentially cause permanent change to coastal areas around

the world. The effects go through marshlands and up tidal waterways rather far inland.

- *"King Tides"* – Following the pull of the moon and other planets, the oceans change height on a regular tidal cycle, varying somewhat by location. The extreme high tides are often referred to as "king tides" and can be predicted to the minute for various locations. Over the last few decades as sea level rise accelerates, the height and extent of the king tides is getting noticeably greater. From San Francisco Bay to Annapolis and from Vancouver to Miami, this routine flooding is becoming more than a nuisance, even though it recedes in hours. It is driven by and is the harbinger of creeping higher *permanent* sea level. ("Permanent" here in the sense that sea level is unlikely to go down for millennia.)

At the convergence of these five flooding forms, even engineers, architects, and planners find themselves challenged in terms of how to plan for new flooding extremes, where the past no longer easily predicts the future. In Texas and Louisiana, Hurricane Harvey illustrated the challenge of designing viable solutions for the rapidly changing environment. Drainage systems were overwhelmed. Pavement, concrete, and buildings all stopped water from absorbing into the ground.

Possible Solutions

The lessons of these three recent storms are profound and powerful. Specifically, Houston needs to implement good zoning, building codes, and storm water management. Bayous are not something to be paved over with urban sprawl, without consequence. Puerto Rico not only needs to rebuild with new building codes, this should be the opportunity to redesign its power system from the ground up. This is also a good opportunity to design a large-scale system of solar, wind, microgrids, and batteries using the latest technology. Despite a potential catastrophic scenario, Florida mostly escaped disaster this time, but may not fare as well with the next storm, and certainly not with sea level rise.

Solutions for rainfall and runoff require more robust drainage systems, including retention ponds, larger storm culverts, pumps, and areas to absorb the water. Storm surge from the sea, though, is entirely different. One proposed solution to deflect the storm surge at Galveston, at the mouth of the Houston Ship Channel is an $11 billion storm barrier. However, structures designed to stop waves and storm surge would not stop slowly rising sea level. A dam or water-tight barrier to protect against rising sea level would need to accommodate shipping traffic efficiently, posing a different design challenge. Also, gates or barriers do nothing to solve the problem of record rainfall and runoff. In fact, many storm surge barriers or sea walls could actually act to retain the flooding from rainfall, making the problem even worse.

With extreme rainfall, the solution to prevent flooding has to be drainage systems, elevating buildings, or even relocating low-lying neighborhoods. Realistic solutions should also include revisions to building codes, zoning, and restoration of wetlands. The key is to design for and adapt to this new reality, recognizing the very different flooding forces.

Though a somewhat separate issue, there needs to be a slowing of carbon dioxide and other greenhouse gas releases that are trapping heat and warming the planet. That means instituting policies to reduce reliance on fossil fuels and reduce the level of greenhouse gases

Flooding comes in different forms that can require different solutions. This Fort Lauderdale street with trucks in the foreground and boats in the background illustrates how "king tides" now routinely flood streets. Even a "no wake" sign typically aimed at boats, is intended here to get cars to drive slowly, to minimize salt water waves in the neighborhood (*Source:* John Englander, 2017).

that correlate with the warming temperatures. Slowing the warming process and adapting to changing climates need to be done simultaneously and aggressively.

Adapting communities for the five different forms of flooding will not be easy. The effects are very different, with storms, rainfall, runoff, and king tides causing short-term flooding and sea level rise potentially putting property underwater permanently. Rising sea level is a special problem, as it slowly increases the water levels from other short-lived flooding factors. However, understanding these different aspects clearly can facilitate designs for greater resilience for all of them.

A New Era of Water Challenges

As long as the planet continues warming with increases in carbon dioxide and other greenhouse gases, sea levels will rise, storm surges will likely worsen, and moisture will come down as unprecedented rainfall – or snow, if the local air mass is below freezing. Paradoxically, the above normal temperatures will also cause droughts and wildfires outside of historical patterns.

Preparing for this new era of extreme rainfall will be a huge challenge. Despite differences in preparing for the flooding from storms, extreme tides, rainfall, runoff, and rising sea level, the similarities may help when confronting the "water challenge" in a bold and thorough manner. People, cities, infrastructure, economies, and nations must adapt rapidly to environmental changes. Full recovery for the places affected by these three recent storms will take years. However, perhaps the "1-2-3 punch" of Harvey, Irma, and Maria will be a turning point for discussions and action to deal with the increased flooding in this new era. Those involved with emergency preparedness are on the front lines of flooding response and prevention.

John Englander is an oceanographer, consultant, and leading expert on sea level rise and related flooding. His broad marine science background with degrees in geology and economics, and personal experience in Greenland and Antarctica allow him to see the big picture on sea level rise and explain the phenomena in plain language. Englander works with businesses and government agencies to understand the risks of sea level rise and the need for "intelligent adaptation." He goes beyond the usual projections and explains the "uncertainties" that could yield considerably higher sea level as early as mid-century. His bestselling book, "High Tide on Main Street: Rising Sea Level and the Coming Coastal Crisis," clearly explains the science of sea level rise, the impending devastating economic impacts and the opportunity to design for a more resilient future. He is a sought after speaker, having presented to national security leadership, the American Planning Association, American Institute of Architects, the U.S. Naval Academy, etc. He does a weekly blog and news digest "Sea Level Rise Now." Visit: www.johnenglander.net

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Hurricane Harvey & What It Means for Future Disasters

By Dawn Thomas

As initial search and rescue operations in Houston, Texas, following Hurricane Harvey shifted to recovery efforts, three CNA experts discussed the various challenges metropolitan areas face during, immediately after, and throughout the long-term recovery from a large-scale disaster. Drawing on their 40 years of collective experience, panel moderator Monica Giovachino, Jason McNamara, and Dawn Thomas shared perspectives on a wide range of disaster response and recovery topics.

Described briefly below, these topics continue to resonate in discussions of Hurricanes Irma and Maria and add to the general conversation of how the nation responds to and recovers from disaster.

Responding to Massive Flooding

Although Harvey's winds and storm surge damaged Gulf Coast areas of Texas and Louisiana, the days-long rain associated with the storm caused the most serious impact to population centers. As such, Harvey highlighted the response and recovery challenges that come with excessive flooding, which will continue to be an issue as weather patterns change and flood plains are repurposed.

Considering Evacuation Versus Sheltering-in-Place

After weather events of Harvey's nature, the media and residents often question the decision to evacuate versus sheltering-in-place. The panelists discussed why this decision is so difficult (including the human and economic cost of evacuation), and whether a metropolitan area the size of Houston would have been able to conduct a safe and effective evacuation of a larger population with the time and resources at hand.

Acknowledging Federal Improvements in Coordination & Speed

Those involved in disaster management over the last 20 years have seen significant improvements in local, state, and federal coordination, the integration of the private sector into response activities, the speed with which federal resources are deployed to impacted areas, and the ability of the Department of Defense to work outside its normal procedures to support disaster relief missions.

Anticipating Short-Term Recovery Challenges

The panelists noted two major issues prominent during short-term recovery efforts: providing mass care/housing and ensuring that disasters such as Harvey do not lead to ongoing health issues (e.g., disease spread, environmentally caused illness, and decompensation of vulnerable populations) over the coming weeks and months. To move people out of mega-shelters, jurisdictions affected by disaster need both interim/temporary solutions for those whose homes require repair, and long-term housing solutions for those whose homes are total losses. In addition, there are numerous issues – including mass care living situations, people returning to their homes before they are safe, decompensation of those who require

medical support, and the upcoming flu season, which experts need to focus on to prevent a secondary public health crisis in the affected areas.

Looking Forward

The panelists addressed a range of topics on how Houston and the country can use the lessons of Harvey to improve disaster response. These topics included: planning for larger catastrophes; defining and analyzing ways to truly "build back better"; understanding the economics of federal disaster response; and defining key indicators that show that Texas is returning to a sense of normalcy.

Listen to the podcast at http://www.cna.org/podcast

Monica Giovachino is the managing director for CNA's Safety and Security division, and served as moderator for this episode. She has more than 15 years of experience supporting preparedness programs for federal, state, and local agencies. She has led evaluations of complex, national exercises, as well as real-world incidents, including hurricanes, storms, disease outbreaks, shootings, and special events.

Jason McNamara is the senior director of Emergency Management Programs at CNA and is an established emergency management and homeland security expert. He previously served as the chief of staff for the Federal Emergency Management Agency (FEMA), where he helped implement organizational reforms that contributed to FEMA responding effectively to some of the busiest, and most costly, disaster seasons on record.

Dawn Thomas is an associate director in CNA's SAS Safety and Security division. She has contributed to the analyses of real-world operations, including two presidential Inaugurations, Democratic and Republican National Conventions, Superstorm Sandy, Hurricanes Katrina, Rita, and Irma, and the Moore, Oklahoma, tornado. She has also worked with state, local, regional, and federal entities in preparing for and responding to catastrophic events.

Lone Wolves – Finding the Red Flags

By Richard Schoeberl & Daniel Scherr

The Department of Homeland Security has acknowledged that the threat of "lone wolf" attacks continue to represent the greatest threat to national security. This acknowledgement is supported by the fact that the United States is experiencing an unprecedented number of active shooter events – whether ideologically or non-ideologically inspired. Two weeks following the worst mass shooting in American history, details are no closer to being solidified and law enforcement continues to search for a motive.

According to the Federal Bureau of Investigation (FBI), active shooter situations carried out by both ideological and non-ideological shooters are on the rise and, in fact, such incidents have increased sharply over the past decade from 6.4 events to 16.4 events annually in 2014. However, a more recent 2017 study conducted by the Department of Justice Office of Justice Programs suggests a higher estimation of incidents and a rising actual trend over the past 15 years, from 1 shooting in the year 2000 to 20 incidents in 2015. Active shooter situations are unpredictable and evolve rather quickly. Because active shooters are not limited to a certain age, race, profile, or socioeconomic status, identifying a potential shooter is less predictable and almost impossible. A research-based academic study conducted in 2013 by the American Psychological Association concluded that, "There is no single profile that can reliably predict who will use a gun in an act of violence."

Shooting on the Las Vegas Strip

On the night of 28 September 2017, wealthy retired accountant Stephen Paddock checked into suite #32135 at the Mandalay Bay Resort and Casino in Las Vegas, Nevada. The room had multiple windows overlooking the Las Vegas Strip, offering Paddock uninterrupted views of many local attractions and approximately 22,000 patrons below. Typically, active shooters raise "red flags," such as nervousness, eye contact, and erratic behavior. However, nothing during the check-in process arose suspicions of Paddock's motivations or intentions of his stay.

Over the next three days, Paddock transferred at least 10 suitcases to his room. Starting at approximately 10:00 p.m. on Sunday, 1 October 2017, shots were reported at the Route 91 Harvest Festival, a country music concert taking place approximately 300 yards from Paddock's hotel. The selection of the suite on the 32nd floor of the Mandalay Bay Resort and Casino not only provided unobstructed views of the Strip and the venue, but also provided protection. Even if the room was easily identifiable by law enforcement, being surrounded by other guest rooms meant police and other responders could not return fire from the ground. This further delayed the response and allowed the shooter additional time to continue his

rampage, elevating the body count. Likely because of the challenging task of quickly searching 43 floors and more than 3,300 rooms, it took Las Vegas Police 72 minutes from the initial gunfire to reach the shooter.

Once the shooting began, reports started pouring in from eyewitnesses, guests in the hotel, security guards at Mandalay, and police. Although about an hour elapsed from the initial gunfire, authorities were able to localize Paddock in less than 20 minutes, after he shot a security guard that approached his room around 10:20 p.m. Police then established a cordon and quickly brought in additional resources. The breach occurred approximately an hour later, and authorities found Paddock dead from an apparent self-inflicted gunshot wound. Details regarding the mentality, motivation, or political ideologies of Stephen Paddock, the alleged shooter, will take time and investigation, but initial reaction from his family and investigators indicate a lack of radicalization, political ideology, or other motivation.

Premeditated Actions

Although authorities have yet to establish any motivations, and have not recognized any connection to known terrorist groups, the Islamic State (IS) wasted little time in claiming the attack. There are a number of questions regarding this claim, including the fact Paddock does not fit the profile of an IS soldier, has no credible ties (thus far), and that IS has issued multiple claims over the last few months for other attacks with no apparent ties, along with at least two claims for incidents that did not occur. This lack of corroboration of a link to IS, however, does little to limit the propaganda benefit and utility for IS and other terrorist organizations.

The Las Vegas attack claimed 58 lives and injured 489, according to latest reports, pushing it past the Pulse nightclub shooting in Orlando and making it the deadliest shooting incident in U.S. history. Authorities found 23 firearms in the hotel room of the alleged shooter, along with at least 19 more at his residence. At least 10 suitcases and bags were present in the shooter's hotel suite, as well as different explosive components and thousands of rounds of ammunition stockpiled in his vehicle and residences. He used hammers to break hotel windows in two directions to improve his field of fire and vision of the Strip and target area. Among the avenues being explored is whether the shooter, who was also a licensed pilot, specifically targeted containers of jet fuel on an adjacent property owned by McCarran Airport or if the containers were inadvertently struck during the shooting.

The methodical preparation over the course of multiple days demonstrates that Paddock was not acting impulsively or irrationally, but building toward his goal over time. Paddock's meticulous preparation is supported by a "Study of Ideological Active Shooter Events in the United States, 1970-2014" conducted by the CUNY Graduate Center. The study concluded that "lone wolves" are much more methodical and commit to their attack after considerable planning. Among the findings emerging from Las Vegas is Paddock's apparent attempt to purchase tracer ammunition at a gun show shortly before the attack.

Tracer rounds contain a small incendiary charge at their base, which is ignited by the powder when the round is fired. These rounds are used to assist in adjusting aiming points, particularly with automatic weapons employment. With the high visibility of the path of the round, tracers can be used by both the shooter for aim and others to rapidly trace the origin of the fire. These rounds also have a mild incendiary effect, mostly known for starting fires when fired in areas of dry brush. The lack of tracer rounds used in the attack contributed to the difficulty in locating the shooter during the initial minutes. These rounds might have been useful sighting in on specific targets, and could ignite the explosive Tannerite found in Paddock's vehicle, creating additional carnage and confusion to the existing situation.

Finding Answers

Americans want answers regarding the events that transpired in Las Vegas. As such, there is a growing number of thought pieces and statements from multiple fronts on the need for greater gun control and how to provide better event security going forward. Thus far, the gun control discussion is centered on two facts: all the weapons identified by authorities were legally obtained over the course of several years; and the shooter used bump stocks. Under current laws and regulations, bump stocks are legal accessories for semi-automatic rifles that allow the shooter to significantly increase the firing speed to approximate an automatic weapon. Both areas are receiving a lot of attention and calls for improved regulation and smarter controls, with the National Rifle Association even recommending that the Bureau of Alcohol, Tobacco, Firearms and Explosives revisit the legality of bump stocks, adding the National Rifle Association felt additional regulations should apply to these and similar devices. Debate on the number and types of weapons citizens should be able to purchase at one time, transport, or own is beyond the scope of this article, but will continue in the national discussion for some time.

In addition to gun concerns, extremist groups have often considered hotels as "soft targets." The 2008 attack on the Taj Hotel in Mumbai, India, launched hotels as the preferred target for terrorist groups, thus forcing the Taj to upgrade security measures post attack by screening guests and luggage with metal detectors. On concerns of how to better secure hotels and special events in the future, several areas have been discussed at length since the attack. The first is how the shooter could move such a large quantity of weaponry into his hotel room without raising suspicions. Due to the sensitive nature of the topic, many hotels will not openly discuss their security measures, but metal detectors, especially in higher-end facilities, are widely viewed as a negative from a hospitality perspective. Some security


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officials in Las Vegas insist their facilities would be able to identify similar behaviors but demurred in providing details or a technological basis for their claims. Open-air events will struggle to secure adjacent properties such as the one involved in the Las Vegas shooting.

The infrastructure of Las Vegas is designed to allow visitors to "get lost" in the casinos, hotels, and enjoy the wide range of activities and experiences the city has to offer. Threat detection and mitigation is complicated by this structure, in addition to the reliance on the tourism industry. Hotel security going forward needs to change. However, a significant increase in overt security, onerous regulations, or burdens on visitors may be viewed as a threat to tourism and revenue – thus creating a balance of security versus commerce and convenience.

Securing buildings and controlling access to these structures are commonplace for high-profile government events, such as a presidential speech. In the wake of the Las Vegas shooting, this security protocol is likely to expand to other open-air events. Emergency managers and security specialists need to understand the concerns of local leadership and citizens and find alternate methods or partnerships to help accomplish goals. Preparing for and guarding against these types of high-impact, low-probability events are an issue long discussed, but this event brings them to the forefront of public consciousness. Therefore, it is imperative to take steps to educate while people are listening.

Educating for Change

A long-standing pattern in the wake of active shooter events is a significant increase in the conversation and attention regarding the subject for a brief period, the introduction of some legislation at the federal, state, and local levels, but little to no progress or change as the national consciousness shifts to the next piece of news. Even a week after the Las Vegas attack, maintaining focus on the issues at hand is problematic, with other events taking precedence on the front pages of papers and discussions on the attack devolving along political lines. Such behaviors make it even more imperative to identify best practices and be proactive to avoid having the same conversations after the next attack.

Although the mental stability of Paddock is hypothesized, officials have not rushed to judge his attack as an act of terrorism without further exploring his motivations – something that is still unclear at this point. A terrorist attack is typically driven by an ideologically motivated individual, much different than a typical active shooter driven by emotionally or mentally disturbed individuals. Whether or not the deadliest mass shooting in U.S. history was driven by ideology or mental illness, the act itself is a game changer for both the public and private security sectors as it uncovers future barriers for the safety and security of the public.

Society is faced with the new normal being a constant state of heightened security, with elevated angles of shooting being added to the concern. Regardless of motivation, Paddock's actions certainly provide an example for others aiming to commit horrific acts of violence – whether ideologically motivated or mental instability. Despite Paddock's preparation for the

Las Vegas attack, academic research demonstrates that ideological active shooters are much more methodical and they significantly are more likely to have higher levels of planning. Unlike non-ideological active shooters, ideological extremism has a momentous influence on the way these individuals prepare, execute, and conclude their attacks. Most concerning of the Las Vegas shooting, Paddock may have planted a seed in the mind of someone ideologically motivated to carry out a "copy-cat" style attack.

Richard Schoeberl (pictured), a Ph.D. candidate (ABD) in criminology and terrorism, has over 20 years of security and law enforcement experience, including the Federal Bureau of Investigation (FBI) and the Central Intelligence Agency's National Counterterrorism Center (NCTC). He has served at a variety of positions throughout his career, ranging from supervisory special agent at the FBI's headquarters in Washington, D.C., to acting unit chief of the International Terrorism Operations Section at the NCTC's headquarters in Langley, Virginia. Before his managerial duties at these organizations, he worked as a special agent investigating violent crime, international terrorism, terrorist financing, cyberterrorism, and organized drugs. He also was assigned numerous collateral duties during his FBI tour – including a certified instructor and member of the agency's SWAT program. In addition to the FBI and NCTC, he is an author and has served as a media contributor for Fox News, CNN, PBS, NPR, Al-Jazeera Television, Al Arabiva Television, Al Hurra, and Sky News in Europe. Additionally, he has authored numerous articles on terrorism and security.

Daniel Scherr, a Ph.D. candidate (ABD) in public policy administration with a concentration in terrorism, mediation, and peace. He served in the U.S. Army Field Artillery, primarily at Fort Sill, Oklahoma, and left as a captain after spending time in command, operations, and multiple other functions. After the military, he worked as a transportation officer for CSX Transportation, and currently works as a professor at various colleges. His research areas include cybersecurity, terrorism, school violence, transportation policy, and education reform.

National Safe Schools Week: Securing Learning Environments

By Mark Williams

Studies show that children's learning improves when they feel both physically and emotionally safe. As "National Safe Schools Week" (16-20 October 2017) approaches, it is an appropriate time to discuss how to create those environments through safe schools programs in local communities across the United States.

In years past, the "door openings" industry and commercial buildings adhered to legacy codes – like Building Officials and Code Administrators International Inc. (BOCA), Uniform Building Code (UBC), Southern Building Code Congress International Inc. (SBBCI), and International Conference of Building Officials (ICBO) – which have traditionally been revised every three years, while local jurisdictions decided what versions to adopt and enforce. Currently, however, there is a move toward the International Building Code (IBC), which is published by the International Code Council (ICC) and includes standards and guidance for commercial buildings on doors, windows, and other openings.

Still, despite this migration of codes from a patchwork of local decisions to global guidelines, there remains a lack of consensus around school security. This raises the question, "What is 'good enough' when it comes to the security of schools and children?" The current fragmented approach causes confusion regarding how new schools are designed and how to retrofit existing school buildings, whose average age is 44 years. There have certainly been a few advances in technology and infrastructure since 1973, such as standards around fire, life safety, energy, and so many other aspects of commercial buildings, but not around school security.

Collaborating to Define Standards

The Partner Alliance for Safer Schools (PASS) is one of the organizations at the forefront of establishing security standards for schools. In 2014, the Security Industry Association (SIA) and the National Systems Contractors Association (NSCA) formed PASS, which brought together members of the security industry, school officials, and law enforcement to develop a coordinated approach to protecting K-12 students and staff. SIA and NSCA had a unified vision that combining their school safety programs and mass notification and emergency communications task forces would make a big impact in this space.

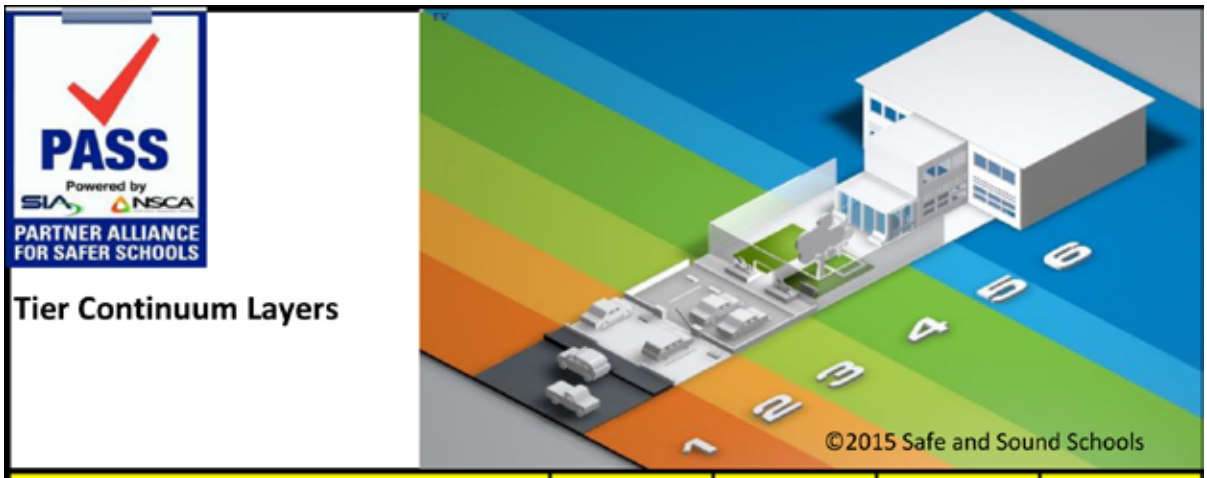
Together, they have provided valuable insights regarding school safety and security. In fact, PASS suggests that school administrators are challenged with two decisions: determining what they need to do and how they will pay for it. A third challenge, which complicates the second, is to understand how much implementing an appropriate security plan would cost. This includes determining how much would need to be budgeted, and whether those funds should come from the education budget, or from another source such as the homeland security budget.

School administrators are experts in running schools and providing education. However, most are not security experts and do not understand the complexity of implementing a comprehensive physical security and safety program across their districts. Still, they are often contacted repeatedly by organizations with multiple safety and security products. Some of these organizations recognize their products are just pieces of a safe school environment puzzle and how they fit in, whereas others focus on specific applications and do not understand how their specific solutions may affect life safety codes and Americans with Disabilities Act rules. (*Note:* Many "barricade devices" fall into this latter category and actually introduce liability concerns with the unintended consequences of their use.) Even for experts, the plethora of options and disparate systems required to integrate a safety and security approach at schools is daunting. The ongoing challenge is integrating access control, video, mass notification, and/or visitor management products into a single, effective, and appropriate system the owner can understand, utilize, and afford. In the absence of standards, schools are likely to amass a collection of devices that do not constitute a comprehensive solution.

Finding the Right Approach & Method

PASS has provided a solid roadmap – its free downloadable guidelines – for comprehensive security plan implementation by following a layered approach, suggested by Safe and Sound Schools, and then aligning the layers into measurable tiers (see Figure 1). The tiers define the level of security for each layer, with "Tier 1" being basic security or a starting point, and "Tier 4" being the most sophisticated. The layers within those tiers include:

- *Procedural Layer* – The human element, which includes roles and responsibilities for staff, volunteers, and others on school property;
- *Drill Layer* – Internal policies around drills for certain scenarios of danger;
- *Property Perimeter* – Defining the property perimeter and the procedures and policies for managing it, from signage and video to fencing and landscaping;
- *Parking Lot Perimeter* – Management of parking lots, whether for visitors, contractors, or staff;
- *Building Perimeter* – How various users access the inside of the building (students, staff, and visitors) and how this perimeter is managed physically and electronically;
- *Video Surveillance* – Where to locate video devices and how the data collected is managed;
- *Visitor Control* – How visitors are enrolled, identified, and managed, from building access to background checks;
- *Classroom Layer* – How protection is provided to students and staff in classroom settings; and
- *Emergency Notification Layer* – How various situations are communicated inside and outside the building to the appropriate audiences, from students and staff to parents and local authorities.



Layer	TIER 1	TIER 2	TIER 3	TIER 4
Procedural				
Drill				
Property Perimeter				
Parking Lot				
Building Perimeter				
Video Surveillance				
Visitor Control				
Classroom				
Emergency Notification				

Figure 1. The PASS Tier Layers (*Source:* PASS, 2015).

The tier of security a given school requires is generally determined based on identified risk (e.g., location, crime rates, surroundings) and budgets. Different environments require different approaches and levels of security. Therefore, schools in urban, suburban, and rural environments have different needs. Some environments may require a higher level of security for the property perimeter or parking lot perimeter depending on what is present in the surrounding area (e.g., shopping centers, bus terminals, freeways). The PASS approach provides the flexibility to mix and match the various layers and tiers to accommodate diverse environments.

Budgeting a Solution

Once there is an understanding of the tiers – as well as their layers and components – a budget can be estimated by a method developed by PASS. Although costs vary by market, PASS established a baseline budget using actual costs for a Denver area school district that implemented the PASS guidelines. PASS then looked at the number of public schools across the United States (approximately 100,000) in each state and broke them down by type (K-8, secondary, and other) to determine cost by state and school type for each tier.

Based on the approach described above, a summary of costs by state, building type, and tier was determined. Looking at the cost from a national standpoint, estimated costs would

be: Tier 1, $11 billion; Tier 2, $15.3 billion; Tier 3, $25.1 billion; and Tier 4, $35.9 billion. Costs for a sampling of several states are listed in Table 1.

Table 1. PASS Study Data – Cost Per State Based on the Number of K-8, Secondary, and "Other" Public School Buildings

		Costs			
State	**Total # of Schools**	**TIER 1**	**TIER 2**	**TIER 3**	**TIER 4**
Indiana	1,910	$214M	$298M	$488M	$700M
Texas	8,793	$986M	$1,373M	$2,247M	$3,225M
Florida	4,162	$442M	$612M	$988M	$1,452M
Washington	2,394	$272M	$379M	$623M	$889M
New Jersey	2,558	$281M	$391M	$636M	$921M
Louisiana	1,383	$151M	$209M	$341M	$495M

Note: Numbers established in July 2017 by PASS based on actual costs of implementing the tier continuum in the Littleton School District in Colorado.

Recently, several organizations – including the Secure Schools Alliance, Safe and Sound Schools, SIA, PASS, and Allegion – testified before the Congressional School Safety Caucus on the importance of school security and establishment of standards. Additionally, led by the Secure Schools Alliance, 12 organizations – including nonprofits representing parents, emergency responders, educators, and industry leaders – sent a letter to President Donald Trump requesting $3.5 billion in federal funding for school security, which incidentally coincides with the cost of implementing Tier 1 security nationwide. In the proposed plan, federal funds would require matches from state and local entities.

National Safe Schools Week provides an opportunity to elevate school safety standards and funding conversations in communities across the United States. Tier 1 should be the minimum standard for all school buildings, but more action is required. Hopefully, it will be a conscious decision rather than another act of violence that spurs such action.

Mark Williams is vice president of Architectural and Construction Services at Allegion Americas. His experience in the "openings" industry started in the mid-1980s. As a novice, he quickly became aware of the importance of fire and life safety codes, as well as the role his industry plays in providing secure and safe environments. By becoming a student of the codes, he eventually had the opportunity to work as a code instructor with local authorities and with architects and school staff to discuss the safety and security of education facilities. Currently, he also serves as a director for The Partner Alliance for Safer Schools (PASS), a steering committee of the Security Industry Association (SIA), and as a volunteer advisor to the Secure Schools Alliance.

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Prioritizing Life Safety While Addressing Classroom Security

By Lori Greene

As school districts across the country provide an effective level of security within budgetary constraints, dozens of new retrofit security devices are being marketed to enhance the safety and security of students and teachers. Although the price tag for some of these security methods may be attractive, there are also significant life-safety implications to consider.

Model codes include several requirements to ensure that doors serving a means of egress can be opened quickly and easily to allow building occupants to evacuate. Although most of these requirements have been in place for decades, they are sometimes overlooked based on the assumption that codes mandating free egress, fire protection, and accessibility for all should not apply during an active-assailant situation in a school.

In reality, concerns about egress, fire, and the ability for anyone to evacuate – regardless of physical disabilities, is of vital importance during any emergency. Plans for past school shootings have included fires and explosives, and evacuation is a primary component of school emergency plans. Classroom barricade devices, which are retrofit security devices designed to be installed in addition to existing door hardware, not only deter or prevent access to classrooms, they also restrict egress from these rooms.

"Today, schools face significant safety and security threats – and not just in terms of natural disasters," said Tim Eckersley, Security Industry Association (SIA) board member and Allegion's senior vice president and president of the Americas, in October 2017:

> *Our schools are "soft targets" for man-made violence, too. At the same time, the main instructional buildings of America's ~100,000 K-12 public schools are, on average, more than 40 years old. Many schools don't have updated hardware and technology that's available to protect students, teachers and administrators, at least in part because they don't have access to funding.*

Lack of funding for security measures is what makes these inexpensive devices so attractive to school officials and parents who are desperate to see this threat addressed. Unfortunately, the true cost of these devices is their impact on life safety. Active-shooter incidents have occurred where an assailant barricaded himself inside with the victims, including the shootings at Virginia Tech, the West Nickel Mines Amish School, and Platte Canyon High School. In all three situations, barricaded doors delayed access by emergency responders and may have contributed to the loss of life.

Fire Safety

Some proponents of classroom barricade devices claim that security measures should take precedence over fire safety, implying that active-shooter incidents are more common

than fires. However, the National Fire Protection Association (NFPA) reported that between 2000 and 2013, there were 1,456,500 non-residential structure fires in the United States, with 1,260 civilian deaths and 21,560 civilian injuries. For the same period, the Federal Bureau of Investigation (FBI) published statistics on active shooter incidents, counting 160 shootings resulting in 487 deaths and 557 injuries. These statistics starkly illustrate the need for continued prioritization of life safety.

In 2015, the National Association of State Fire Marshals (NASFM) published a classroom security checklist, and NASFM members approved a resolution supporting these guidelines. "The state fire marshals understand the security concerns and the need to protect schools and businesses from senseless acts of violence," said Jim Narva, executive director of NASFM, in September 2017. He continued:

> *However, some of the proposed solutions may compromise life safety, despite the manufacturers' good intentions. The NASFM guidelines for classroom security are aligned with the model codes, and underscore the importance of the requirement for new and existing classroom doors to unlatch with one operation, ensuring free and immediate egress. Classroom doors must also meet federal accessibility laws and other requirements of the building codes and fire codes.*

Code Updates

During the most recent model code development cycle, the issue of classroom security was discussed and debated at length:

- Should existing code requirements be relaxed in order to allow less expensive security devices to be installed?
- Should requirements remain as is, or should additional mandates be included in model codes?

Through the consensus process used for model code development, stakeholders from all related areas of expertise had an opportunity to take part in the decision. The Builders Hardware Manufacturers Association (BHMA) provided guidance and expertise based on decades of experience with code-compliant door openings.

Model codes adopted in most U.S. states include the International Building Code (IBC), International Fire Code (IFC), and NFPA 101 – *The Life Safety Code*. The outcome of the code development process was an overwhelming decision to maintain existing egress requirements for classroom doors, and to add an additional safety mandate. The 2018 editions of these model codes will include the following requirements for classroom doors:

- Latch(es) on egress doors must be unlatched simultaneously by one releasing operation from the egress side. Hardware used to release the latch(es) must be mounted between 34 inches and 48 inches above the floor.
- Operation of the hardware for egress must be accomplished without tight grasping, pinching, or twisting of the wrist, and without using a key, tool, special knowledge, or effort. If electrified locks are remotely engaged, they must allow free egress from the classroom side of the door.

- Locked classroom doors must be able to be unlocked from the outside with a key or other approved means, to allow access for school staff and emergency responders (this is the new requirement that was added to the 2018 model codes).
- Door closers, panic hardware, and fire exit hardware may not be modified by retrofit locking devices, and modifications to fire door assemblies must be in accordance with NFPA 80 – *Standard for Fire Doors and Other Opening Protectives*.
- The facility's emergency plan must address locking and unlocking classroom doors, and staff must be drilled in these operations.
- In addition, NFPA 101 requires the doors to be lockable from within the classroom, without opening the door.

In a January 2017 *NFPA Journal* article about proposed code changes to NFPA 101, Ron Coté, NFPA's technical services lead for life safety, wrote:

> *The classroom door locking criteria will help weed out the dangerous hardware and locking means, currently available in the marketplace, that do not provide safe egress from the classroom. A key requirement is for the presence of a feature absent in the unproven quick fixes being offered – namely, the classroom door must be capable of being unlocked and opened from outside the room via a key or other credential. This will permit staff to respond in a timely fashion to diffuse a threat within the classroom as might occur where an occupant locks the door from the inside to buy time to attack others.*

Local Jurisdictions

In a handful of states, legislators or code officials have modified state code requirements for egress in order to allow classroom barricade devices to be used in schools. In addition to lack of compliance with model codes, there are several other concerns, including the potential for devices to be used against the building occupants they were designed to protect.

As the Door Security & Safety Foundation noted in its publication on liability of classroom barricades (published in 2017 on LockDontBlock.org):

> *Storing a barricade device in a classroom makes crimes easier to carry out. When used by an unauthorized person, barricades have the significant potential to facilitate unintended consequences such as bullying, harassment, or physical violence. According to the Centers for Disease Control and Prevention (CDC) and the FBI, a member of the student body is most likely to commit violence on school grounds.*

"We understand how important safety is to the school community," said Jerry Heppes, CEO of the Foundation, in October 2017.

> *Our members design and build door openings that address a variety of scenarios. Openings can also be misused. Our industry takes that responsibility seriously. We understand what is at stake if the door opening is not equipped to handle each of those scenarios – lives can be lost.*

Another consideration is the Americans With Disabilities Act (ADA), a federal law that prohibits discrimination against people with disabilities and sets standards for accessible access and egress. Classroom doors nationwide are required to comply with the ADA, and it is unclear how states can adopt codes that are in conflict with a federal law. In a 17 July 2017 letter to the NFPA Standards Council with regard to appeals filed by representatives of a manufacturer of classroom barricade devices, Curt Decker, executive director of the National Disability Rights Network (NDRN), wrote, "The language the above-listed appeals (if successful) would reinstate is discriminatory to those with physical or visual impairments, impedes egress, and is in violation of standards and laws regarding accessibility."

Code-Compliant Security

Fortunately, numerous options for locks meet all requirements for egress, fire protection, and accessibility, while providing the necessary level of classroom security. According to the 2015 Partner Alliance for Safer Schools' Position Statement on Classroom Barricade Devices:

> *The final report of the Sandy Hook Advisory Commission (2015) includes many recommendations for school safety, including Recommendation #1 – classroom doors should be lockable from inside the classroom. The report states: "The testimony and other evidence presented to the Commission reveals that there has never been an event in which an active shooter breached a locked classroom door." There are other factors to consider, such as impact-resistance of glass adjacent to door hardware, distribution of keys to all staff including substitute teachers, methods of securing exterior doors, visitor protocols, and procedures, training, and drills.*

Many security consultants have also spoken against the use of these products. One particularly vocal opponent is Paul Timm, who is vice president of Facility Engineering Associates, a board-certified Physical Security Professional (PSP), the author of "School Security: How to Build and Strengthen a School Safety Program," and a nationally acclaimed expert in school security. He wrote the following in the May 2017 issue of Doors and Hardware:

> *As a security consultant, I want to like the classroom security aftermarket product that costs less than a classroom security lock, is made in America, is endorsed by some local authority figure, and has lots of people buzzing…. Unfortunately, that magnet, barricade, or door contraption poses more risks than it addresses.*

> *To improve classroom security, keep the doors closed and locked at all times. If you are unwilling to do that, consider purchasing classroom security locks that enable teachers to lock the door from the inside with a key.*

Whether school administrators choose to adjust security protocols incorporating existing locks, install classroom security locks, or invest in electrified locks that can be secured remotely, code-compliant solutions are available. Life safety must not be ignored in favor of lower-cost security. Robert Boyd, executive director of Secure Schools Alliance said in May 2017:

> *You don't have to sacrifice life safety for security. You don't have to destroy fire codes or violate laws that help the disabled to protect vulnerable populations. You won't save money by using inappropriate products, when affordable solutions that meet codes and laws exist. You only expose yourself to new liabilities. It is irresponsible for anyone to make it difficult to flee a hazardous situation. It is equally irresponsible to allow the use of locking devices that could be deployed as barricades by someone seeking to do harm to others. Schools house our most vulnerable population, our children, and their safety should be first.*

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Implications of the Opioid Crisis During Disaster Response

By Dawn Thomas

During disaster response, individuals suffering from opioid addiction have both similar and unique needs as compared to those suffering from other types of illness. Emergency responders need the resources to manage opioid-addicted victims of a disaster, and response teams must be appropriately staffed to meet the physical and behavioral health needs of addiction. Response personnel must coordinate closely with local public health officials and other addiction stakeholders to facilitate access to local support services.

On 10 September 2017, Hurricane Irma made landfall on Cudjoe Key, Florida, as a Category 4 storm. Irma continued onto the mainland as a Category 3 hurricane, affecting all of Florida, including the major population centers of Miami and Tampa Bay. The storm (and related incidents) killed 82 people in the state, left millions without power, and caused an estimated $50 billion in damage.

In the wake of Hurricane Irma, Florida residents (along with those from the U.S. Virgin Islands and Puerto Rico who had come to Florida to receive care) began to present at special needs shelters and medical clinics. In general, those seeking shelter came because their homes were without power (with temperatures well into the 90s), or because their homes were severely damaged or destroyed. Not surprisingly, those seeking medical care had very diverse medical needs: some came because they needed treatment and medications for chronic illness (doctor's offices and pharmacies had not reopened), while others presented with more acute sickness or injuries. Many patients had the added complexity of being in various stages of opioid addiction. Florida, one of the six states to declare a public health emergency in response to opioid addiction, was being hit particularly hard by the epidemic. In 2015, the state experienced 1,417 prescription opioid overdose deaths, second only to Ohio. During the first half of 2016, opioids killed an average of 14 Floridians a day.

The opioid crisis presented new challenges to seasoned emergency response professionals. This article highlights four of those challenges: maintaining access to key pharmaceuticals, inadequate staffing to respond appropriately, increased pressure to coordinate with local service providers, and ongoing legal and ethical deliberations.

Maintaining Access to Key Pharmaceuticals

Medical responders often go into the field with pharmaceutical caches composed to treat the majority of patients they will see, based on experience from previous disasters. However, in the case of Irma, those caches often lacked the specific medicines required to care for individuals suffering from opioid addiction. For example, federal medical responders often did not have access to naloxone, which is used to treat people suffering from an overdose. Although local emergency medical services (EMS) and law enforcement officers increasingly

have access to naloxone, supplies vary greatly from state to state, city to city, and even among different ambulance services, making this source unreliable.

Medical responders also did not have access to methadone, which is highly regulated and extremely difficult to stockpile. Although lessons learned from Hurricane Sandy demonstrated a clear need for solutions to dose addicts after a disaster, the take-home doses some methadone clinics supply (for one to three days) are inadequate for a widespread, long-term disaster response. Finally, opioid addicts often have other physical and mental health issues, and they take other medications related to those comorbidities. Disaster relief caches often lack the full range of medicines addicts might need, and substituting drugs that have similar effects as those prescribed is often inappropriate for this cohort.

Considering Staffing for Disaster Medical Teams

Medical responders in Florida believe that shelters and clinics were inadequately staffed in light of the ongoing opioid crisis. The whole community approach to disaster management means that shelters are often staffed with volunteers, who are generally not equipped to identify and deal with the medical and physical health issues (e.g., withdrawal symptoms) suffered by those with opioid addictions. In addition, responders noted a need for more behavioral health specialists certified to counsel and prescribe medication. The mental and physical health impacts of addiction result in complex patients who face more challenges in a stressful disaster environment. This situation is exacerbated when patients go without medications (both for medication-assisted treatment as well as for other chronic physical and mental health issues) for several days before being seen by care providers, and need to be reassessed to ensure that their previous medications and doses are still appropriate. Doctors and nurse practitioners then find themselves making decisions and prescribing medications without the benefit of professional training and experience in chronic addiction. Clinicians also noted that they spent large amounts of time dealing with patients' behavioral health issues, which limited the number of physical health needs they could address. Response teams that did have behavioral health specialists were able to free up other clinicians to focus on patients without addiction-related issues.

After a disaster, patients in various stages of opioid addiction make responses more complex for those tasked with treating survivors.

In addition to medical staff, law enforcement missions in shelters and clinics may have to expand if medical caches are updated to include more sought-after pharmaceuticals to treat addition.

Increasing Pressure to Coordinate With Local Service Providers

Since the extended sheltering operations after Hurricane Katrina in 2005, local, state, and federal organizations have placed additional focus on discharge planning. Shelter staff, facility owners, shelter inhabitants, and the community at large benefit when emergency sheltering missions end expeditiously. However, discharge planning is a complex operation

that external emergency responders cannot perform on their own. Returning emergency shelter inhabitants to their homes – or to another housing solution – involves a diverse set of stakeholders, including community public health officials, utility companies, shelter facility owners, and the shelter residents themselves. The opioid epidemic adds yet another layer of complexity to discharge planning. Medical responders must maintain close relationships with local public health officials to ensure that they are discharging those suffering from opioid addiction into a community where support services (e.g., methadone clinics, support groups) are open, fully staffed, and adequately supplied.

Providing Legal & Ethical Guidance to Responders

Addressing the needs of opioid addicts during disaster response has put both health professionals and policymakers in legal and ethical grey areas. Many states and localities are grappling with decisions over who can administer naloxone and how to best serve their communities given the strict regulation of methadone. It is also unclear what support state and federal governments can provide to methadone clinics to keep them open, staffed, and adequately supplied during disaster response and recovery.

As communities develop more detailed policies, it will become even more difficult for disaster responders to know the laws and regulations that affect their operating procedures. Laws are in place to protect first responders from liability during emergencies, but responders are still rightly concerned about the legal implications of providing – or not providing – appropriate medication to those in need days after the immediate threat has passed. Many responders deployed for Hurricane Irma also had ethical concerns about the medical care they provided – or could not provide – to addicts and those suffering from overdoses.

Meeting Future Medical Challenges

People involved in disaster management often repeat the mantra, "every disaster is different." Although new challenges pop up in every disaster, some challenges repeat over time. Given the current state of the opioid epidemic in the United States, medical response personnel will continue to meet challenges in providing appropriate care, and they will continue to encounter difficult legal and ethical situations. With more planning and guidance, medical personnel will be able to better support this population across the country.

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