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Volume 19, Issue 1, January 2023





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Domestic Preparedness Journal is electronically
delivered by the Texas Division of Emergency
Management, 313 E Anderson Lane Suite 300,
Austin, Texas 78752 USA; email: subscriber@domprep.com.

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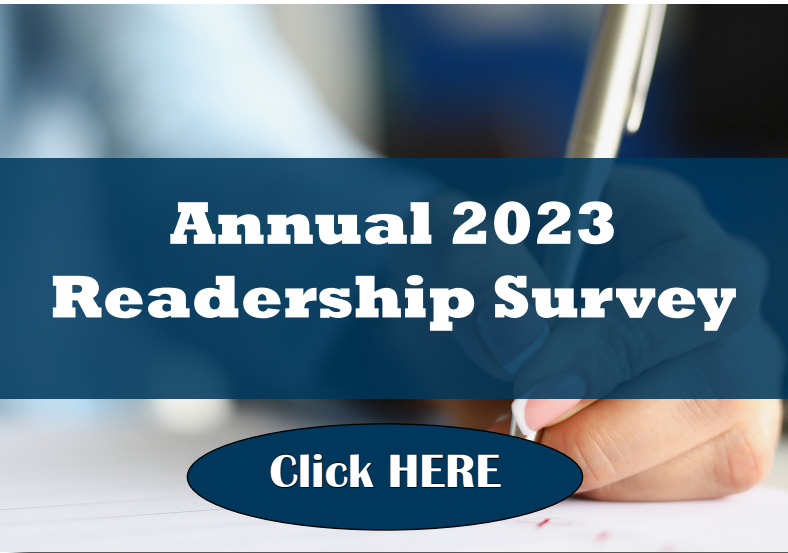
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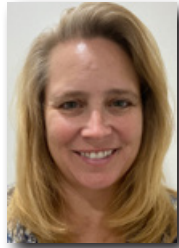
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Strong Foundations – What Every Disaster Plan Needs

By Catherine L. Feinman



The initial goal of a disaster plan should be to avoid the disaster. The secondary goal should be to respond effectively when a disaster cannot be avoided. To be clear, the *disaster* here is not a hurricane, earthquake, flood, wildfire, tornado, or even human attacker. These are simply examples of events – with the exact when and where unknown – that could lead to a disaster without careful planning and implementation. The authors in this January edition of the *Domestic Preparedness Journal* share foreword-thinking ways to avoid or mitigate disaster by building a strong foundation before the next event.

Two authors who take this topic literally share architectural design solutions for building resilience. The first describes how, with detailed community planning and structural design, her [town stood up](#) to 155 mph wind speeds and flooding with little damage (i.e., avoided disaster). The second shares a [layered approach](#) to physical security that considers the facility’s design and operation to thwart attacks.

Other authors emphasize the importance of relationship building and their impact in reducing the impact when disasters do occur. For example, the [industrial liaison](#) model facilitates accurate and timely information sharing when minutes matter during a hazardous material response. In another example, professional and personal relationships collide when a [responder becomes the evacuee](#) – providing mutual aid in the field while receiving assistance at home.

Implementing lessons learned and training are other key components for building a strong foundation. One author shares how COVID-19 and supply shortages drove the lessons learned from the [Pony Express](#) into the 21st century to get critical supplies to those in need. Meanwhile, another author takes a futuristic view of training to turn [virtual reality](#) into real-life learning.

Disaster planning is not simply a written document but is a foundation upon which to build resilient communities. Not all disasters can be avoided, but the resulting consequences can be lessened with a comprehensive plan that equips stakeholders with the right [tools](#) and resources and [mentally](#) prepares them for what to expect. Follow these authors’ examples and build a strong foundation of community resilience by designing with a resilient mindset, liaising with key stakeholders, training through different methods, understanding others’ perspectives, acting based on lessons learned, and utilizing all available tools and resources.

How One Town Stood Up to a Category 4 Storm

By Jennifer Languell



Many have said Babcock Ranch in Florida was *lucky* regarding how well it fared during [Hurricane Ian](#), which made landfall on September 28, 2022. Yes, it did feel lucky watching from the living room as the storm and devastation happened. The sliding glass doors bowed in and out, tapping the back of the chair as the wind pressures changed. But while it may feel lucky – the location, planning, design, engineering, and implementation of resilience and sustainability are all very intentional in the growing town of [Babcock Ranch](#).

Based on over 25 years of working in the green building sustainable development sector, there are three reasons builders and developers modify their traditional practices in favor of sustainable design. The first reason is regulation. The construction industry does not like the stick versus the carrot approach, but it works. The second reason is money. Increasingly, a financial partner or funding source requires green building certification or projects that help achieve investors' newly established Environmental Sustainability Goals ([ESGs](#)). If funding for a project comes from the federal, state, or local government, there is often a green building certification requirement. The third reason, which is usually a very small percentage, is corporate culture. Some corporations believe there is a business case for resilience and sustainability and are incorporating this into all aspects of their companies.

Sydney Kitson, chairman and chief executive officer of Kitson & Partners, falls in that third category. He had a remarkable vision to create a new multi-generational town that proves it is possible to develop while both protecting and improving the quality of the natural environment. The original land purchase of Babcock Ranch included approximately 91,000 acres, of which 73,000 acres were sold back to the State for permanent preservation. Under the direction of Kitson, teams of design and engineering professionals began the process of visioning and planning a sustainable new town.

The process started with research, looking at historical maps, topographical and soil maps, tree and timber surveys, land use, connectivity, wildlife, and hydrology reports of the land identifying the [natural flow ways](#). Strategically working with what nature has provided versus trying to fight what the land and water want to do is a recipe for success. Communication, partnerships, and a cross-curricular approach to the planning and design process are also fundamental to creating a sustainable design. The planners, design team, and engineers work together versus in silos, no one makes decisions in a vacuum.

From this process, a [master plan](#) evolved for the 17,000-acre new town of Babcock Ranch, which would include 19,500 residences, six million square feet of commercial space, and roughly 50,000 people. The most impacted land, areas previously used for mining rock and agriculture, are those being developed. The plan sets an additional 60% of that land aside as open green space such as preserved wetlands, uplands, [greenways](#),

lakes, parks, and wildlife corridors. Most of the land sits at an elevation of roughly [30 feet above sea level](#). Combining the elevation with the natural beauty of the land and being non-coastal, the team had a perfect canvas to create a storm-safe, resilient, and sustainable new town.

Stormwater Management

Restoring the natural flow ways and wetlands are only one component of the multi-faceted stormwater management system. Amy Wicks, P.E., the civil engineer of record, designed the innovative system that includes an interconnected lake system, created wetlands, [rain gardens](#), and [bioswales](#). Open spaces, such as parks, were designed with a lower elevation to store water in extreme events. While traditional systems may rely on berms and pipes connecting lakes in series, the system at Babcock Ranch interconnects all the lakes allowing the system to operate both in parallel and in series. The advantage of this approach is that during extreme events, if one part of the system is blocked or fails, the water can easily find an alternative path. The homes' finished floor elevations are intentionally two feet higher than the road so that if lakes were to rise past capacity, the roads provide additional storage capacity to protect the homes and buildings. Using natural and engineered systems creates the redundancy that protects the infrastructure, resulting in resilience.



Bridging silos between Nevada, Nevada National Guard, FEMA Region IX, and the CDC Foundation at the Nevada Operations Center in 2021 (Source: Fogerson).

Utility Infrastructure

Power

Partnerships play a large role in the success of the infrastructure. In partnership with Florida Power and Light ([FPL](#)), the town is powered by a solar farm that generates 150 MW. This is roughly 880 acres of land containing 680,000 photovoltaic ([PV](#)) panels, enough to power 30,000 homes. In 2017, before any residents lived at Babcock Ranch, Florida was hit by Hurricane Irma and Babcock Ranch lost power. Lessons learned from Irma resulted in hardened transmission poles (concrete), which now run the power directly from the PV array and from the grid to an FPL substation located at Babcock Ranch. From that point, transmission lines within Babcock Ranch are all underground. The PV array also consists of 10 MW of battery storage that was intentionally not discharged during Hurricane Ian. The batteries were kept charged just in case the power was needed post-storm. When the sun is not shining and the battery backup is spent, power for Babcock Ranch comes from a nearby natural gas plant via the grid. The three sources of power – PV array, battery backup, and the grid – provide the redundancy necessary to have a resilient electrical delivery system. During the team’s post-Ian debriefing, discussion included a key vulnerability – the substation. Had lightning hit the substation, Babcock Ranch would have lost power. FPL and Babcock Ranch are currently working on a second substation so that, should one fail, power can be rerouted and continue to serve the town.

Strategically working with what nature has provided versus trying to fight what the land and water want to do is a recipe for success.

Water

The Babcock Ranch water utility, Town & Country Utilities (TCU), is onsite, operating in a hardened structure at an elevation consistent with the rest of the town, which keeps it safe from flooding. With power online, the town continued to have normal water and sewer operations. The utility has also won awards for outstanding accomplishments on water reclamation – transforming wastewater into reusable water for irrigation, which is critical to the mission of creating a town that respects the environment and conserves natural resources. Treating water to potable standards also is energy intensive. By using reclaimed water, TCU is also saving energy.

Communication

In partnership with Quantum Fiber, formerly Century Link, Babcock Ranch provides 1-Gig internet speeds via a fiber optic network. Having access to the internet while in the middle of a Category 4 hurricane delivered multiple advantages. It allowed Wicks to monitor lake levels during the storm and provide real-time updates to the team. Regular communication with family members elsewhere, who were watching the devastation in

real-time, provided reassurance and hourly status updates. The ability to communicate for the Babcock Ranch team and its residents allowed the community to become a resource that ultimately provided cooked meals, showers, refuge, laundry services, internet, and power to as many as asked post-storm

The Town

Babcock Ranch is the only community-certified Platinum by the Florida Green Building Coalition (FGBC) [Green Land Development Standard](#). All homes and buildings are required to certify using the FGBC Standards. The FGBC standards are the only third-party program that is specific to a hot, humid climate and contains a disaster mitigation section. During the builder orientation, emphasis is on durability and the importance of being storm-safe, so the residents can shelter in place. Florida has a strong building code, and it works. However, these homes perform, on average, at an efficiency 25% better than [Florida Energy Code](#), and an ongoing effort to continually improve. The town has recently opened the Southwest Florida Regional Emergency Center to serve evacuees from neighboring communities. Designed and constructed under rigorous International Code Council ([ICC 500-2014](#)) requirements, the building doubles as a gym and cafeteria for the new Babcock High School when not in service as a shelter.

Landscaping is another important part of the town's sustainable design. Each home must have 75% native and drought-tolerant vegetation and 90% for common areas. The landscape is planned to mimic what is found in nature, understanding that these species have survived for hundreds of years withstanding hurricanes. Additionally, these plants can survive with minimal supplemental irrigation – providing significant water savings. For example, the Muhly grass bloomed just days after the storm as though nothing had happened.

Post-Ian Debriefing

Lessons learned are always a key component to doing better. However, having a team that not only finds the lessons learned but uses them to improve is a game changer. The Babcock Ranch team has been challenged by Syd Kitson to think about the “what ifs” (e.g., What if there was more rain? What if the winds were stronger?). The marching orders were clear: the town would not sacrifice safety, durability, resilience, or sustainability at any cost.

Jennifer Languell, Ph.D., is president and owner of Trifecta, which she founded in 2003 to help develop sustainable development and green building solutions. Her work has included the creation of award-winning high-rise, multi-family, and single-family residential projects, commercial projects, and some of the world's largest and most sustainable land developments. She has also become a trusted consultant to governments and municipalities that are rapidly moving toward more sustainable and fiscally prudent operating and management practices. Dr. Languell and Trifecta have received numerous awards from government and industry organizations such as the Urban Land Institute, National Association of Home Builders, Center for Sustainable Florida, and the Florida Green Building Coalition. She is also an award-winning author and was selected as a technical advisor and star for the Discovery Channel's environmental series Discovery “Project Earth.” She holds a bachelor's degree in Materials Science and Engineering, a master's in Civil Engineering and Construction Management, and a Ph.D. in Civil Engineering and Sustainable Construction.



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Building Design for Safety and Resilience – First Steps

By Paul Marshall



There is a need for more resilience as it applies to emergency preparedness in the design, construction, and renovation of the built environment. Conventional design of buildings by architects and engineers meets code and aligns with the owner’s or developer’s programmatic requirements. However, unless the program specifically calls for safety, security, or environmentally resilient design, these elements are not usually included as a focus in the design. This does not mean that traditionally designed buildings are not safe or cannot withstand the effects of weather or seismic instability. Given that architects and engineers are professionally responsible for the health, safety, and welfare of the general public, they are required to produce buildings that meet code. However, the current conventional design of a code-compliant commercial structure does not always require additional thought to potential threats outside the envelope of the building. Put another way, a building will be accepted as a successful building and will likely serve the owner as a good investment if it:

- Keeps the occupants cool in the summer,
- Keeps the occupants warm in the winter,
- Meets all required structural and energy codes,
- Has a properly designed exterior that keeps out the regionally appropriate weather, and
- Meets the owner’s aesthetic and programmatic requirements.

This process can be improved by including an all-hazards approach to building design that considers not only the function of the building during normal operation but also the safety of the occupants and the surrounding community by considering the possible threats to the building from any regionally specific threats.

All-Hazards Design Process

The most important step in an all-hazards approach for a resilient facility is to consult the area’s Threat and Hazard Identification and Risk Assessment (THIRA). This resource should identify all known and possible threats to consider during design. Consult the Homeland Security [Comprehensive Preparedness Guide \(CPG\) 201](#) for details on the THIRA and related information. Once the threats and hazards are identified, a stakeholder group should be assembled to include all relevant parties from the owner’s team as well as local providers such as fire, law enforcement, emergency medical services, emergency management, utility providers, and if relevant, outside agencies. By utilizing an integrated team at the outset of the design process, gaps in planning can be avoided that, if not identified, could produce catastrophic results.

Acknowledging that financial pressure is always a concern in decision-making, there must be a method to prioritize the threats and the appropriate response in design and construction. These threats are typically represented in a risk matrix from low-impact/low-frequency to high-impact/high-frequency. For example, a building designed for the Gulf Coast might classify a hurricane as a high-impact/medium-frequency event. In contrast, a nuclear power plant might classify a meltdown as a high-impact/low-frequency event. Both conditions require appropriate planning to mitigate potential impact but having the impact/frequency matrix allows for thoughtful prioritization of risk and allocation of resources.

Codes and Prescriptive Design

Although building codes have progressed a long way since their inception, they are, by nature, a retroactive measure. Building codes, historically, have been enacted in response to a failure. They have not been universally proactive despite calls for various restrictions to be put in place. Since building codes are part of a municipality's jurisdictional power and are not arbitrarily applied, there may be resistance to adopting a code that could place unnecessary financial hardship on public or private development.

By utilizing an integrated team at the outset of the design process, gaps in planning can be avoided that, if not identified, could produce catastrophic results.

An example of a new code enhancement is the requirement in recent building codes for a storm shelter in K-12 schools or similar functions. The shelter must safely hold the entire building population for a duration outlined in the code (such as 90 minutes for a tornadic event). However, a similarly vulnerable population, such as sleeping students in university residence halls, does not have the same code requirement and could potentially be viewed as a financial hardship for some owners.

CPTED

The approach to this, primarily relating to safety and security, is known as Crime Prevention Through Environmental Design (CPTED). The tactics and techniques of CPTED are beyond the scope of this article, but the four primary principles of CPTED are:

- *Natural Surveillance* – allows for visibility by legitimate occupants to their surroundings;
- *Natural Access Control* – access onto the property;
- *Territorial Reinforcement* – identifiable features to clearly designate property boundaries; and
- *Management and Maintenance* – upkeep of the property to demonstrate diligent ownership.

These principles are intended to inform the design and construction of buildings in a way that creates safe spaces. Critical attention must be given to avoid creating fortress-like buildings that are visually unappealing and uncomfortable to occupy. This same advice applies to buildings that are resilient to disaster.

Concentric Layers

Another concept from security design that applies equally to facility resilience is the principle of concentric layers of protection. Like when resisting criminal intrusion, multiple layers of damage can be inflicted by human-caused or natural disasters. The analogy of an onion is often used to describe this concept. By placing multiple layers of protection around sensitive or critical areas, these areas are shielded from threats. In relation to weather, this applies to building materials and construction methods to create sheltered spaces within these facilities. Having multiple layers eliminates the need to depend on one layer to provide total security because there is a redundant layer in case the outer layer is compromised. Suppose the design or programmatic requirement demands the reduced effectiveness of one of these layers (such as an all-glass wall looking into a large assembly space instead of a solid wall). In that case, the other combined layers of security must compensate for this shortfall to provide the same net level of protection to the occupants.

Practical Approach to Operation

Even the most effective design process in the world cannot overcome the element of human error. Daily operations of a facility must be considered to produce a facility that can be effectively and efficiently maintained in the manner intended. An example relating to school security might be the placement and operation of exterior doors relative to the HVAC system. If a building is not designed for proper humidity and temperature control,



Compilation of personal photos (Source: Paul Marshall, 2023).

daily users are likely to prop open a door to get fresh air, thereby producing a serious security vulnerability. In the case of emergency management of a building, numerous *quality-of-life* considerations must be considered for both operation and process. The following is an abbreviated list of examples:

- Establish familiar relationships with all local emergency service providers and allow them to tour the facility regularly to maintain familiarity.
- Consider a comprehensive building identification system that provides exterior signage identifying window and door locations. These should use reflective letters of sufficient height to be seen by emergency vehicles responding to the facility.
- Provide multiple locations to shut down outdoor air intakes and ventilation dampers if the THIRA shows proximity to possible sources of chemical risk like highway, rail, or industrial plant use.
- Locate outdoor air intakes out of reach of unauthorized personnel to avoid introducing toxic substances into the airstream. A rooftop location is preferred.
- Locate emergency generators, if they are part of the program, at least 25 feet from the building, parking lots, or any occupied structure. If generators cannot be separated from the public in this way, an explosion-proof enclosure may be utilized. These types of enclosures must not allow unauthorized personnel to enter them or hide contraband out of sight within the enclosure.
- Ensure that appropriate public address capability is provided throughout the facility to complement the fire alarm system. If possible, consider multiple means of mass communication for all facility and grounds occupants, regardless of whether they are assigned users. Geofencing for emergency SMS messaging may be considered.
- Ensure that the facility has adequate shelter-in-place capacity for the maximum occupant capacity. The event duration must be identified and considered when determining the space needed. For example, standing room is sufficient for most emergencies, but shelter-in-place for longer-duration events such as a hurricane may demand more square footage.
- Identify if the facility needs backup power to maintain functional operation. A warehouse has very different power requirements than a hospital, for example.
- Conduct proactive maintenance and functional checks of all critical systems.

Blast Resistive Design Strategies

Although blast damage would typically be seen as a high-impact/low-frequency event, some building uses may make them a credible target for terrorist activity. If so, the Federal Emergency Management Agency's Risk Management Series Primer for Design of Commercial Buildings to Mitigate Terrorist Attacks ([FEMA 427](#)) should be consulted

for detailed considerations of blast resistive design strategies. The exterior shape of the building can have significant effects on the ability to withstand explosive forces as well as high winds and airborne projectiles. Whenever possible, locate buildings with a setback from uncontrolled vehicle thoroughfares to minimize risk from vehicle ingress.

Conclusion

Although descriptions of the above concepts and strategies for an all-hazards design process are not an exhaustive coverage of the topic, they illustrate the strategic view necessary to produce more resilient facilities.

Paul Marshall is a licensed architect, Eagle Scout, and former United States Marine. He has been actively involved in the design and construction of secure and resilient facilities for over 20 years. He has designed facilities and consulted for multiple defense contracting corporations, the Department of Defense, and other federal agencies. Since 2011, he has specialized in higher education architecture and facilities. He is a graduate of the FEMA basic academy and is in the 2023 cohort of the National Emergency Management Advanced Academy (NEMAA). As part of NEMAA, he is currently researching the intersection between facility design and construction, resiliency strategies, and public administration.



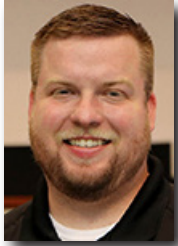
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Benefits of Industrial Liaisons – A Harris County Example

By Jamie Hannan



Make friends before you need them” summarizes the guiding principles behind the Harris County Office of Homeland Security & Emergency Management’s (HCOHSEM) Industrial Liaison Program, where private industry and local government work together to keep the residents of Harris County, Texas, safe. This program and its resulting relationships have proven invaluable through industrial and devastating natural disasters, including Hurricane Ike (2008), Hurricane Harvey (2017), and the February 2021 Winter Storm.

For some context, [Harris County](#) is the third largest county in the United States by population, with over [4.7 million](#) residents. This is larger than the population of [26 states](#) and covers an area of [1,777 square miles](#), larger than Rhode Island. Harris County is home to 34 cities, including Houston, the largest U.S. port for international exports and one of the world’s largest petrochemical and industrial complexes. These factors make it important for officials at various levels of government, industry partners, and community stakeholders to work together to keep everyone safe.

Reason for Having an Industrial Liaison

In the late 1990s and early 2000s, the frequency of industrial incidents such as explosions, flaring, and chemical releases affecting communities near petrochemical plants in Harris County revealed gaps in communication between the chemical industry, local governments, elected officials, and the communities surrounding the plants due to the lack of a cohesive communications plan. At the time, notifications of incidents came through calls to 911 or faxes as was standard at the time. That notification process led to delays in communication to jurisdictions outside of the original 911 service area. In addition, the non-standardized forms took time for the receivers to realize where something was occurring and how it could impact the community. The nature of chemical releases and impacts by weather made it critical that stakeholders in surrounding communities outside of the initial area knew about potential impacts. Industry leaders realized that maintaining the status quo was not an option, so they came together to find a solution to streamline communications and information sharing.

The East Harris County Manufacturers Association (EHCMA), which includes over 130 manufacturing companies in Harris County and the surrounding area, created a task force in 2003 to address the concerns. EHCMA worked with its members, community stakeholders, and local government to determine the best way to fill the identified communication gaps. Ultimately, the task force decided a position should be created within

the county government to work closely with industry. The Harris County Commissioners' Court created the industrial liaison position in 2004 as part of the HCOHSEM with a mandate to build better relationships with local industry and expand communications networks during incidents.

The responsibilities of the industrial liaison include joining Local Emergency Planning Committees (LEPCs) and making the county government aware of issues and concerns these groups discuss. Additional responsibilities include representing the county at the regional, state, and federal levels when necessary and coordinating response and planning on a regional basis.

The Implementation Process

The initial implementation in 2004 was met with hesitation from key partners in the industry and community. Despite having 25 years of experience from a previous career in the chemical industry and as a firefighter, the new industrial liaison found partners were not yet ready to embrace the concept. A major noted obstacle involved information sharing with a government official. Trust and respect had to be built and earned through continued engagement in steady-state conditions and response experience in times of crisis.



The industrial liaison provided the HCOHSEM On-Call with situation reports and the Harris County Sheriff's Office and Harris County Pollution Control with initial information on chemicals involved in the fire. In addition, the liaison supported unified command with the shelter-in-place recommendation and obtaining a Temporary Flight Restriction over the incident to allow the Environmental Protection Agency's Airborne Spectral Photometric Environmental Collection Technology plane airspace to fly an air-monitoring grid (*Source: HCOHSEM, April 2, 2019*).



HCOHSEM industrial liaison supports the USCG Multi-Agency Type I Federal Response to a ship collision at the Texas City Y in Galveston, Texas. With the largest port in the nation closed to imports and exports, the industrial liaison provided real-time status updates to the County Judge's office and industrial partners (Source: HCOHSEM, March 27, 2014).

As time progressed, the industrial liaison became a key member of the Channel Industries Mutual Aid ([CIMA](#)) organization, considered one of the world's largest industrial mutual aid organizations based on the hundreds of participants, resources, and personnel from member companies and government organizations. He also became a liaison to all Harris County LEPCs, working with community members, EMCs, city leaders, industry members, and federal and state government partners to partake in drills and exercises to help the community plan and prepare for events that may occur.

In 2008, the relationships established through the Harris County area LEPCs and various drills proved their worth. Early in the year, an incident at a petrochemical facility allowed the industrial liaison to support the industry and the community, demonstrating the county's partnership during a crisis. Having completed trainings with personnel from that specific facility weeks prior, he was familiar with the facility's personnel, and they trusted him to join the command structure.

He used his contacts with various government agencies like the FBI to inform them that the incident was not a terrorist incident, which was an immediate concern in the years following the September 11, 2001, attacks. He also provided a crucial role in communication with the community, surrounding jurisdictions, and other stakeholders to provide situational awareness, allowing the facility's staff to focus on response.

After this incident, one in which the benefits of the partnership were highlighted, word spread among industry members that working with the industrial liaison and HCOHSEM was a benefit to them and their work outside of the fence line or outside of their property. Doors began to open, and partnerships expanded.

Growth of the Relationship

The year 2008 was also significant for Houston and Harris County due to the impacts of Hurricane Ike. The storm surge, winds, and utility outages greatly affected the industrial complexes close to the Port of Houston and Ship Channel. At the time of its impact, [Hurricane Ike](#) was the third costliest U.S. hurricane on record, with Harris County having an estimated \$4.64 billion in damages, more than 230,000 damaged homes, [7,100 damaged businesses](#), 2.2 million customers without power, and 280 shelters established. These impacts came from 12-15 feet of storm surge, 110 mph winds at landfall, and 8-11 hours of tropical storm force winds.

The industrial liaison worked with local, state, and federal partners to assist in coordinating response and recovery to the storm across multiple jurisdictions. Partners across sectors needed support and a conduit to response and recovery information sharing, which the industrial liaison was able to provide. The liaison helped coordinate bringing plants back online after Ike to ensure the systems providing critical utilities to plants were not overloaded as they were after Hurricane Rita in 2005, when there was no systematic approach to restarting them. His work at the Houston Ship Channel included communicating with utility companies to prioritize repair work and service to critical plants and notifying utilities of downed lines and other infrastructure that was blocking roadways and rail service.

Since 2008, the industrial liaison role has facilitated communication during many incidents and evolved from response-focused to preparedness and planning.

Federal partners also appreciated the coordination provided by the industrial liaison. In 2008, the United States Coast Guard (USCG) decided to provide office space for the industrial liaison within their newly re-formed USCG Planning and Partner Agencies Division at their Sector Houston-Galveston location in Houston, Texas.

Since 2008, the industrial liaison has assisted in facilitating communication during many incidents and evolved from a role with a response focus to one of preparedness and planning through work with [LEPCs](#), Community Advisory Councils (CACs), EHCMA, CIMA, USCG, and others. Integration of local committees, advisory councils, and industry groups has allowed Harris County to have a regular presence in the facilities' emergency operations centers.

In a 2017 memo, Mary Jane Naquin, one of the CAC facilitators who works closely with the industrial liaison, shared the following with HCOHSEM and Harris County leadership regarding the value of the industrial liaison program:

The IL [industrial liaison] knows who's who, where's where, and what's what, which eases the tension that results for a mix of cities, elected officials, authorities and citizens who lack this broad knowledge. The IL does, and uses it to effect! The IL, at least this one, has developed a rapport across East Harris County, and I am sure, in the organizations and agencies he engages with in the county. The familiarity and presence that the IL has developed among his peers and colleagues is a value that can't be measured. He is generous with his time and energy, and is patient with those who need his assistance in any situation.

In the eyes of EHCMA and some Department of Homeland Security partners, the liaison program is a unique partnership between industry and local government. EHCMA's recognition of this has led them to include literature and information about the liaison program in their messaging to new plant managers as they come into the region. They found that most, if not all, who are new to the area have not worked in partnership with local government in this manner.

Building for the Future

After an incident in Deer Park in 2019, where a tank farm caught fire, resulting in a coordinated regional response and significant national attention, Harris County commissioned a [gap analysis](#) to thoroughly review the county's response to the incident. The analysis determined the county needed a more robust presence in the



The industrial liaison supported Intercontinental Terminals Co. LLC with emergency communications and provided initial information on chemicals involved in the fire and situation reports to the HCOHSEM On-Call, Harris County Sheriff's Office, Harris County Fire Marshal, Harris County Pollution Control, Cities of Deer Park, La Porte, Pasadena, Baytown, and Jacinto City. Several days after the fire was suppressed, the industrial liaison joined unified command as the local on-scene coordinator (Source: HCOHSEM, March 17, 2019).

private sector. The Commissioner's Court responded by creating a second industrial liaison position, with both liaisons reporting to a newly created operations supervisor position at HCOHSEM.

The increased investment added another layer of experience and expertise to HCOHSEM and increased the capacity for relationship-building with industrial partners. Those hired to fill the new positions brought decades of experience in emergency response, including significant experience with petrochemical manufacturing and hazardous materials handling.

During incidents of any type, the expanded Operations Section hosts briefings and calls for industry partners to ensure all parties have an awareness of the current situation as well as insight into what to expect next. Private and government partners also lean on HCOHSEM's industrial liaisons to acquire information and coordinate resources to ensure the safety and continuity of operations at facilities. As one example, liaisons were able to work with government partners to clear roads during Winter Storm Uri to ensure industrial partners and other partners had the supplies and materials needed to keep their facilities safe and operable.

With the [largest network](#) of petrochemical manufacturers in the United States, Harris County's exposure to risk from industrial accidents is extensive. HCOHSEM has created a track record of successful cooperation that has improved emergency communication and response by proactively building relationships between industry and government. For example, a real-time electronic notification system alerts responders, elected leaders, and community members of incidents that occur and actions that may be needed. The addition of a second liaison by the Harris County Commissioners Court indicates the success and necessity of the program.

Key Takeaway

Not all communities have large industrial complexes like Harris County. However, most, if not all, have some business or critical infrastructure that is important to the community and could have detrimental effects on the economy and people residing in the area. The key to the success of this program is forming and nurturing relationships between local government and critical industries or businesses to help ensure accurate and timely information is given to those who need it.

A community may not have the resources or frequency of incidents that necessitate a newly formed or dedicated position. Still, most might consider identifying at least one key person to get on the ground at the scene of an incident. This person would provide timely and accurate information to emergency managers and leaders so they can make the best possible decisions without delay in receiving information.

Jamie Hannan, MAT, MPP, is the Innovation Research Analyst for the Harris County Office of Homeland Security and Emergency Management (HCOHSEM) in Harris County, TX. He joined the team in 2021 after working for a decade in the non-profit and education sectors. In his role at HCOHSEM, he works across sections to highlight best practices and innovative processes, serves as a policy analyst, and acts as a liaison to Commissioners Court, the local governing body for Harris County. He holds a Bachelor of Arts in History and Master of Arts in Teaching from Austin College in Sherman, TX, and a Master of Public Policy from the University of Houston.

Beachie Creek Fire – A Practitioner’s Firsthand Account

By Charles (Chuck) Perino



Emergency managers are resilient, clear-headed, serene, and strong – except when they are not.... The summer of 2020 was hot and dry in the Northwestern United States. Fire crews had been battling fires throughout Oregon for most of the summer. About 40 miles from home, the [Beachie Creek Fire](#) smoldered and grew slowly during the final weeks of August. The fire was spotted on August 16, 2020, in the Opal Creek Wilderness Area as it gradually became a blaze, likely caused by a lightning strike from a storm several weeks earlier. Due to the remote area of the fire, the U.S. Forest Service attacked the fire aggressively using helicopters and hot shot teams that hiked 4 hours over rugged terrain to reach the fire. Aircraft equipped to combat wildfires were unavailable at that time as crews across the region simultaneously fought fires at other locations.

Under a long-term management strategy to oversee its control, the fire did not grow beyond 15 acres until August 23 – seven days after it was initially spotted. After that day, it slowly grew until Labor Day Weekend but was still under the control of the [incident management team](#). For most fires in the Northwest, this is the beginning of the end of the danger. However, Western Oregon was exceptionally dry. Following are the personal logs of an emergency manager during the wildfire evacuations in Oregon in 2020.

Labor Day Weekend, 2020

As the emergency manager of Albany, Oregon, some 70 miles from Beachie Creek, I forwarded the National Weather Service’s Critical Fire Weather Warning to the City Departments and Community Partners before leaving the office that Friday, September 4 (19 days after the fire was initially spotted). That summer, I distributed over a dozen weather warnings for heat and dry conditions to these departments and partners. This one seemed no different than any others passed along that summer. Personally, it was a great Labor Day holiday weekend. Sure, it was hot and dry, but some cool-water recreational paddleboarding with my son, barbecuing with friends, and relaxing were welcome experiences that helped ease the stressors of the seemingly never-ending response to COVID-19. The National Weather Service issued an extreme fire weather warning for Sunday, September 6 (21 days after it was initially spotted), with low humidity and a rare, strong easterly wind.

September 7, 7:00 P.M. – “Dad, it sure is windy.”

After playing some basketball in the driveway, poorly on my part, my son and I eerily watched the backboard sway in the wind. The weed fabric I had failed to cover in bark mulch that summer flapped like a torn flag against a decorative rock on the walkway to the house. Being prepared, resilient, cautionary, and, let’s face it, paranoid, we laid the basketball hoop on the ground in the yard, so it would not blow over on the car – mitigation in action. The wind continued to blow as we went inside, and everyone tried to enjoy the last few hours of the long weekend with a delicious dinner and a movie.

The previously manageable Beachie Creek fire grew exponentially as the hot, dry winds continued throughout the day. Oregonians who face fire every summer thought we *understood* the threat. Like others in the Santiam Canyon where we lived, my family was well outside the fire's location, so we assumed this would not be a problem in the next seven hours.

September 7, 10:00 P.M. – “I’m worried.”

As I was getting ready for bed, my wife was concerned. She had been scouring Facebook all night and was getting reports of fire from her friends who lived further up the canyon (closer to Beachie Creek). There were no evacuation warnings yet, and not even notices to prepare for evacuation. Besides, the fire is 40 miles away, so there is no need to worry. I am the expert, after all, so I went to bed full of barbeque and beer and tired from days of recreation. What a great weekend! As the night progressed, easterly winds whipped through the Santiam River Canyon, with the fire spreading and overtaking small towns 30+ miles to the east of our home, such as Idanha, the recreational community of Detroit Lake, and Gates continuing westward and being funneled and concentrated by the canyon. As I slept, those communities evacuated hastily. Tragically, some people did not make it out at all.

September 8, 2:00 A.M. – “Get up. We are leaving NOW.”

My wife entered the bedroom, flipping the lights on and waking me up. She is the hero of this story. She continued to worry, monitor, and pack up essentials. When she woke me, she heard from the adjacent county that they were being evacuated. As we loaded the car, the sky was a hellish orange, and smoke kept us from seeing across the street. We heard neighbors packing and getting things together. We woke the kids and got the dogs loaded into the two vehicles.

September 8, 2:15 A.M. – “Where is the dang cat!?”

We ran through the house, grabbing what seemed necessary – food, water, toys for the kids, photos, computer, anything we could grab in 10 minutes. My son asked me where the cat was, “Dang, the cat!” Luckily and likely cashing in one of his lives, he was inside, so I grabbed the cat, put him in the box we turned into a carrier, and we were off. Looking at the house was hard, not knowing if we would return. We followed an endless line of taillights westward. Despite the chaos of that night, I was amazed at the efficiency of the evacuation. The volunteer firefighters, some dressed in shorts, sandals, and helmets, guided my neighbors onto the highway. I cannot imagine the stress they must have felt as their own families left that night. By this point, the fire had engulfed the town of Detroit and continued down the canyon. Mill City was mostly spared, but areas to the north of the city were devastated. The fire continued heading toward Lyons, now 10 or so miles away.

September 8, 2:55 A.M. – “Don’t worry, boys. I will see you guys soon. You are safe here.”

Friends, who lived about 20 miles from our town, opened their home to my wife, kids, and one dog that night. We all were already coughing and suffering from the smoke. I left them there and went to work. There wasn’t enough room at their house for another dog,

a cat, and me. Plus, even though the City of Albany wasn't affected by the fires, I knew there would be a lot of work to support the county's response. I never actually asked my boss (the fire chief) if I could stay at the station. However, like it or not, Chief, I would live at Station 11 with the animals for almost eight days.



View from Albany at 10:00 a.m. on September 8, 2020, as the fire turned sky orange from 40 miles away (Source: Perino, 2020).

September 9-15 – “Have you guys heard anything?”

We stopped hearing the status of the fire and concrete information on our home after the evacuation during the ongoing effort to fight and slow the fires. My wife and kids were cared for wonderfully by our friends. My wife would get bits of information on our house and started to look at our insurance policy, just in case. All the time, half my brain was focused on my home, was it still standing? Tons of misinformation and rumors flowed during those chaotic days, fueled by people on social media. For example, misinformation on the fire destroying “landmarks” such as the Gingerbread House restaurant made us fear the worst. In addition, there was looting of evacuated homes, with dozens of thefts occurring in that period. One firefighter at our station's house was looted three days after the evacuation. We, of course, feared the worse.

Albany had fire crews involved in the response since the night of the evacuation. On September 10, one of those crews drove by our house and sent me a picture. Our house was still there. My position afforded me peace of mind that my neighbors would not receive until days later. The homes in our neighborhood survived. Slowly, firefighting efforts were gaining control and reversing the gains of the fire, which came within a quarter mile of our home.



First photo confirmation from an Albany firefighter that the house was smoky but safe (Source: Perino, 2020).

Firefighters continued struggling with the fire. The winds had died down, but the heat and dryness continued. My days were filled with helping the Albany Fire Department support the county’s sheltering operations at the Linn County Fairgrounds. I worked with homeless shelters to support that population, keeping them healthy and safe from the oppressive smoke but also being careful of COVID-19 spreading through that community. Later, I helped the county with damage assessments. The dog never left my side. He was terrified. We both needed each other that week. I was happy to have him with me. The dang cat had no problem at all. In fact, he enjoyed his time at the fire station.



September 15 – Home at last

The [Beachie Creek Fire](#), driven by those devilish winds, ended up burning nearly 200,000 acres. Flames from the fire left five neighbors further up the canyon dead, took thousands of homes, businesses, and structures, and had a net economic impact of [\\$5.9 billion](#). The communities of Detroit, Idanha, and Gates were largely destroyed and forever changed by that night. Scars remain on the landscape and in the Santiam Canyon residents’ hearts.

The dog “Diesel” wanted to share a cot at the fire station (Source: Perino, 2020).



“Lost” sign found in the ruins of a burned home in the Santiam Canyon (*Source: Perino, 2020*).

Lessons Learned

The unexpected change in that massive Beachie Creek Fire provided many lessons learned for someone trained to respond to disaster who suddenly found himself fleeing from it. Since that night, we have kept our vital documents together and are ready to go at a moment’s notice. The State of Oregon, having learned from the evacuation and warning challenges, has enacted a statewide warning system to ensure that residents are aware of emergencies. We now ensure everyone is signed up (including on the kids’ phones, work phones, emails, etc.) to restore these truly lifesaving messages. Lastly, we now have a family plan, what we will do if we are separated the next time something like this occurs, a plan for where we will go, how we will communicate, and how we will reunite.

These primary lessons are not new, but they take on a new perspective when the disaster responder becomes the one impacted by the disaster:

- The control, management, and coordination of an incident are fragile. Being personally affected by an event makes even an experienced emergency planner, manager, or responder much less capable than if their family were not at the center of the disaster. Understand that being impacted by the disaster will affect work performance, and that is okay. Fortunately, in this case, my job and department only served in a support role to the county. Be aware that personal concern over the family’s well-being will preoccupy thoughts and affect actions. Have a solid supporting cast, robust partnerships, and good people to lean on.
- Information is the primary need of people impacted in this situation – some acknowledgment that they are paying a considerable price and are

in an awful time and place. Take a moment to acknowledge that, ensure they know the response's status, and let them know what is happening in the event. They seek leadership and hope, even if the news is terrible for their neighborhoods.

- Linn County could stand up, manage, and handle evacuees, pets, and farm animals in this disaster. The staff put together an effective ad-hoc response in a short time. Look at jurisdictional plans for evacuation and sheltering, get to know them, spread the word to neighbors, and be ready to help.
- Like many other communities hit by disasters, the community came together and did not let the disaster pull it apart. "Santiam Strong" signs and banners were placed in the ashy ground, and a sense of defiance to rebuild was born. Capitalize on this desire to come together and use it to promote recovery efforts, develop community-based plans to deal with the next disaster, and develop an effective volunteer force.
- And know where the dang cat is.



The cat "The General" had no trouble relaxing at the fire station (Source: Perino, 2020).

Charles (Chuck) Perino is the emergency manager and safety officer for the City of Albany, Oregon. He has worked in Oregon land use and emergency management planning for over 20 years. He graduated from the Naval Postgraduate School with a master's degree in Homeland Defense and Security in 2014 and earned his Certified Emergency Manager (CEM) accreditation in 2022.

The Pony Express Rides Again

By Monty Dozier



In the early days of the COVID-19 pandemic, health care providers and facilities, local jurisdictions, and state agencies struggled to acquire personal protective equipment (PPE), such as masks, gloves, gowns, and hand sanitizers, for their patients and staff. Supplies of these items were extremely low and getting them shipped proved difficult when they were found. This supply shortage set the stage for the State of Texas and agencies that serve in times of need to devise an unconventional plan to locate, secure, and deliver PPE across Texas to those in need.

The plan centered on resurrecting a modern version of the mid-1800s Pony Express, where horses and riders moved mail across the United States to way stations that received and stored the mail. The new plan used pilots and drivers to move PPE and other medical supplies across Texas via trucks, pickups, and aircraft to warehouses. The plan involved agency personnel from the following state agencies Texas Division of Emergency Management (TDEM), Texas Emergency Medical Task Force, Texas A&M Engineering Extension Service, Texas Department of Public Safety, Texas Military Department, Texas Wing of the Civil Air Patrol, Texas Parks and Wildlife Department, and Texas A&M AgriLife Extension Service (ALEXT).

This modern Pony Express was built on the premise of TDEM securing PPE from vendors across the U.S. and other countries, with a central delivery point established at a TDEM warehouse in San Antonio. Once at the warehouse, TDEM worked with the state partner agencies mentioned above to sort and prepare orders – consisting of a variety of PPE, ventilators, and therapeutics such as remdesivir – to ship to awaiting hospitals, doctors’ offices, long-term care facilities, educational institutions, retirement homes, dental offices, local jurisdictions, and state agency offices. Orders were submitted via the State of Texas Assistance Request process. Then, a team of the Pony Express agencies serving at the alternate State Operations Center assigned them to the nearest regional staging area. The Pony Express aircraft, trucks, and pickups handled movement from the TDEM warehouse to the appropriate regional staging area and, finally, to the requesting entity. ALEXT ensured that deliveries reached their destinations as the state strived to protect the health of its citizens as COVID-19 ravaged Texas. The following sections focus on ALEXT’s efforts.

Phase 1 – Setup for Emergency Operations

During the first week of April 2020, ALEXT began deploying Pony Express drivers to each of the 10 regional staging areas across Texas. These staging areas were established



A Texas A&M AgriLife Extension County Extension Agent from Val Verde County is one of over 150 AgriLife Extension personnel who secured vaccines for delivery across Texas from aircraft such as helicopters of the Texas Military Department as part of the Texas Pony Express (*Source: Emily Grant, 2020*).

in National Guard Armories, fire stations, or warehouses in El Paso, Midland, Lubbock, Dallas, Tyler, Lufkin, Houston, San Antonio, Corpus Christi, and McAllen. From these locations, PPE and other supplies received from the TDEM San Antonio warehouse were packaged and made ready for pickup directly from a regional staging area or for delivery by an ALEXT Pony Express driver to the jurisdiction or entity making the State of Texas Assistance Request. Deliveries were made around the clock and seven days a week. Holidays did not deter the delivery of PPE and medical equipment by the Pony Express. Such dedication allowed for the continuous flow of much-needed medical supplies and PPE across Texas to those in need. ALEXT Pony Express drivers and warehouse support team members built out 74,596 bundles or pallets of PPE, cleaning supplies, sanitizers, or vaccine ancillary kits while making an additional 16,533 deliveries of supplies to a wide variety of hospitals, medical clinics, dentist offices, nursing homes, schools, child care providers, long-term care facilities, and local and state governmental offices.

As the pandemic evolved and new coronavirus variants emerged, the Pony Express's mission also evolved. When the State of Texas began to operate testing stations, the Pony Express was tagged with additional cargo to ship across Texas. ALEXT drivers began

meeting aircraft flying test samples packed in ice coolers from various testing locations across Texas to deliver to one of several COVID-19 testing laboratories in Houston, Galveston, San Antonio, Austin, and Dallas. ALEXT drivers would secure samples from an airfield near these laboratory testing locations and ferry them to the laboratories for processing. Such deliveries required speed and efficiency to ensure samples were received and analyzed within the approved time window. By ensuring strict transportation standards were followed, nearly 4,000 COVID-19 samples were tested, and results were shared with test subjects as efficiently as possible.

Phase 2 – Maintenance and Interagency Support

At the start of 2021, the Pony Express mission made another shift. Onsite and additional disposable testing kits were introduced along with large drive-through testing locations in the state's larger metropolitan areas. These testing sites, along with those established at primary and secondary schools, chambers of commerce, local and state governmental agencies, nursing homes, and university campuses, had to receive steady shipments of testing kits to meet the demand. Having demonstrated their ability to keep the supply chain flowing, ALEXT drivers filled the bed of their trucks and pickups with testing kits



Asa Jillson (on the right), Texas A&M AgriLife Extension Disaster Assessment and Recovery agent, along with a Civil Air Patrol pilot, give a thumbs up for the successful hand-off of COVID-19 testing samples during a Pony Express run to a testing laboratory in Houston (Source: Asa Jillson, 2020).

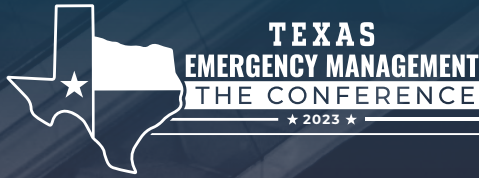
and made their deliveries. The drivers continued to ride their circuits until the mission ended. Their efforts ensured over 4.2 million tests arrived at their destinations and reduced COVID-19 exposures to health care workers, students, teachers, first responders, local and state officials, business owners, long-term caregivers, and the public.

Finally, as vaccines against COVID-19 were developed and began to bear fruit in the form of [vaccinations against COVID-19](#) and its various strains, the Pony Express and its ALEXT drivers mounted their trusted steeds with ultra-cold portable freezers to race vaccines across Texas. Vaccine deliveries were made to local health care clinics, long-term care facilities, and mass walk-in and drive-through vaccination clinics around the Lone Star State. ALEXT drivers loaded with Moderna, Pfizer, and Johnson and Johnson vaccine vials for health care workers to place in the arms of Texans to help tide the COVID-19 spread. As the dust cleared across the trails, ALEXT Pony Express drivers delivered 1.04 million vaccine doses. In addition to vaccines, these same drivers delivered 2,522 doses of therapeutics to treat individuals suffering from COVID-19. Economists with the [ALEXT have estimated the impact](#) of the support provided by over 150 ALEXT personnel to the Pony Express reduced COVID-19-related hospitalizations by 6,500, \$75 million in reduced hospitalization costs, and 1,100 avoided deaths.

In the early days of the pandemic, when everyone struggled to acquire personal protective equipment, one state created a modern version of the Pony Express.

As COVID-19 cases decreased and infection rates slowed across Texas, AgriLife Extension's support of the Pony Express ended on June 30, 2022. The 21st-century version of the Pony Express outlasted the original by over eight months. Much like their 1800s counterparts, with drivers pushed to their limits and mounts being "[rode hard and put up wet](#)," most, if not all, would agree that the protection of fellow Texans and having a small role in returning loved ones to their families were well worth every minute and every mile spent in the saddle.

Monty Dozier, Ph.D., is in his 39th year of service with the Texas A&M AgriLife Extension Service. During his career, he has served as a county extension agent in four counties, as an extension specialist in conservation and water, as well as the Southeast Region program leader and special assistant to the Rebuild Texas Commission following Hurricane Harvey. He currently leads the AgriLife Extension Disaster Assessment and Recovery Unit. This unit works with the Texas Division of Emergency Management and other response and recovery agencies to enhance Texas' ability to prepare for, respond to, and recover from a variety of disasters. During his time with AgriLife Extension, he has received many awards, including the AgriLife Extension Superior Service Award and the Texas A&M University System Regents Fellow Award. He is a second lieutenant in the George H. W. Bush Composite Squadron of the Civil Air Patrol, where he serves as the squadron's emergency services officer. In addition, he serves as a leader for the Robertson County 4-H program and as a deacon of the First Baptist Church of Franklin.



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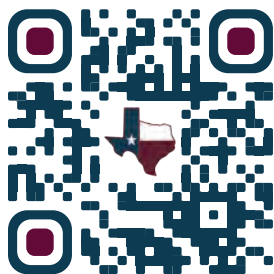
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Virtual Reality Training Revolution Is Here

By Peter Johnson



The *click-through, good-enough* training, ubiquitous in many organizations, is not good enough anymore. A [Harvard Business Review](#) article titled “[Where Companies Go Wrong with Learning and Development](#)” (L&D) discovered that only 12% of employees applied training from L&D programs to their work. The same article explains that hundreds of billions of dollars are spent annually on these training programs that offer little meaningful results. With honest reflection from those within leadership, management, public safety, emergency response, and threat mitigation positions would admit most of the training has not been working. The next generation of training is already here, and there is significant evidence that it will change training standards across industries.

Aligning Adult Learning and Virtual Reality

Virtual reality (VR) and augmented reality (AR) technology are often used in the social media [metaverse](#), a virtual world shared by many users. However, early adopters are discovering the benefits of VR/AR for training purposes. VR training allows individuals to practice and develop skills to respond to real-life situations in a simulated, safe environment. One major advantage of VR training is the time it saves. Traditional training methods can be time-consuming, requiring people to travel to a training location and spend hours in a classroom. VR training, on the other hand, can be done from anywhere at any time and typically takes less overall training time. This time savings leads to cost savings, as it reduces the need for travel expenses and lost productivity due to time away from work.

More important than cost savings alone, VR training effectively improves skills and knowledge when conducting safety-focused training. Research highlighting the benefits of VR training was published in an article by [Education Sciences](#) in 2021, “Establishment of Virtual-Reality Based Safety Education and Training Systems for Safety Engagement.” The researcher concluded, “from a cognitive perspective, VR-based safety education can increase learning outcomes because it is more advantageous for acquiring knowledge.” These findings on the benefits of VR training are echoed across cultures, economies, and industries.

In an ever-changing world, the ability to uptake knowledge faster will be one of the keys to providing meaningful threat mitigation, which is accomplished by using the [Adult Learning Theory](#) developed by Malcolm Knowles. He emphasizes the importance of self-realization and experiential learning in adult-focused education. The theory suggests that adults are more motivated to learn when they see the relevance and value of the material to their own lives. This concept of self-realization should intuitively resonate with educators, leaders, and public safety alike.



Combining the benefits of VR training with the Adult Learning Theory training principles can be conducted with the trainee's internal motivation at the core. VR training is, by nature, hands-on and interactive, which creates an ideal environment for adults to practice and apply their skills while allowing them to take an active role in their own learning. VR training can effectively engage and motivate adult learners by allowing learners to self-direct their learning and connect to their own experiences. VR technological advances have placed the tools necessary to develop, deploy, and engage meaningful training at a previously unseen scale.

Closing Staffing and Liability Gaps

The conversation becomes even clearer when analyzing the need for next-generation training from a staffing and business perspective. Finding qualified candidates for even entry-level positions has been a relatively constant challenge. When candidates are willing to do good work, the balancing act of investing in training versus retaining current employees remains omnipresent within an organization. On the one hand, there is concern about pouring money into training an employee that will leave. On the other hand, a valid concern of not training employees and risking significant ramifications is present.

As with active shooter/threat training, most organizations cannot or will not invest a few hundred dollars for an in-person quality course, historically leaving these same organizations with a *good enough* training option. With the advent of VR training,

however, organizations can now provide faster and better training at a fraction of the price compared to traditional in-person training courses. These courses can also be perfectly repeatable, like a video game being played countless times after development.

Lastly, liability is an ongoing concern. In the worst-case scenario of an active threat attack, an organization's training can be audited to ensure it was conducted and that the team members learned the material enough to claim the organization acted reasonably to mitigate the recognizable hazard. Advancements in VR make it possible to prove what someone learned in training. With the continuing development of VR immersive environments and leveraging nearly endless data points to capture (e.g., eye movement, facial expression, observational focus, reaction time, etc.), organizations can determine what training worked and, by contrast, which fell short of the training objectives. With these systems in place, teams can respond to legal or Freedom of Information requests with confidence in their training standards.

It is easy for anyone to get lost in the noise of the news cycles and forget the human element behind what the public safety and emergency response community is committed to protecting. The author was reminded of this concept while conducting an interview regarding VR in Tampa, Florida, with [Channel 8 WFLA](#). The host, Gayle Guyardo, recounted how her two daughters were recently in an active shooter lockdown situation at their school. As Guyardo described the terrifying feelings from her daughters' frantic text messages and the ensuing rush of parents approaching the school, one could not help but see why the profession of protecting others is so critical. Thankfully for Guyardo and her family, this incident was resolved without anyone getting hurt. However, leaders and practitioners must look beyond the status quo to seek meaningful training solutions for the people who count on them. These training opportunities expand well beyond active shooter/threat training, including emergency management, medical response, search and rescue, "red teaming" exercises, and more. VR technology is already reshaping the training landscape, and it is time to lean into the next generation of training.

More important than cost savings alone, virtual reality training effectively improves skills and knowledge when conducting safety-focused training.

[Peter Johnson's](#) experience has been gained from military, law enforcement, and federal counter-terrorism while serving in the Federal Air Marshal Service. Now an entrepreneur, he has grown a successful national training company that trains police departments, SWAT teams, corporations, and non-profits in active threat response/mitigation along with terrorist planning cycle disruption through his company [Archway Defense](#). He continues to conduct public speaking on workplace violence along with threat mitigation for organizations around the country. Since 2019, he co-founded a VR Development company, [Deep Attic](#), and leads curriculum development of their [disruption technology platform](#) for active threat and security training.

Crisis Standards of Care – A Mental Health Perspective

By James L. Greenstone



Crisis standards of care and sufficiency of care are topics of great controversy and debate in [professional circles](#). The reasons may be obvious to most. Traditionally, health care responders are trained and held to the standard of care of their profession when rendering aid. Nothing less is acceptable. The public understands this and demands this high level of care, even under disaster conditions. Medical and allied professionals experience stress when they cannot deliver high-level care and may subsequently fear liability exposure and litigation.

A True Story and Its Related Issues

After an intensive disaster medical deployment following a major hurricane, an experienced trauma nurse found it necessary to come in and talk about what she had encountered. Her feelings were intense. She explained, “I had an 85-year-old woman who needed intensive care with a ventilator. No ventilators were available nor likely to be. I did what I could do. In my hospital emergency room, I would have had everything I needed, and she would still be alive today. There, the best that I could do for this woman was to hold her hand while she died. How will I ever live with myself?”

Disasters and mass casualty incidents pose a counter-testimony to the training that most health care professionals receive. With overwhelming numbers of victims and supplies that can never be adequate under such circumstances, the care mandated must be first aimed at those who can benefit the most from it. Additionally, it must reach the greatest numbers possible of such victims. However, all possible care cannot be rendered for every disaster victim. Certainly, it cannot be rendered to those who will not survive even with such care. These are less-than-ideal circumstances, and health care professionals must be prepared to provide this less-than-ideal care when necessary. In so doing, survival potential may be enhanced for those with the greatest opportunity to survive. This is not advocacy for not giving the best care possible to all affected. Instead, it suggests that professionals must respond realistically to the crisis or disaster situation under which they may find themselves working.

Points to Consider

Usual standards of care may not be possible within a disaster or crisis scenario. Therefore, professionals must carefully understand the application of sufficient care, as the standard is likely to shift from standard of care to sufficiency of care as dictated by the actual circumstances. Adjusting one’s mindset to this eventuality may be the hardest part of this dynamic.

Recognize that people will die, then recognize it again at the gut or feelings level. Sufficiency of care may need to be and is expected to be the “standard of care” under most



Tsunami victims receive medical attention from U.S. Navy Medical personnel and aid workers at Sultan Iskandar Muda Air Force Base in Banda Aceh, Indonesia (Source: U.S. Navy, Mate 3rd Class Benjamin D. Glass, January 5, 2005).

disaster situations. If the circumstances are better, that is great, but do not expect them to be. Mentally plan for this as well – emotionally and intellectually. Discuss the concept pre-incident with other practitioners. Then remind each other during the actual crisis.

Health care professionals will provide the usual standard of care when possible. At the same time, that standard of care may not be possible. Although this dilemma needs to be worked out internally before being deployed, few people are currently trained to allow for feelings about this predicament and resistance to it, for example:

- Discourage blaming others;
- Resist self-blame; and
- Seek professional help early to resolve difficult issues as the need for assistance arises.

Remember that, in disasters, needs outweigh resources. Therefore, the available resources must provide the greatest good for the greatest number of people who can benefit from them. In addition, not all suffering can be eliminated. Some people will suffer despite health professionals' best efforts. Since critical resources must be allocated to those having the best chance of benefiting from them, health care responders often must make crisis decisions using their best professional judgments. Complexities include helping the greatest number of people by providing what is currently available while

resisting the guilt of knowing that more would be available under normal circumstances. Here are some additional points to consider:

- Document all decisions made and secure a witness to the documentation.
- Learn how to manage and comfort those who will die because helping them die with dignity is an important aspect of caring for them.
- Prepare to surrender the standard when necessary and provide care that is at least sufficient under the existing circumstances. Allow this to be *okay* because the totality of the circumstances prevents the ability to provide a higher level of care, not a lack of personal knowledge and skill.
- Understand protections afforded by laws that shield health professionals from liability exposure and criminal and civil litigation.
- Learn to accept limits, which include circumstantial and personal limitations. The ability to do this may vary from culture to culture. Reflect on unique cultures and what it says about handling limitations. “Expect the moral traces of remorse as you think about your experience. Sometimes it presents as a ‘twinge’ when you remember what happened and what you did or were not able to do.” (D. Isch, Personal Communications, May 8, 2006)



At Dobbins Air Force Base, Dr. Steedman A. Sarbah and other Veterans Administration personnel from Georgia and South Carolina provide triage services to New Orleans evacuees upon arrival by Delta flight (Source: George Armstrong/FEMA, September 4, 2005).

The goal for each health care responder is not to *get over* what they feel, which is an impossible task. Instead, the realistic goal is to *get past* what has happened and what is felt and find ways to get on with life both professionally and personally. Health professionals try to teach this to victims, but they also need to learn it to help themselves.

Conclusions

Life is precious and must always be regarded as such. Dealing with life and death decisions is critical to what health care responders do. Disasters or crises often offer a counter-testimony to what these responders want to do and are normally bound to do. Nothing must be examined more carefully and with greater understanding and empathy than the decisions to depart from the standards of care to which all health care providers subscribe so faithfully. Yet, those decisions may face each person involved in realistic crisis care. The recent pandemic has taught many lessons and forced those in the healing and helping professions to examine the unexaminable, and even unthinkable, in non-pandemic times. These lessons are applicable now and will always be part of all that is done in the name of patient care:

For health care professionals, accepting a sufficient standard of care during a crisis may involve the most difficult decisions they must make.

- Understand that disaster work is difficult because health care providers may not be able to provide the same level of care that they are accustomed to doing.
- Realize that this disconnect causes a risk of psychological trauma and possibly longstanding stress or mental health issues.
- Seek help to discover potential ways to resolve role concerns in the circumstances.
- Remember that the goal is to do the greatest good for the greatest number of people who can in fact benefit from the services rendered in these tough/unprecedented situations.

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Applications for a Newly Developed Risk and Resilience Tool

By Christina Nunez, Kyle Pfeiffer & Rao Kotamarthi



By the mid-century, many parts of the United States will experience longer summers with more [extreme heat](#) events. While swelteringly hot days are uncomfortable, they can become dangerous for some households, particularly those without air conditioning. Intense heat,

stronger storms, extended droughts – climate change poses a formidable list of hazards for communities across the country in the coming decades. The need to plan for these risks is clear: More resilient systems prevent deaths, improve health outcomes, and minimize losses from damaged infrastructure. However, bridging the gap between global climate trends and targeted resilience measures is not necessarily straightforward.

Data That Drives the Decision-Making Process

A new, publicly available tool, the Climate Risk and Resilience Portal ([ClimRR](#)), provides a window into how future climate realities could affect U.S. cities and towns. Planners and decision-makers can get map-based analyses driven by peer-reviewed climate data using the free portal. The U.S. Department of Energy’s (DOE) Argonne National Laboratory developed this tool with funding from telecommunications company AT&T and the U.S. Federal Emergency Management Agency (FEMA).

ClimRR transforms complex, large climate datasets into local reports that non-technical audiences can understand and apply for numerous purposes. In global computer climate models, a single point represents 100 square kilometers (62 square miles) or more. At that coarse resolution, it is very hard to look at extremes in precipitation or winds, for example, that occur on smaller scales. Infrastructure decisions also require information about evolving climate trends at spatial scales, typically tens of kilometers.

The tool also can zoom in to plots as small as 12 square kilometers (7.5 square miles), and the Argonne team plans to provide even finer spatial resolutions within the next couple of years. Currently, users can analyze climate variables, including average temperatures, precipitation, wind speed, and degree days – a measure of heating and cooling needs. Next year, the portal will incorporate inland and coastal flooding, drought, and wildfire projections.

The need for a new tool emerged from 2017’s brutal hurricane season. Hurricanes Harvey, Irma, and Maria, among other climate-driven events, made it the [costliest year to date](#) for U.S. disasters. With valuable infrastructure and connectivity for millions of

people at stake, AT&T recognized that fortifying its own network would not matter if, for example, the electric grid powering its communication towers went down. “Resiliency can’t be built in a vacuum,” said Charlene Lake, chief sustainability officer and SVP-Corporate Social Responsibility at AT&T, when ClimRR [was announced](#) in November 2022. “Our world is interdependent. We want other organizations and communities to see where they’re potentially vulnerable to climate change and take steps to become resilient.” AT&T commissioned Argonne’s [Center for Climate Resilience and Decision Science](#) to aid its adaptation efforts, and the project began.

An Integrated Tool That Opens New Possibilities

Though public climate datasets exist, few organizations have the expertise and computing power to use them at regional or local scales. Argonne scientists used a method called [dynamical downscaling](#) to integrate regional forecasting with global climate models. An alternate approach, statistical downscaling, bases future predictions on historical climate and weather data. Dynamical downscaling bolsters this process with the same one used to generate weather forecasts, allowing for stronger estimates and a broader range of climate variables.

Argonne’s Center for Climate Resilience and Decision Science is modeling the [atmospheric physics](#). More people do not do this because the computational load is immense, but Argonne has some of the most powerful



computers in the world. Using the Argonne Leadership Computing Facility, a DOE Office of Science user facility, researchers first validated the ClimRR model by *backcasting*, or having it predict conditions in the past and comparing those predictions with the historical record. This allowed the team to see where the model predictions were closer to real-world observations and where they did not match so that the team could develop confidence in the model calculations. They then used the model to project average conditions from 2045 to 2054 under different greenhouse gas emissions scenarios.

Climate projections in ClimRR can be overlaid with community and infrastructure information from FEMA’s Resilience Analysis and Planning Tool ([RAPT](#)). The combination illuminates local-scale climate risks in the context of existing communities, such as the location of vulnerable populations and critical infrastructure.

In Philadelphia, Pennsylvania, for example, ClimRR predicts average annual temperatures will be about 3.5 to 4 degrees Fahrenheit higher, depending on emissions

trends. As outlined in a sample [use case](#), users can overlay socioeconomic information on the heat map. Planners can see where there are high numbers of people who might be disproportionately affected by extreme heat, such as those over age 65. The data can also be exported to other geospatial analysis systems and combined with other data layers, such as whether homes have air conditioning or where more of the population might have trouble getting to cooling centers based on car ownership and walking distance.

This new, publicly available tool transforms complex climate data into local reports that non-technical people can understand.

This new tool offers many other analysis opportunities nationwide. For example, tribal and Alaska native communities could use ClimRR to examine how temperature changes pose [risks to natural resources](#). The introduction of wildfire and flood data in 2023 will open new possibilities for emergency response agencies to allot resources and prepare for worst-case scenarios.

Beyond the ClimRR, organizations interested in working with Argonne to safeguard their current infrastructure and make more informed decisions about future infrastructure should visit www.anl.gov/partners.

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