DomPrep Journal

Proengin

AP4C

SIMPLE   **FAST**   **VERSATILE**

Chemical weapons & NTAs   HAZMAT & Homemade agents

Quick response   Accurate & Precise

www.proengin.com

Advertisers in This Issue:

Featured in This Issue

Pictured on the Cover: Source: ©iStock.com/egdigital

TELEDYNE
FLIR
Everywhere**you**look™

WE'VE GOT YOUR BACK. LITERALLY.

high sensitivity detection is now able to fit in a simple backpack.

The identiFINDER R700 Backpack Radiation Detector (BRD) offers a hands-free capability for broad-area radiological search and monitoring missions. The identiFINDER R700 provides the user all that is required to successfully perform wide-area searches quickly, efficiently and confidently. Providing the ultimate versatility, the identiFINDER R700 can be placed for stationary monitoring at makeshift checkpoints, fence-line monitoring, and other temporary screening locations. When coupled with radiation monitoring software, the identiFINDER R700 can be used as a fixed-site monitoring tool.

LEARN MORE AT FLIR.COM/R700

Safety: Protecting Communities
From Dangers & Risks

By Catherine L. Feinman

The word safety is commonly used in the workplace and sounds good when it is tacked onto other words or used in phrases – for example, public safety, safety officer, safety lock, safety culture, safety goggles, and various slogans like "safety first," just to name a few. However, the true meaning of the word should not get lost in such casual terms used in daily routines.
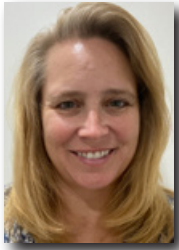
When defining the word *safety*, various dictionaries describe it as a state, condition, or place of avoiding, being safe or protected from, or being unlikely to cause danger, risk, or injury. With that definition, achieving a culture of safety in the workplace let alone in entire communities is daunting. Even with the best plans, procedures, and equipment in place, not all dangers and risks can be avoided. However, there are uncountably more dangers if efforts are not made with safety being the primary goal.

On November 5, a crowd broke through barricades at a music festival, killing 10 and injuring hundreds more. On November 21, a vehicle plowed through a holiday parade, killing at least 5 and injuring dozens more. Investigations are ongoing for these incidents, but it is not too soon to start learning from them to help prevent similar tragedies. To avoid inherent dangers of not protecting events, any special event should involve extensive safety and security planning that includes all key stakeholders – event planners or organizers, venue leadership, security officers, performers, and anyone else who has a responsibility to keep attendees safe.

Some risks and hazards are common within a community, whereas others are rare or unexpected. A challenge that many preparedness professionals face when urging community leaders to institute safety programs and initiatives to mitigate threats and reduce costs to life, health, and property is not being able to convince them their predicted events will someday happen. As a result, unheeded warnings can turn into "unimaginable" destruction. Pandemic preparedness and the use of quarantine procedures is just one example of a lost opportunity that should now be revisited – before the next pandemic.

In addition to planning for disasters and gaining stakeholder buy in, there are many tools and resources that can be incorporated into the process to help promote safety, especially for frontline workers. Human-machine teaming is one example that is currently being conceptualized and developed by scientists and engineers. With safety and security as priorities, such innovation could help better protect officers in the field and the communities they serve.

The November edition of the *Domestic Preparedness Journal* embraces the true meaning of safety by urging preparedness professional to take steps toward actually being safe and protecting others from anticipated risks and hazards. It is not good enough to just have a safety and security plan. The plan must also have buy-in and resources to implement the plan. The task may be daunting, but safety is worth the effort.

The Dangers of Not Protecting
The "3Ps" During Events

By Kole (KC) Campbell

On 5 November 2021, an apparent crowd crush at the Astroworld music festival in Houston, Texas resulted in <u>ten deaths</u> and untold injuries. While the criminal investigation is in its early stages at the time of this article, the music festival undoubtedly represents some failures of safety and security planning and execution. The death count and reported injuries are too high to be the normal cost of holding events. Disturbing videos from the event, in addition to statements from concert goers and first responders, belie assertions that initial observations by subject matter experts are impossible until the completion of the investigation. The events at Astroworld are a reminder of the need to "protect the 3Ps" at concerts and special events, and the fact that these activities must be balanced.

Safety and security at concerts and special events are complex affairs, and stakeholders include promoters, tour managers, technician crews, venue operators, performers, the performers' security team if applicable, security management and guards, law enforcement personnel, the fire department, regulatory officials, and medical personnel. These entities must plan, prepare, execute, coordinate, and effectively <u>communicate among themselves</u> to best protect the 3Ps:

- Protect the Pocketbook
- Protect the Patrons
- Protect the Performers

These 3Ps provide a framework through which to categorize best practices and view lessons learned from disasters and near-disasters at events. Although protecting the 3Ps might seem like common sense, history – and the recent events at Astroworld – provides many fatal examples of failures to protect one or more of these 3Ps.

Protect the Pocketbook

Most concerts and special events are held to make money. Even charity event organizers need to use proceeds from ticket sales to support their causes. Hence, organizers of all types of events try to deny access to the people who are neither ticket holders nor invited guests. At Astroworld, fans breached or attempted to breach perimeter gates and fences of the concert venue (NRG Park) at least 17 times before and after 10 a.m. when the gates were opened, according to a <u>Houston Fire Department (HFD) log</u> and videos posted to social media.

These breaches included a 2 p.m. crowd rush at the VIP entrance. <u>One video shows at least 300 people</u> breaching this entrance. According to press reporting, the price of a general admission ticket, including fees, was <u>$365</u> (VIP tickets sold for $725 and $1,000 excluding fees). Thus, in two minutes, that breach of the VIP gate cost event organizers

a minimum of $109,500. The HFD log also notes that, by 5 p.m., NRG command reported that 3,000 to 5,000 people were "not scanned." Based on the $365 ticket price, this equates to between $1.1 million and $1.8 million in lost revenue. These losses do not include possible merchandise theft; security at the merchandise area was compromised for roughly a half-hour according to the HFD log.

Inadequate attempts to protect the pocketbook can lead to injuries or death, which can in turn hurt the pocketbook – or at least that of the event organizer's insurer. In 2014, a security guard for the Ultra music festival in Miami sued the organizers for $10 million after she was trampled and seriously injured by fence crashers. The police department claims it had recommended better fencing to the festival's organizers prior to the festival.

Protect the Patrons

Failure to protect the pocketbook can result in failure to protect the patrons. The failure to protect patrons has historically been the most consequential of the 3Ps. In 2014, the insurance company for the Ultra music festival in Miami paid $400,000 to a man who was beaten by off-duty Miami police officers in their roles as security guards for the festival in 2011. Inadequate perimeter security can also lead to trespasser injury. At the 2021 Astroworld in Houston, an HFD log entry records four individuals needing medical attention two minutes after a 9:23 a.m. breach of the secondary checkpoint (gates did not open until 10 a.m.). Likewise, at 3:21 p.m., police also request medical assistance at the same lot

> *Protecting the pocketbook, the patrons, and the performers are the necessary goals for every concert and special event. These efforts must be well-balanced.*

where they requested assistance because of a large group attempting to go over a fence. Fortunately, more people were not seriously injured in the numerous security breaches and bum-rushing.

Additionally, security guards can be seen shoving some gatecrashers. These were instinctive but ill-advised attempts to mitigate the mayhem, but they risked injuring these trespassers. If they were injured by security guards, they could attempt to sue event organizers and or the security company. Thus, the failure to protect the pocketbook because of inadequate or inappropriate security at the VIP gate could have resulted in additional hits on the pocketbook through lawsuits by patrons or trespassers.

Overzealous protection of the pocketbook can also negatively affect the protection of patrons and can precipitate a disaster. In January 2017 in Playa del Carmen, Mexico, drug cartel gunmen entered the Blue Parrot nightclub on the last night of a music festival and opened fire. One of the only exits was at the rear of the club, which sat on the beach. The gate was not only locked, but its height prevented many patrons from scaling it to escape to the beach. Five people died – including an 18-year-old American woman who was trampled to death – and 17 were injured. Even worse tragedy met patrons in a 2004

nightclub fire in Buenos Aires, Argentina. In addition to lacking basic safety measures such as fire extinguishers, working emergency exits, and non-flammable walls, the club's doors were locked to deny access to people without tickets. Almost 200 patrons died and at least 1,400 were injured.

Protecting the patrons also requires that security personnel protect patrons from themselves. An example is a venue or event that prohibits *crowd surfing*. Security personnel might mark the hand of violators with a permanent marker as a warning. A second violation could result in expulsion from the venue. Some barricades also protect patrons from themselves, potentially mitigating against disaster. A best practice is to use a T-shaped barricade in front of the stage, which divides the patrons, reducing lateral forces that can cause people to fall. Someone trained in crowd dynamics should also be located at the front of the crowd to identify precursors to or actual disasters.

Mother Nature poses an additional hazard to patrons. In August 2011, 12 patrons at performances in two countries – the Indianapolis State Fair and the Pukkelpop music festival in Hasselt, Belgium – were killed by sudden storms that caused equipment to collapse. In Belarus in 1999, over 50 people leaving a concert were killed by trampling when the crowd rushed into a metro station to escape a thunderstorm. Protecting the patrons includes an awareness of an event's natural hazards, sound planning for those hazards, as well as complying with code and permitting requirements.

As mentioned, all major events need an adequate number of readily available medical personnel. By 4 p.m. at the Astroworld concert, ParaDocs (the medical provider) had treated 54 patients, according to the HFD log. Other mass-casualty incidents, such as the attack on the Boston Marathon in 2013, have shown that bystanders with medical training can provide critical assistance. There is a good reason to have at least some security personnel trained in cardio-pulmonary resuscitation (CPR), and at least a few of them trained as emergency medical responders (EMR, formerly known as medical response technician). Each state has its own certification requirements for EMR or its equivalent. In Texas, the rough equivalent of the EMR is the Emergency Care Attendant certification.

The Manchester Arena Inquiry, which is investigating the May 2017 terrorist attack at the Ariana Grande concert in England that killed 22, concluded in its Volume 1 report that it would be beneficial if employees with a "Protect Duty" were "trained in first aid relevant to injuries of the type caused during the Attack on 22nd May 2017." In October 2021 the Security Industry Authority's (SIA), which regulates the U.K.'s private security industry, added first aid training to its licensing requirements for some security guards.

Protect the Performer

Protecting the performer is arguably the security role most noticeable to the public. The primary purpose of security guards around the stage is to protect the performers (in addition to protecting patrons at the front of the crowd who need assistance). Depending on the professionalism of the performer's security team, a significant portion of protecting

the performer workload occurs prior to the start of the concert. For example, a meeting between the performer's security team and venue management (including the venue's security leadership) and conducting a security advance of the venue are best practices. The latter includes ensuring the security team is familiar with and comfortable with the areas to be inhabited and paths to be traveled by the artists or speakers.

A good advance avoids a myopic focus on only threats from fans or other people. For example, the stage might have hazards that are not clearly visible in the darkness of a performance, such as gaps or holes. In addition, elements on or off the stage might not structurally support all elements of a performer's whims or performance, whether rehearsed or not. These hazards can be mitigated by changes to the stage or briefing the performer(s) on the hazard. As with patrons' deaths and injuries from storms, performers can also succumb to accidents from these natural hazards. In December 2017 in Brazil, a DJ performing at a music festival was killed when strong winds toppled a steel structure on the stage.

Risk Intelligence

Risk intelligence is vital in protecting the 3Ps. Although intelligence cannot predict the future, it can provide assessments of likely scenarios or developments. These assessments should include a risk assessment, including weather and patron behavior.

For example, it is reasonable to expect that 80% of the time meteorologists can accurately forecast the weather for an event seven days away. For an event that starts in five days, the meteorologists can forecast the weather approximately 90% of the time. Since event operations/security plans are often completed well before these timeframes, the risk intelligence function should update the weather forecast in the days leading up to, *and also during,* the event. This risk intelligence function, like all intelligence functions, should be performed by the appropriate *professionals*.

At the fatal August 2011 Indianapolis State Fair mentioned above, officials reportedly received weather updates directly from the National Weather service. Patrons were never evacuated. However, 15 miles north of the State Fair, 6,700 patrons at a performance by the Indianapolis Symphony Orchestra were evacuated and the concert was canceled, based on organizers' consultations with the National Weather Service and a private weather company. Event organizers should be aware of the difference "between *consumer-grade* and *business-grade* weather." As such, the event operations plan for the 2021 Astroworld notes that a "WeatherOps meteorologist" will conduct weather monitoring for the event.

Risk intelligence for events also includes analysis of the performer's, festival's, and venue's previous events. At Astroworld in 2019, hundreds of fans stampeded into the venue after barricades collapsed and the gates fell to the ground. Almost two weeks before the Astroworld tragedy on 5 November 2021, rapper Playboi Carti's concert at NRG Stadium was canceled after fans bypassed security and knocked down metal detectors.

©iStock.com/egdigital

Patrons, performers, venue employees, and security guards alike have become victims when event planners have failed to adequately protect the 3Ps at concerts and special events. These three goals require the right balance, detailed planning and preparation, and professional execution. The tools available to event planners are many – including risk assessments, risk intelligence, crowd models, professional services, and experts – as are the fatalities, injuries, and financial costs when protecting the 3Ps is haphazard and marred by negligence and mismanagement.

Additional Significant Disasters at Concerts and Performances

- November 1942, Boston, Massachusetts: Over 490 people died in a fire at the Cocoanut Grove nightclub – the deadliest nightclub fire in U.S. history.

- July 1944, Hartford, Connecticut: 170 patrons died in a Ringling Brothers and Barnum and Bailey circus fire.

- May 1977, Southgate, Kentucky: A fire at the Beverly Hills Supper Club erupted as patrons waited for a performance by singer John Davidson, killing 164.

- December 1979, Cincinnati, Ohio: 11 people were killed during a crush before a concert by British rock band The Who.

- June 2000, Roskilde, Denmark: Nine patrons died from a crowd crush during the Pearl Jam's performance at the Roskilde Festival.

- January 2001, Sydney, Australia: A 16-year-old patron was crushed in a mosh pit during a performance by the band Limp Bizkit at the Big Day Out music festival. She died of a heart attack five days later.

- February 2003, West Warwick, Rhode Island: During a performance by 1980s rock band Great White, 100 people died and more than 200 were injured in the Station nightclub fire caused by stage pyrotechnics.

- December 2004, Columbus, Ohio: At the Alrosa Villa nightclub, a fan shot and killed four people, including former Pantera guitarist "Dimebag" Darrell Abbott and three other people during a show by Damageplan, Abbott's latest band.

- January 2009, Bangkok, Thailand: 67 people died and more than 100 were injured in the Santika Club nightclub fire during New Year celebrations and a performance by the band called Burn. Pyrotechnics started the blaze.

- July 2010, Duisburg, Germany: 21 people died and more than 500 were injured in a crowd crush at the Love Parade electronic dance music festival.

- January 2013, Santa Maria, Brazil: Pyrotechnics caused a fire during a band performance at the Kiss nightclub, leading to 242 deaths and 168 injuries.

- July 2014, Conakry, Guinea: At a rap concert on a beach to celebrate the end of the holy Muslim month of Ramadan, 33 people died as they tried to leave through a small gate, creating a stampede.

- November 2015, Paris, France: 90 patrons were killed when ISIS members attacked the Bataclan concert hall, where American rock group Eagles of Death Metal was playing. The attack was part of a complex, coordinated terrorist attack that included a soccer stadium, bars and restaurants.

- 2016, Oakland, California: 36 people died when they attended a concert in a former warehouse that had been converted into an artist collective with living space named the Ghost Ship.

- October 2017, Las Vegas, Nevada: A gunman opened fire into the crowd from the 32nd floor of the Mandalay Bay Resort and Casino, killing 58 and injuring more than 850. It ranks as one of the deadliest mass shootings in U.S. history.

K. Campbell, CBCP, CPP® is a security and intelligence professional with experience and training in intelligence; risk, threat, and vulnerability assessments; security management; and business continuity. He is a Certified Protection Professional (CPP), board certified in security management by ASIS International. He has also earned his Certified Business Continuity Professional (CBCP) certificate from DRI International. During his prior career as a U.S. military intelligence officer, his responsibilities included classified and protective intelligence operations; counter-WMD and counterterrorism recommendations; and war and contingency planning. He has led highly sensitive intelligence planning efforts against Iran and North Korea. He has also led security risk assessments for the U.S. government and for private industry. He has training in threat assessment (violence risk) with various structured professional judgment tools. He has presented twice (on concert and special event security, and on red teaming the security risks to the 2020 Olympics) at the Global Security Exchange, the 20,000-attendee flagship conference for the international security industry. He obtained a Master of Arts degree in global risk from Johns Hopkins University's School of Advanced International Studies, a Master of Arts degree in military operational art and science from the Air Command & Staff College at the U.S. Air Force's Air University, and a Bachelor of Arts degree in political science from Virginia Tech.

Cassandra's Curse: Disasters Revisited

By Rodney Andreasen

The study of Greek mythology can provide examples of failure to heed the call of emergency management specialists and experts. The story of Cassandra is an illustration of this warning. To win her favor, the Greek god Apollo gave her power to predict the future. However, once she received the gift, she refused further advances, angering Apollo. In retaliation, he cursed her with an additional power of an inability to convince anyone the predictions were true. For emergency managers and other related agencies, Cassandra has come to represent the challenges faced when trying to convince others that predicted events will happen.

Many case studies and incidents are witness to the challenges of predicting disasters. For those required to develop planning and preparedness actions for future events, many are discounted or even ridiculed. However, many of those predictions have come true. Incidents such 9/11 as well as Hurricanes Katrina and Michael are recent examples of predicted incidents that, at some point, were ignored. In many cases, there was a simple belief that it had never happened before, so it will not happen now. The resulting destructive impact from these disasters became a sobering reality that the improbable event had become probable.

Unimaginable Events

In 2001, the attacks of 9/11 provided a clear picture of the "failure of imagination" to stop these events. The 9/11 Report provides a comprehensive picture of what should have been done as well as a road map for the future regardless of the method of attack or nature of incident. The 2001 Phoenix Memo produced by the Federal Bureau of Investigation in Arizona and the 2001 Presidential Daily Brief produced by the Central Intelligence Agency provide a backward look into what might have been a warning of what was to come. Before that, though, a 1968 article in the *New York Times* called The Mountains Come to Manhattan, along with the accompanying photo in the article, paints a chilling reminder of why warnings from experts need to be heard. The article raised concerns for navigation issues and possible flight diversions while landing at the nearby airport – a significance that was not realized until 9/11.

In 2004, the Hurricane Pam exercise demonstrated the destructive potential of a hurricane hitting the New Orleans area. Whether any of the recommendations were taken seriously or not, the results of the exercise paralleled the damage and destruction that marked the 2005 Hurricane Katrina. Although the storm was destructive in its impact, the fact that warnings had been voiced by specialists in this area prior to the storm continues to raise questions. A case in point was that of Ivor van Heerdon, the deputy director of the Louisiana State University (LSU) Hurricane Center. Reports indicate that, since 2001, he and his team had warned that models indicated the extent of destruction that would follow a significant hurricane. In 2005, those predictions came true.

In 2018, a similar event would take place that would forever change the landscape of the Florida Gulf Coast, as well as the interior of the Florida Panhandle. Hurricane Michael made landfall in Panama City moving northeast in a destructive path. The destruction would impact the area for years to come and forever change the belief that it could not happen here. This belief had been developing for years as other storms impacted the area to a lesser degree.

Source: U.S. Dept. of Housing and Urban Development (2018).

Unthinkable Destruction

In 1985, Hurricane Kate made landfall in Mexico Beach, Florida as a Category 2 storm moving northeast through the Florida Gulf Coast area. With the greatest impacts to the east, the storm had minor effect on the area west of the storm. This set the stage for the belief that such a storm could not impact the interior of the Panhandle area as it was too far inland. Numerous misses by other threatening storms through the years would only exacerbate this belief.

In 2004, Hurricane Ivan, would again strengthen the belief that the interiors of the Florida Panhandle would be immune to such a storm. Emergency management personnel briefed that the storm could impact the interior and requested the authority to take actions needed to prepare for such impacts. As the event unfolded, Hurricane Ivan began its turn to the west away from the area. As such, there was a general belief that the area would not be impacted except from what was termed *a little wind and rain*. No major concern existed.

Again, emergency management personnel warned that was not the case and a danger existed from other threats such as heavy rain, strong winds, and severe tornadoes. Adding to the danger was the fact that no hurricane or tornado shelters were presently available. A suggestion was made by individuals outside the emergency management chain of command that the Jackson County should use a local call center building for housing those evacuating their homes. It was termed a *strong building*, but emergency management personnel strongly recommended against this action as the facility was not rated for hurricane or tornado sheltering. As such, emergency management personnel, under a local state of emergency, issued evacuation orders for low-lying areas, as well as those living in mobile home trailers and manufactured homes.

> *The resulting destructive impact from disasters like 9/11 and Hurricane Michael became a sobering reality that improbable events had become probable.*

Approximately a day later, a strong EF2 tornado, spawn from Hurricane Ivan, traversed the county causing a large amount of destruction in its path. Several trailer parks and housing subdivisions, as well as the local federal prison, were impacted. The call center building that had been identified as a possible hurricane shelter took a direct hit from the tornado. Half of the facility collapsed, and debris (comprising glass and metal) was blown throughout the other half of the building with such force that exterior walls and windows were blown out. If the call center had been used as a shelter, it likely would have resulted in serious injuries and deaths to those in it. Calhoun County to the south was not as fortunate – four were killed by tornadoes from the same system.

Before and for the many years after Hurricane Ivan, local emergency management officials repeatedly warned of the potential impact of a strong Category 2 or weak Category 3 storm making landfall in the Panama City, Florida area then moving northeast through the Florida Panhandle. It was only a matter of time. The destruction from such a storm was still unthinkable to local citizens. After Hurricanes Kate and Ivan, it was generally thought that the county, which lay 40 miles from the coast, would not be impacted because the land mass between the county and the Gulf (called the Sand Hills) would impede such a storm.

On 10 October 2018, the *unthinkable* storm occurred. Even as the storm moved northeast and closer to the Panama City area as indicated by the hurricane models, many still believed the land mass would prevent a major impact to the interior counties. That belief was so strong that, when some of the government offices closed, personnel were told they would be closed for only two days. However, on that date, the storm that had been predicted all those years prior did not come ashore as a Category 2 or 3 hurricane, but as a Category 5 hurricane with winds of 160 mph tracking along the exact predicted

path warned about for 17 years. The system entered the interior county of Jackson County, 40 miles to the northeast, with reported winds of near 102 mph or higher – near major hurricane status (other reports place the winds near 140 mph). An after-action report stated that the main city in Jackson County had 400 buildings and structures destroyed, another 600 sustained major damage. The impacts of that storm can still be seen today, with recovery efforts ongoing.

Heeding the Warnings

The experiences and, more importantly, warnings from these events can be applied to preparedness efforts today. Throughout the ranks of first responders, there are "Cassandras" whose predictions have been ignored or thought to be unrealistic. Yet repeatedly many predictions have come true, leaving communities to ponder the what-if scenarios of what might have been different if they had heeded the warnings. However, memories fade with time, and daily routines embrace the fallacy that it cannot happen again. The process must change to integrate the assessments and warnings of specialists who are trained to identify potential threats and anticipate their impacts.

A pathway to this change can be found in two seminal works on the subject. They each present a thorough exploration of past incidents and the reasons why communities fail to comprehend and give credence to predictions from subject matter experts. In *The Gray Rhino – How to Recognize and Act on the Obvious Dangers*, Michele Wucker provides an outstanding in-depth exploration of the subject. Her book provides an excellent insight on the issues and the difficulties that are present when trying to convince those who refuse to be convinced. The second book is equally in-depth. In *Warnings: Finding Cassandras to Stop Catastrophes*, Richard Clarke and R. P. Eddy developed the "Cassandra Coefficient" as an excellent tool for convincing the naysayers of the probability of an event taking place. The tools are there and just need to be employed.

In most cases, predicting the future only requires looking at the past. The lessons learned from the successes and failures provide a road map for the future. To quote a cliché that is very applicable today, "Those that do not know history are doomed to repeat it." Whether to study past disasters and heed the warnings of experts are choices that must be made, and those decisions have serious consequences. Emergency managers are extremely cognizant of these consequences and strive to provide the most succinct and timely disaster intelligence that is available. However, if that information is ignored, the consequences can be more than anyone may imagine.

[Rodney Andreasen](#) is a retired emergency management director from Jackson County, Florida. After serving approximately 20 years in that position, he retired in December 2020. Prior to that, he served 21 years in the Air Force, retiring as a Master Sergeant. He currently owns Xspct LLC providing consulting services as well consulting with the Counter Threat Group LLC in Birmingham, Alabama. He is a graduate of the University of Southern Mississippi with a master's degree in Technical and Occupational Education, Auburn University of Montgomery with a master's degree in Justice and Public Safety, and the Naval Postgraduate School with a master's degree in Security Studies Homeland Security and Defense.

Our commitment to **BioDefense** has allowed us to be ready for the **Ebola outbreak** in West Africa.

Now, with the **FilmArray system** and our reliable **BioThreat Panel**, we are able to test for 16 of the worlds deadly biothreat pathogens all in an hour.

Now That's Innovation!

BIO FIRE®
DEFENSE

Learn more at www.BioFireDefense.com

Another Opportunity to Prepare for Quarantines
By Robert C. Hutchinson

An article published in 2013 discussed the considerable challenges of quarantine order implementation and enforcement during a future pandemic or other serious threats to public health. That discussion was after the emergence of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), but before the re-emergence of the Ebola virus in West Africa. The level of preparedness for the rapid execution of federal quarantines has not greatly improved since 2013. The nation's readiness may have even diminished during the current pandemic due to social, political, and organizational discord.

The article, Black Swans – Preparing for Pandemic & Biological Threats, proposed that, if the novel coronavirus MERS, H7N9 influenza, or another serious pathogen were to arrive in the United States, it would trigger a response in many critical sectors – especially medical services, public health, and law enforcement. It was predicted that it would test medical detection and surge capacity capabilities to a level that may demonstrate insufficient planning and preparedness in an all-hazards environment. One of the first lines of defense and possible failure points, according to the article, was the initial screening and identification of the virus in time to utilize designated quarantine and isolation procedures and practices to contain the spread of the virus. If possible, swift containment would be the most effective response to assess and control the exposure of the emerging threat.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) – the novel virus that caused the COVID-19 pandemic – confirmed numerous concerns regarding national planning and preparedness for a pandemic or bioterrorism attack. Even though actual quarantine orders were not largely implemented for COVID-19 in the United States, the vast and various restrictions for social movement, education, and commerce may have affected the ability to properly plan and prepare for the implementation of formal quarantines in the future. Quarantine orders are very different from stay-at-home directions.

Despite polarization over the freedom of movement and commerce, specific quarantine orders can be essential tools – when timely and wisely executed – to stop or mitigate an evolving novel or weaponized pathogen. The recent stay-at-home or shelter-in-place requests or orders may not be as useful to contain a serious public health threat as official quarantine orders, especially if the next disease is a man-made pathogen that requires an immediate and suitable response.

Quarantine and Isolation
The definitions of quarantine and isolation can be confused with each other. A person exposed to a contagious disease can be quarantined to separate them from others and restrict their movement pending confirmation of exposure or illness. If the person

becomes ill from the exposure, they can be isolated from others who are not sick while they receive medical treatment. Broader and informal variations of this concept have been implemented since the arrival of SARS-CoV-2 in the United States.

A federal or state quarantine order may be issued to force compliance with the process. For a noncompliant person, the quarantine order functions similarly to a public health detention to control their movement. The compliant and those too ill to resist may not require legal restrictions. A quarantine order is often specific and directed at a person or persons arriving at a border or hospital with a highly pathogenic disease to control an outbreak before it spreads to others.

On the federal level at a border or between states, the Centers for Disease Control and Prevention (CDC) possesses the authority to quarantine individuals. In February 2020, CDC developed a generic quarantine order for persons returning from China. The order declared:

> CDC may legally detain you until it finds that you are no longer at risk of becoming ill and spreading the disease to others. This is commonly referred to as the incubation period for the disease. The incubation period for COVID-19 is currently believed to be up to 14 days. You will be reassessed while you are detained. CDC will count the beginning of the incubation period from when you left Hubei Province, China.

The quarantine order was specific to a person rather than a group, city, state, or region. It was legally and functionally different than the assortment of governmental directions or guidance issued since the arrival of SARS-CoV-2 across the United States.

Other Than Quarantine Orders

The wide-ranging social distancing/shelter-in-place requests, instructions, orders, and other guidance versions issued since the arrival of COVID-19 ranged from state to state and city to city over time. Most directions did not include formally executed quarantine orders as per existing laws and previous practices, but a broader adaptation or lesser variation of the concept.

The federal quarantine orders, as seen above, involved people returning from China in the early days of the outbreak. These quarantine activities, conducted mostly at military bases, were apparently less demanding to implement since the limited number of subjects were apparently content to comply to receive swift transportation back to the United States from China or depart an unexpectedly extended stay on a cruise ship.

However, the nation has not completely resolved the massive quarantine challenges at the international border. Enforcing specific or larger general quarantines at the border or functional equivalent of the border (airports and other entry locations) may be more challenging to accomplish for compliance and proper execution. The screening and quarantining of noncompliant passengers or illegal border crossers shall result in a

myriad of new challenges, issues, and lawsuits. There would be unexpected and unmet surge capacity issues for resources for numerous agencies and organizations, not to mention sensitive and precarious subjects such as use of force guidance to enforce legal orders and other supporting laws. The tremendous increase in illegal border entries on the southern border in 2021 demonstrated the monumental response challenges and the resource-depleting consequences of attempting to manage the substantial surge – especially during a pandemic.

Requests, instructions, or orders to stay-at-home or shelter-in-place, outside formal quarantine orders, can be problematical to enforce. Interstate and intrastate quarantines would be even more difficult. They were not easy to execute in the 1800s and early 1900s with a smaller less mobile population. However, this does not mean that they should be ignored. No- or short-notice federal quarantines shall be required at some time to control an exceptionally dangerous pathogenic threat from spreading across the county, state, nation, or world.

Federal Quarantine Enforcement

The U.S. Secretary of Health and Human Services is authorized to take measures to prevent the entry and spread of communicable diseases from foreign countries into the United States and between states under the federal statute 42 U.S. Code § 264. The authority to execute these functions was delegated to CDC.

> *A first line of defense is to screen and identify emerging pathogens in time to use formal quarantine and isolation procedures and practices to contain spread.*

Federal law identifies the federal officers responsible for quarantine enforcement and associated activities during a public health emergency. The federal officials with legal authority, and at times mandate, to enforce federal and state quarantines are identified within the foundational 2006 *National Strategy for Pandemic Influenza – Implementation Plan*; by specific federal statutes (42 U.S. Code § 97, 42 U.S. Code § 268) and by CDC guidance.

According to federal policies, plans, strategies, and statutes, designated customs officers are responsible for the enforcement of federal quarantine orders. The CDC identified U.S. Customs and Border Protection (CBP) and U.S. Coast Guard (USCG) officers as those authorized to help enforce federal quarantine orders. In addition to CBP and USCG, U.S. Immigration and Customs Enforcement (ICE) employs thousands of designed customs officers that would be required to support the enforcement at border or interior locations. Customs officers are the personnel within CBP, USCG, and ICE with legally designated customs authority. The number of officers with delegated customs authority within the agencies has expanded since the creation of the Department of Homeland Security in 2003 – providing a larger pool of deployable resources but still extremely limited for the vast mission.

As identified by CDC, public health authorities at the federal, state, local, and tribal levels may sometimes seek help from police or other law enforcement officers to enforce a public health order. Violating a federal quarantine order is punishable by fines and imprisonment, which expands responsibilities to other departments and agencies.

The *National Strategy for Pandemic Influenza – Implementation Plan* states that the federal government has statutory authority to order a quarantine to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the United States or from one state or possession into another state or possession. The plan provides additional guidance for federal quarantines and other movement restrictions.

> *Customs and Coast Guard officers are required to aid in the enforcement of Federal quarantine rules and regulations. Furthermore, Customs and Coast Guard officers and "military officers commanding in any fort or station upon the seacoast" are required to aid in the enforcement of State quarantines.*
>
> *Customs and Coast Guard officers may assist in enforcing State quarantines at the direction of the Secretary of Health and Human Services.*

CDC does not have the law enforcement capability for the execution of this unique mission thus requiring outside resources. This additional responsibility assigned to customs officers was not well-known by the public or many of the customs officers. It was not a standard mission that was sufficiently funded and exercised by the agencies, and was often viewed as a CDC, National Guard (under Title 32), or state public health responsibility. The customs officers in CBP, USCG, and ICE are already consumed by their primary responsibilities and duties along with other unexpected taskings and events.

The discussion and planning for federal quarantine enforcement may not be a practical one at this time. It was a challenge to plan and train for this unique responsibility in 2006 to support the new implementation plan long before the current pandemic.

Threats Over the Horizon
The concerns for a possible pandemic threat from a novel coronavirus were not new. In 2012, the coronavirus of concern was MERS with its mortality rate of approximately 30-40%. The international concern a decade ago was that MERS would travel and spread around the world like SARS in 2003 with its mortality rate of approximately 15%. The feared pandemic would turn out to be the novel SARS-CoV-2 in 2019 with a mortality rate of approximately 1%. The mortality rate was significantly lower, but the impact for the nation and world was immense. The mortality rate of the next pathogen may be closer to SARS and MERS or even much worse.

The White House released *American Pandemic Preparedness: Transforming Our Capabilities* in September 2021. The document described the work needed to transform capabilities to respond to any future pandemic or high-consequence biological threat. The

©iStock.com/No-Mad

document declared that there will be an increasing frequency of natural – and possibly human-made – biological threats in the years ahead. The document stated:

> *As devastating as the COVID-19 pandemic is, there is a reasonable likelihood that another serious pandemic that may be worse than COVID-19 will occur soon – possibly within the next decade. Unless we make transformative investments in pandemic preparedness now, we will not be meaningfully prepared.*

The document also addressed the areas of biosecurity, biosafety, and prevention of catastrophic biological events by expanding capabilities to identify safety and security risks to deter and detect the development and use of bioweapons.

Bioterrorism or biowarfare may be a more serious threat than a naturally occurring zoonotic pathogen. A novel man-made pathogen resulting in enhanced levels of transmissibility, morbidity, and mortality through gain-of-function experimentation could make the current pandemic issues appear manageable and even preferable.

Opportunities Lost

It is critical to identify and stop highly pathogenic threats, such as multidrug-resistant tuberculosis, viral hemorrhagic fevers (Ebola, Lassa, and Marburg), Nipah, and a novel influenza A virus before entry into the county. Effective and efficient screening, quarantine, and isolation procedures could make the difference between a public health concern and catastrophe during an encounter or emergence.

With the increasing politicization and polarization over face masks, vaccines, therapeutics, and other pandemic-related restrictions and directions, it becomes less likely that subjects such federal quarantine orders and enforcement shall be thoughtfully analyzed and addressed for the next inevitable public health threat. The topic of legally enforced federal quarantines may continue to be overlooked due to the current optics and politics.

At this time in the COVID-19 pandemic, the frank discussion of forceful quarantine orders and their proper execution may not be feasible. Not many may be overly interested in entering the societal and political debate with limited resources for the perceived return on investment. Even though quarantine orders are intrusive, they sometimes are a necessary tool to contain pathogens or other direct public health threats.

Containing the Next Threat

SARS-CoV-2 may be just another warning shot to caution the nation and world about the ramifications of the failure to plan and prepare for a serious pathogen that leads to another more perilous epidemic or pandemic. During the past two decades, SARS, MERS, Ebola, and several influenza viruses provided the world with warnings that faded away as quickly as the outbreaks themselves.

Another more serious public health threat, naturally occurring or man-made, will happen. It is critical to be prepared to identify it as soon as possible to block or slow it from spreading. The appropriate and legal use of quarantine orders can provide the ability to contain the early spread of an emerging pathogen. However, the execution of a quarantine order is not the same as a wide-ranging request for citizens to stay-at-home or social distance. It is a powerful authority and resource demanding an established process that can reap great benefits if properly executed by knowledgeable and trained personnel. Quarantines can also create confusion and resistance if not fully understood by the implementing officials and the public.

It is time to address the formal quarantine issue or more ground shall be lost – thus increasing vulnerabilities and cascading consequences. Public health threats can get much worse than SARS-CoV-2, especially in the realm of an engineered bioterror or biowarfare attack. The nation's level of preparedness for the execution of federal quarantines is not where it needs to be to stop or slow the next outbreak, epidemic, or pandemic. There is another opportunity to prepare for quarantines.

Robert C. Hutchinson, a long-time contributor to DomPrep, was the former deputy special agent in charge and acting special agent in charge with the U.S. Department of Homeland Security (DHS), Homeland Security Investigations in Miami, Florida. He retired in 2016 after more than 28 years as a special agent with DHS and the legacy U.S. Customs Service. He was previously the deputy director for the agency's national emergency preparedness division and assistant director for its national firearms and tactical training division. His numerous writings and presentations often address the important need for cooperation, coordination, and collaboration between the fields of public health, emergency management, and law enforcement, especially in the area of pandemic preparedness. He received his graduate degrees at the University of Delaware in public administration and Naval Postgraduate School in homeland security studies.

Copyright © 2021, Texas Division of Emergency Management

Human-Machine Teaming:
A Vision of Future Law Enforcement

By Corey Fallon, Kris Cook & Grant Tietje

Neither human nor robot, a digital police officer (D-PO) is a vision in machine teammates: an artificial intelligence-based partner that can be reached through multiple devices including the patrol car's on-board computer and officers' mobile devices. A D-PO has access to multiple data sources including live security camera feeds and criminal databases as well as other D-POs assigned to officers. Scientists and engineers, like those at Pacific Northwest National Laboratory (PNNL), are working in the field of human-machine teaming to bridge the gap between today's tools and the machine teammates of the future.

Patrol Officer Miller and her reliable D-PO partner have worked together for five years. As they start their patrol, D-PO knows which neighborhoods the pair will patrol based on previous patrols and provides the officer with a situation report on these neighborhoods. Thirty minutes into the patrol, the dispatcher informs them of a reported robbery and provides a description of the suspect. While Miller drives to the site of the robbery, D-PO monitors camera footage from an autonomous police drone circling the crime scene.

Next, D-PO uses its deep learning image recognition to detect an individual matching the suspect's description. D-PO requests to take over driving so the officer can study the video footage of the possible suspect. The officer accepts as D-PO shares the video on the patrol car's display and explains the features that led to its high-confidence rating.

D-PO asks, "Do you want to attempt to apprehend this person?" Agreeing that the individual matches the suspect's description, Miller decides to pursue. D-PO quickly calculates the best route to reach the suspect and presents it to Miller for review. With patrol lights on, the team begins following the suggested route. Although D-PO could drive, they both know that Miller prefers controlling the wheel in times like this.

D-PO notifies dispatch of the plan and updates other D-POs in the area. Through a quick exchange, the D-POs identify which patrol cars are best positioned to provide backup and coordinate with their patrol officers to determine who will respond. Officer Smith approaches the scene from the southwest and will arrive in 10 minutes. As both officers approach the scene, their D-POs track the location and anticipated arrival time of both cars.

Talking as she would with a human partner, Miller asks, "What are my best options for apprehending this guy?" D-PO processes the question along with the context of the situation. D-PO quickly shares three options for apprehending the suspect, including a risk assessment for each one. Since the initial robbery report, headquarters has identified the suspect, his criminal history, and other related data, which are included in the risk assessment and displayed on the center console.

> *Many technological capabilities already exist, but a machine teammate is more than a collection of tools. Scientists and engineers are working to bridge the gap.*

D-PO's brief auditory description is not enough for the officer to decide, so she needs her digital partner to take the wheel while she studies the various options. "Take over," she tells D-PO. From previous experience, D-PO knows what this simple command means. "I am taking over driving," D-PO says to confirm that it understands and will act on the officer's directive. They then proceed to the scene.

The Essence of Human-Machine Teaming

The above scenario may sound like something from a science fiction novel depicting a distant future. However, many of the technological capabilities described are real. Even though these capabilities already exist, current technology does not behave as a machine *teammate* because the D-PO described is more than a collection of tools. Many existing tools have one or two of D-PO's capabilities, but this is not enough to function as a teammate. For example, autonomous systems like drones and self-driving cars are useful, but these systems on their own are not teammates. They require the user, or in this case an officer, to regularly monitor their activity to make sure they are functioning properly. Interactive search engines like Google and Alexa are useful, but they do not anticipate an officer's needs or take the initiative to help solve a problem the way a teammate would. Sensors and their associated alerts can help direct an officer to important information, but they do not help the officer determine how to act on the information they provide.

It is challenging for developers to integrate these complex capabilities in a way that can support humans as partners and teammates. As a result, much of today's interaction between humans and their tools (or "machines") places a burden on the human, who either directs the tool to perform tasks or closely monitors automated assistants to ensure accurate performance. Developers need a deeper and more nuanced understanding of the human-machine dynamic in order to build machines that can work toward larger goals and are capable of doing more than blindly executing tasks.

Machine teammates both enhance team performance and minimize the work required for the human to manage the machine. A good machine teammate has enough autonomy to both perform the job and stay connected with its human partner. Rather than blindly performing tasks, they learn from their human teammates and provide suggestions,

support, and backup when their human partners need help. They work toward a larger team goal and support their human partners along the way.

The many D-PO capabilities on display in the example above paint a picture of a "gold standard" in machine teammate development and design in law enforcement. These capabilities can be organized into three broad categories that define a true teammate: a machine teammate should be able to observe, communicate, and act.

Observe

Unlike many current computers, machine teammates have an awareness and understanding of their environment and their fellow officers. These teammates have access to sensors and databases that monitor the environment and help them to adapt quickly when unexpected events arise. For example, in the above example, D-PO accessed video footage from a police drone to help identify the suspect and accessed the patrol car's onboard sensors to support navigation and driving when needed.

Perhaps just as important, machine teammates should be able to learn officers' preferences and patterns to predict what officers might need next. For example, the D-PO above anticipated what situation report its partner would need because it learned the patrol route over time. Additionally, D-PO was able to match patterns and recognize images, enabling it to identify the possible suspect in the drone footage.

Communicate

Rather than simply observing the environment and its partner, the machine teammate also makes recommendations and understands instructions. Designing for the ability to communicate naturally and in multiple ways with humans is an important aspect of human-machine teaming research.

Machine teammates conduct analyses and detect significant events in the environment. These teammates must be able to communicate their findings effectively and efficiently. Proper communication often involves navigating the tradeoff between providing enough information to help the officer appropriately trust the technology's guidance, and not providing so much information that it overloads the officer. Balancing this tradeoff can be challenging. A machine teammate that is sensitive to its human partner's current focus and workload may help the machine navigate the tradeoff. The machine teammate uses its understanding of the current situation to know when and how to interrupt the officer with its findings.

For example, when D-PO was presenting its three options for apprehending the suspect, it spoke the options to the officer while she was driving. Presenting more detailed information may have caused the officer to lose focus on driving. Recognizing that Miller may need to review a more detailed analysis, D-PO presented this information on the patrol car's center console display for further review. This approach gave Miller the opportunity to study the options when she had time to focus on the analysis.

A good machine teammate understands the context of the current situation when receiving instructions and tasking from its human partner. For example, D-PO knew who

Source: U.S. Dept. of Housing and Urban Development (2018).

Miller was referring to when she said, "this guy." The technology's ability to factor in context when processing human questions and directives makes communication easier for the human. In this scenario, Miller does not need to spend extra time and energy being detailed and precise in her instructions to D-PO. She can be vague and abstract, and the machine can still correctly interpret her requests.

Act

Good machine teammates are proactive. They take initiative to accomplish tasks and direct their human teammates' attention to new developments when necessary. Designing technology to support tasks without explicit guidance is another focus of human-machine teaming research.

Machine teammates do not always need explicit instructions to perform an action. Based on what they observed and learned, they can complete tasks in anticipation of what is needed without waiting for instructions. For example, the D-PO above coordinates with dispatch and with other officers' D-POs to arrange backup. D-PO also takes action by directing Miller's attention to new information, like alerting the officer to the possible suspect in the drone video footage. However, just like human teammates, machine teammates cannot anticipate their human partner's every move. Therefore, a machine teammate must be flexible and take direction from its human partner.

Although machines need to be able to act with some independence to be good teammates, in most environments the machine and the human should not be given equal decision-making authority. Especially in high-stakes environments like law enforcement, human officers should make the critical decisions. Great care must go into the amount of independence given to the machine teammate and what decisions it can make without approval from the human. For example, it is appropriate for a machine teammate to stop at a red light when given control of driving the squad car. Conversely, it would be inappropriate for this teammate to make the decision to pursue the potential robbery suspect.

Look to the Future

Some elements described in the example above are closer than others. For example:

- Having an automated assistant that could search databases, find and organize information is close to reality. Some projects today are already doing some of this work (like an advanced "Siri").

- Having an assistant take over the driving is a long way off. Unlike self-driving cars for ordinary highway driving (e.g., controlled conditions, well-marked lanes, not a lot of turns or sudden movements), self-driving police cars require a lot more sophistication (e.g., city streets with traffic and pedestrians, much more unpredictability, need to maneuver at higher speeds).

Machine learning/deep learning to monitor real-time drone feeds automatically is *not* a near-term capability. However, there are many intermediate approaches that are much more feasible in the short- to medium-term. For example, a machine could assist officers in the police station with reviewing drone footage. When officers spot the suspect, the assistant could communicate location information and recommended driving directions to the officer in the field. Despite technological advances in autonomous systems and artificial intelligence, there is still a gap between current technology and the ideal machine teammate. Laboratories like PNNL are working hard to bridge this gap and make teammates like D-PO a reality. For more information, contact nwrtc@pnnl.gov or visit the Northwest Regional Technology Center.

Corey K. Fallon, Ph.D., is a cognitive scientist at Pacific Northwest National Laboratory (PNNL) with expertise in human factors, cognitive systems engineering, and experimental psychology. His current research focuses on how to transition machines from tools to teammates and assessing the risk of incorporating artificial intelligence to support human-machine teaming. He can be reached at corey.fallon@pnnl.gov

Kristin Cook is a technical advisor, Visual Analytics, at PNNL. For over 20 years, she has been leading research and engineering projects to help people make sense of their data. Her current work focuses on the theoretical and practical challenges of creating human-machine teams.

Grant Tietje is a recently retired project manager at PNNL. He is a former paramedic, police officer, and emergency manager. As a project manager at PNNL, he focuses on research and development of technology for first responders. He can be reached at Grant.tietje@pnnl.gov.

Dräger

Looking for
American-made
N95 respirators?

With a new plant in the USA, Dräger has you covered

For ground personnel working in dusty environments, respiratory protection is essential. The Dräger X-plore® 1750 N95, our next-generation particulate filtering facepiece respirator, offers distinct improvements in comfort and protection. And it's now made right here in the US.

MADE IN
★ USA ★
SINCE SEPTEMBER 8, 2020

FOR MORE INFORMATION VISIT WWW.DRAEGER.COM

Dräger. Technology for Life®