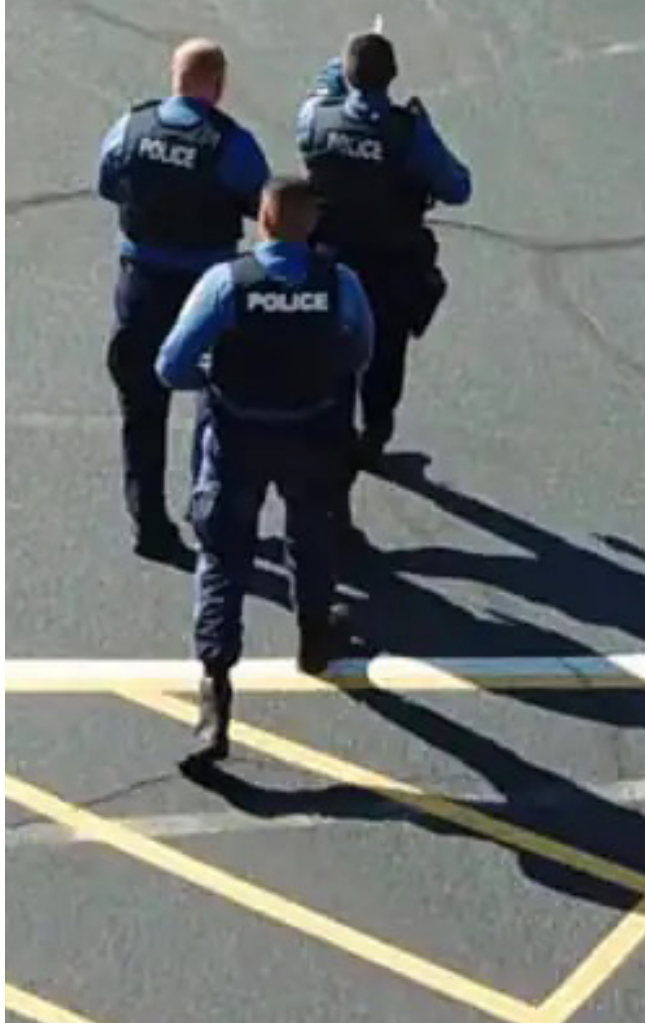
WHITE PAPER

Reducing Response Time Through Simplicity

Emergency Response Mapping for Faster, Safer Outcomes

CRG
CRITICAL RESPONSE GROUP
America's Common Operating Picture®

The TPG
TOMS PROFESSIONAL GROUP, LLC



Introduction

Presidential Policy Directive 21 (PPD-21), issued in 2013, expanded the number of critical infrastructure sectors that our Nation considers vital to our security, economic stability, and overall public health and safety. Although these critical infrastructure sectors can appear to be extremely focused, such as the Water and Wastewater Systems Sector, they can also be very dynamic and decentralized, such as the Emergency Services Sector. The Emergency Services Sector is a geographically dispersed composition of public safety entities staged within the federal, state, local, tribal, and territorial levels of government.[1] Many of these entities' efforts in preventing, preparing, responding to, and recovering from critical incidents are supported by private security, medical care providers, and public works operators. As noted within PPD-21, these distributed networks are varied, and the organizational structures and their respective operating models all contribute to the diversity of effort and complexity of the Emergency Services Sector.[2] It is this complexity that the Critical Response Group has been navigating during the last decade to improve the response and survival capabilities of our allied partners and the general public at large during critical incidents.

[1] Department of Homeland Security, *Emergency Services Sector-Specific Plan: An Annex to the NIPP 2013* (Washington, DC: U.S. Department of Homeland Security, 2015), 2.

[2] The White House, *Presidential Policy Directive/PPD 21 – Critical Infrastructure Security and Resilience* (Washington, DC: The White House, Office of the Press Secretary, February 12, 2013), 1.

Perspectives on Complexity

While most individuals have their own unique perspective of dealing with complexity in their own operating environments, most organizations are not prepared to understand, let alone master the various nuances of complexity. For example, many times people have a misaligned view of the impact of technology and its relationship to complexity. Think about this for a moment: has your personal life or your organizational life become busier or more complicated because of technology that seemingly should be simplifying your tasks. The advent of technology can actually extend complexity (and it usually does) rather than merely reduce it. Consider when Galileo, the father of observational astronomy, casually looked into the skies and noted the various patterns of stars that could be easily seen and counted. This prompted him to refine the telescope. However, the introduction of his telescope for purposes of observing the stars complicated what was already known by providing the ability to observe thousands of other stars and other celestial bodies that had never been seen before. This did not simplify the observation of the heavenly bodies; quite contrarily it complicated what was already known by adding a tremendous amount of new data to existing knowledge. Thus, Galileo's early 1600's refinement of the telescope to reduce variability and complexity in viewing the celestial bodies actually provided more information than was originally conceived. This invention significantly increased the body of knowledge for astronomy and made it more burdensome to study. Not unlike the technologies introduced over the last few decades to assist first responders to safely and successfully navigate an escalating threat environment, these technologies have often made such operations more complex, especially within multi-jurisdictional events.

The Critical Response Group's Focus on Variability and Complexity

Since CRG operates in the public safety space that must contend with an escalating threat environment, its core focus is to reduce variability and to reduce complexity. As a mechanism of evaluating the degree of complexity in which you are operating within, one can consider two elements. The first element to consider is the number of factors that your organization needs to contend with on a daily, weekly, or monthly basis and the second element to consider is the degree to which those factors change. For example, if your organization operates in an environment characterized by only a few critical factors and those factors do not change or change very infrequently, this might be considered a static or stable operating environment. On the other hand, if you have a lot of critical factors and those factors change often, or with rapidity, this might be considered a complex operating environment.

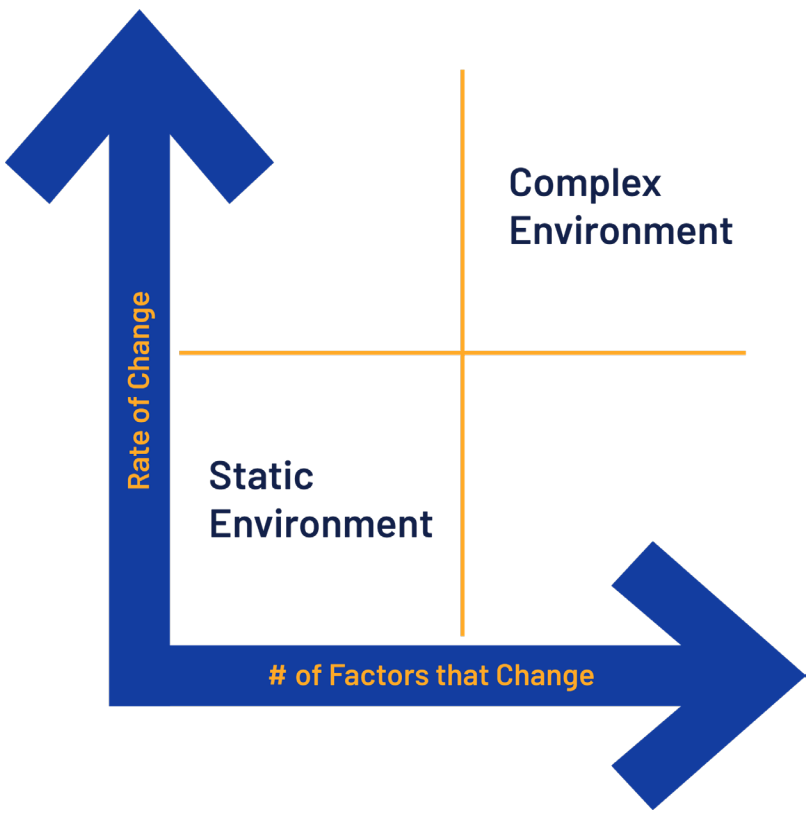


Figure 1: Relationship of Complexity Attributes (Toms, 2019)

Since this type of evaluation is not a pure science, you can also consider the type of operating environment where a lot of factors don't change often, but if one or two factors change frequently (and these are critical factors), your operating environment could still be considered more complex than static. Additionally, an operating environment may only have one factor or operating condition that undergoes such a significant change, and as a result the operating environment may take on traits of a complex operating environment. In the 1980s, such operating conditions were often referred to

[3] George Huber and William Glick, "What was Learned About Organizational Change and Redesign," in *Organizational Change and Redesign: Ideas and Insights for Improving Performance, Huber and Glick*, eds. (London: Oxford University Press, 1993), 3.

as turbulent conditions.[3] In the 1990s, as financial market conditions changed as well as social environments, these conditions were then often referred to as hyper-turbulent conditions.[4]

Complex operating environments often are labeled as such (turbulent or hyper-turbulent) because of the type of complex problems faced by organizations working in these particular environments or domains. These problems might even be considered wicked problems. The term "wicked issues"[5] was first coined by Rittel and Webber in 1973 when they examined the complexities and challenges associated with how to address planning and social policy issues.

While the use or application of labels such as the complex environment or wicked problem is not always statistically evaluated and proven, operating conditions that can have significant change on organizations, their people, the multiplicity of diverse stakeholders, the processes used by the organizations, as well as their assistive technologies, can often be construed as introducing varying levels of complexity for organizations to deal with to be successful in their mission. The introduction of uncertainty (e.g., unfamiliar locations, disparate systems, stress, etc.) into the context of an organization's mission may also contribute layers of complexity that the organization must contend with in order to be effective and efficient. In fact, for some organizations the battle or balance between effectiveness and efficiency can also provide a layer of complexity to navigate. In such situations, the navigational path forward may not be clear, especially if a path or solution has not even been determined yet. In clarifying Rittel and Webber's ten characteristics of wickedness, Conklin noted in 2006 that wicked problems cannot be understood until after the development of a solution to the problem.[6]

[4] David Schwandt and Michael Marquardt, *Organizational Learning: From World-Class Theories to Global Best Practices.* (New York: StL Press, 2000), 24.

[5] Horst Rittel and Melvin Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences*, 4, no. 2 (1973): 155-169.

[6] Jeff Conklin, *Dialogue Mapping: Building Shared Understanding of Wicked Problems.* (New York: Wiley, 2006), 7 and 14.

The Critical Response Group and Reducing Complexity

The Critical Response Group leverages its technology and its experience across various operating environments in high reliability domains to provide solutions to wicked problems in order to reduce operating complexity so individual operators can focus on being successful. We recognize that many types of business and operations analyses seek to reduce variability or improve performance. Examples include critical path analysis (CPA), continuous improvement (CI) cycles, total quality management (TQM), and Six Sigma to name just a few. However, utilizing technologies and methods of operations from the military domain, the Critical Response Group brought forth a solution in the form of an intervention in its patented Collaborative Response Graphics (CRG) that exposed a wicked problem that was only critically revealed upon demonstration of this intervention. This is one way the Critical Response Group accomplishes its mission of reducing variability. The Critical Response Group fully recognizes that one of the main purposes of organizing is to reduce variability. When variability is an accepted condition in an operation, unrecognized or undefined X factors can have a significant, adverse impact on the planning and execution of operations. When there is process variation, which is essentially the difference between how a process is expected to occur and how the process actually occurs, various undefined factors can skew the impact of inputs so that the desired outputs are either diminished or not achieved at all. Much like the crux of critical path analysis (CPA) is to identify any task or part of a process that delays the other parts of the operation, the Critical Response Group focuses on the part of allied partner responses (their critical path) that unintentionally delay or prevent the suppressing of threats and saving victims.

We also understand that when working with humans, variability is generally present in every process. The genesis of this variability can emanate from factors that can include the individuals themselves, the training provided to the individuals, the equipment individuals and groups utilize, and the methods or work they employ to achieve their mission. This is why technology cannot always be the sole reductionist force of variation. The reduction of all variability, especially in

dynamic situations, is difficult to achieve. This is why risks are inherent in most endeavors, and why risk management practices play such a critical role in such situations because risks will always exist, but can be managed or reduced down to manageable or tolerable levels.

The Critical Response Group is focused on managing the complexity of critical incidents, which are inherently dynamic operations with a lot of risk, through the identification of root causes of variability and implementing technological and resource allocation solutions to eliminate or reduce the adverse impact of this variability. Since it collaborates[7] with partners from the Emergency Services Sector (amongst other critical infrastructure sectors) that handle and respond to critical incidents, the Critical Response Group utilizes its collective experiences to introduce products and services into critical responses that reduce variance to negligible levels.

For example, the Critical Response Group utilizes its patented Collaborative Response Graphics (CRG), a simple set of visual communication and collaboration tools, to coordinate emergency responses both outside and inside a building. These tools are built upon the simple premise that when we all speak the same language, we work better. Better in this case is faster (more efficient) and deliberate (more effective), especially when operating under stressful response conditions. One of the primary ways these tools or interventions allow for a faster and more deliberate emergency response is that emergency responders and internal

[7] The White House, *Presidential Policy Directive/PPD 21 – Critical Infrastructure Security and Resilience* defines collaboration as "the process of working together to achieve shared goals."

teams are all operating from a unified understanding of a location. This means that the site-specific nomenclature and the exact physical features of the site are universally recognized by responders on its CRG tools, whether they have intimate knowledge of the site (generally internal teams) or they are geographically distant from the site, have never been to the site before, or are responding to the site due to a mutual aid request to assist in an emergency. This common operating picture saves critical moments in an emergency, especially through improving command and control, because the CRG tools can be easily shared among disparate teams and integrated into the tools these allied responders already use in their daily professional lives.

And this reduction in variability saves lives!

Lives are saved by not wasting seconds and minutes clarifying access points, hallway destinations, or deciphering dispatch information about physical locations on a campus or within a shopping mall or in a business park. These seconds and minutes are precious. Lessons learned from the Vietnam War reveal that survivability dramatically increases if the injured individual received "definitive care within one hour to ensure optimal outcomes."[8] This Golden Hour concept, as generally attributed to Dr. R. Adams Cowley, a prominent surgeon and founder of Baltimore's Shock Trauma Institute, appears to not be evidence-based.[9] While the concept of the Golden Hour, first referenced by Dr. Cowley in 1974, has long been a benchmark for both military and civilian emergency medical services treating trauma patients without particularized supporting data, the concept has without question saved the lives of possibly millions of people. Evidence-based data in the U.S. military now considers how the Golden Hour may be longer than an hour provided appropriate intermediary medical care is available to care for the injured in the immediacy after a traumatic injury. This care generally includes focusing on hemorrhage, airway management, and treatment of tension pneumothorax.[10]

[8] LTC Joseph Hudak III, MD, "The Origins of the 'Golden Hour' of Medical Care and Its Applicability to Combat Medicine, Thesis, U.S. Army Command and General Staff College, 2015: iv.

[9] Hudak, "The Origins of the Golden Hour," 2015: 43.

[10] Hudak, "The Origins of the Golden Hour," 2015: iv.

A study published in the Journal of the American College of Surgeons focusing on potentially preventable death (PPD) after civilian public mass shootings (CPMS) had similar findings. This research found that "pneumothorax from gunshot wounds to the chest accounts for the largest proportion of PPD after CPMS, and a focus on immediate treatment of these injuries must be considered."[11] This prevalence of tension pneumothorax in victims underscores the need for immediate medical attention from trained prehospital personnel.

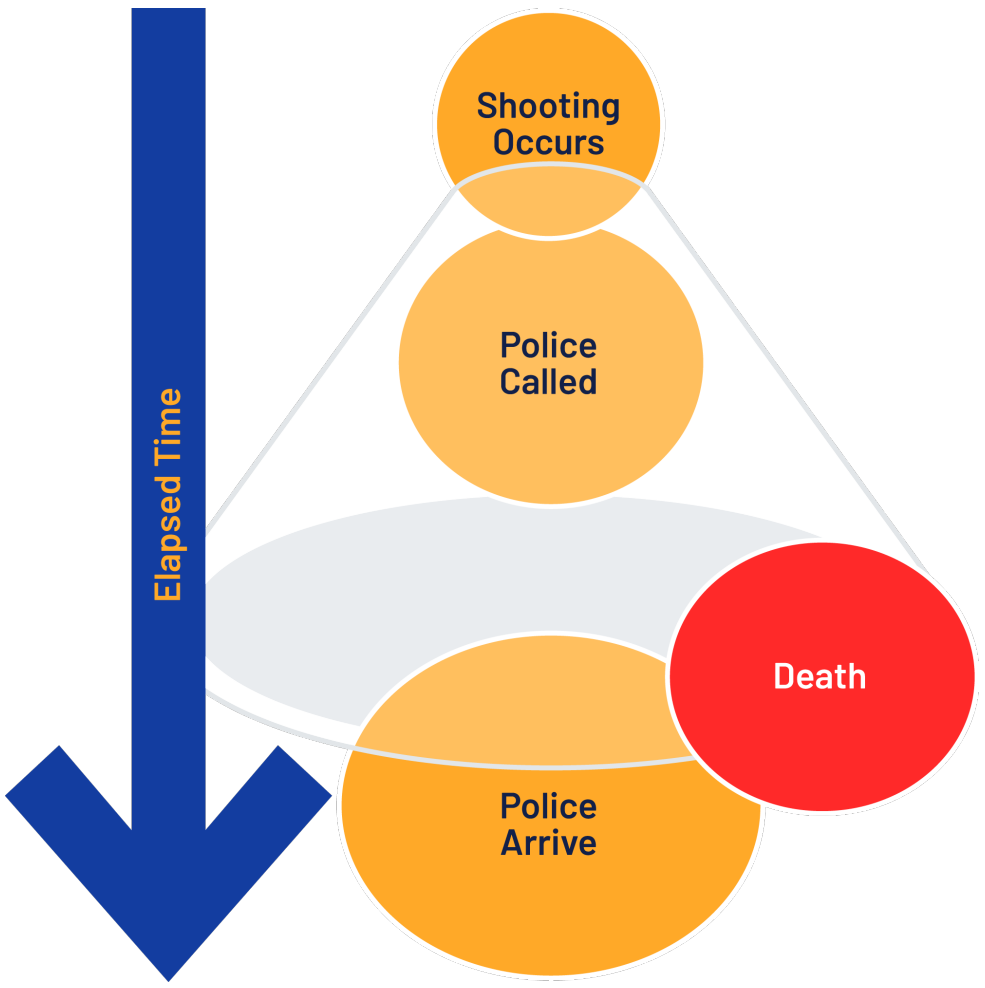


Figure 2: Funneling of Times (Toms, 2025)

While this information represents a mere snapshot of the emerging data available for trauma treatment, one fact is clear: the quicker a patient receives appropriate medical intervention… the better the outcomes for the patients. This focus on time to achieve the best possible medical outcomes is even clearer now, especially with more intermediate care options and a sharpened appreciation of evidence-based practice. The Critical Response Group takes cognizance of the fact that in 2022 the Science and Technology Directorate (S&T) of the U.S. Department of Homeland Security (DHS) noted that the average response time for first responders to arrive to a call for service is seven to ten minutes.[12]

[11] E. Reed Smith, et.al., "Incidence and Cause of Potentially Preventable Death after Civilian Public Mass Shooting in the U.S.," *Journal of the American College of Surgeons*, 229, no. 3 (2019): 244-251.

[12] Ron Langhelm, "S&T Helps 'Stop the Bleed' – FAST," Department of Homeland Security News Room (May 19, 2022).

While these highly trained first responders are competent at assessing a scene and providing immediate care, data shows that the average time for an individual to bleed out after experiencing a gunshot wound is only three to five minutes.[13]

This gap or funneling of time between bleeding out and the arrival of trained first responders, while often unavoidable, can lead to uncontrolled bleeding, or hemorrhage, which is the most common cause of preventable death in trauma cases. This is why entities such as DHS, the U.S. Department of Defense, FEMA, FBI, the National Center for Disaster Medicine and Public Health (NCDMPH), American Red Cross, American College of Surgeons, and other entities have joined one of the largest public health campaigns known as STOP THE BLEED®. In recognition that nearly 40% of trauma-related death worldwide is due to bleeding[14] and the gaps in response times to treat the critically injured, this health campaign focuses on training people in techniques to stop traumatic bleeding.

Many law enforcement tactical teams with a principal response for active shooter incidents now follow the lead of U.S. military operators to extend the Golden Hour. These law enforcement teams now embed a variety of tactical medical providers (TMP) or tactical emergency medical services (TEMS) on their teams as a means of advancing medical care to shooting or blast victims as the tactical team advances through a structure. While the training and background of TMP or TEMS may vary, the premise is clear...the clock is always ticking to save lives.

[13] Langhelm, "S&T Helps 'Stop the Bleed' – FAST."

[14] Langhelm, "S&T Helps 'Stop the Bleed' – FAST."

The Path Forward

The Critical Response Group understands the criticality of the ideas and data presented in this white paper. This is why our core mission is to reduce the critical path of resolving volatile situations through addressing the variability in allied responses, which in turn reduces the complexity of the first responder mission. Reducing this critical path of responses ultimately reduces response times and saves as many lives as possible. The solutions offered by the Critical Response Group focus on deliberate responding, not guessing where to go upon arrival or needlessly utilizing radio transmissions when critical information needs to be transmitted about the location or posture of a shooter or the location of victims in need of immediate care. With this singular focus, the Critical Response Group will remain a thought leader in the collaborative world of responses to critical incidents.