# MISSION CRITICAL TEAMS:

# TOWARDS THE CREATION OF A UNIVERSITY ASSISTED,

# MISSION CRITICAL TEAM INSTRUCTOR CADRE DEVELOPMENT PROGRAM

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## DEDICATION

First, to Amy. There are not enough words to tell you how grateful and honored I am to know you and to love you. So, instead, I will simply say: you are love. Thank You.

Secondly, to the operators who went back to work the day after.

One of the most important things that I have learned in my research is that most people misunderstand courage. They think that courage is the movement toward chaos and threat, when all about you is lost. In truth, those types of actions are often just the result of good training. What I have come to learn, in my own life and in watching others, is that true courage is often what happens the day after. The day after you lost the patient, or your teammate, or the person you were trying to protect. It happens right after you first wake up and all the memories and hurt come screaming back and you just want to surrender, to give up. At the same time, you know if you do, someone else will have to do the work, so you put your gear back on and you go back to work. To me, those actions, the ones taking alone in quiet rooms with no one watching, when no one would blame you for walking away, where you choose to continue, that is courage. There are some who contributed to this research, who you will never hear about, they will never write a book, never have a movie made about them, and yet for the rest of my days will remain the most extraordinary people I have ever met. Thank you.

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ABSTRACT

MISSION CRITICAL TEAMS:

TOWARDS THE CREATION OF A UNIVERSITY ASSISTED,

MISSION CRITICAL TEAM INSTRUCTOR CADRE DEVELOPMENT PROGRAM

Preston B. Cline

Sharon Ravitch

Between 2008 and 2016, the Instructor Cadre's from a number of Mission Critical Teams engaged in a collaborative inquiry process to examine ways to help Mission Critical Teams more fully engage as learning communities. Mission Critical Teams (MCT) are being defined a Small (4-12 agents) integrated groups of indigenously trained and educated experts that leverage tools and technology to resolve complex adaptive problems in an immersive, but constrained (five minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss. The research resulted in a proposed method for more effectively reviewing a Mission Critical Event Lifecycle a plan for the creation of a University Assisted Mission Critical Team Instructor Cadre Development Program.

TABLE OF CONTENTS

LIST OF TABLES

## INTRODUCTION

Beginning around 2005, a phenomenon was beginning to emerge at Military Training, Fire Academies, Tactical Law Enforcement Training Centers, and Surgical Trauma Bays worldwide as members of Mission Critical Teams, who had experienced radical operational and conceptual change in the aftermath of 9/11, were now rotating home to the "School House" to take on the role of the Instructor to develop a new generation of operators. In most cases, however, the Instructor cadres they were joining were still largely dominated by senior instructors who had yet to experience the new tactical, or combat, environment and were still diligently executing on the pre 9/11 doctrine that represented the historical cultures and traditions of their organizations.

Prior to 9/11, these Instructor Cadres were designed to screen, train and educate specific "Special Purpose Teams" (SPT) (Mattson, 2016, p. 81) that were modeled after the military "Special Operations Teams" (McRaven, 1996) which emerged immediately after World War Two with the introduction of the British SAS in 1950 (Asher, 2008) and the U.S. Army Special Forces in 1952 (Bank, 1986). By the 1960's, SPTs had begun to emerge in Law Enforcement, Medicine and Fire Fighting (Alexander, 1974; Mullins, 1999; Roth, 2001; Useem, Cook, & Sutton, 2005; Kessler, 2010). In every case these new SPT's were created to resolve a new problem set which emerged at the edge of things, the liminal space (Van

Gennep, 2011) that is *betwixt and between* life and death, chaos and order, certainty and uncertainty. In the four years following the attacks of September, 11th 2001, however, operational members with those SPT's had begun to encounter new problem sets that were emerging within radically different temporal environments forcing them to rethink both doctrine and ideology. It is the conjecture of this thesis that the radical change event of 9/11 forced a phase transition, or paradigm shift (Kuhn, 1996), from SPT's, to what I have termed Mission Critical Teams (MCT). The resulting conflict between a new generation of post 9/11, MCT, experienced junior instructors, who had directly lost friends, patients, or missions, to suddenly outmoded theories and tactics, and the less operationally experienced SPT senior instructors, who felt they were protecting the culture and legacy of their organization, would expose deep flaws within the screening, selection, training, and education models of the world's most elite teams.

In the fall of 2013, I asked Daniel Kahneman, a Nobel Prize winner in economics, the following question: "What happens to experts when the rate of change exceeds the rate of learning?" His immediate answer was "they cease being experts" (Kahneman, 2013). This dissertation is intended to recommend specific ways to support the Instructor Cadre Communities of Practice that are responsible for the selection, screening, training and education of a new type of Mission Critical Team (MCT) which emerged in the aftermath of the attacks on September 11, 2001. One of the vital and unique characteristics of these

Instructor Cadres is that they are made up of current indigenous, members of the teams themselves. By Indigenous, it is meant that members of the instructor cadre were current or previous members of the teams themselves, who relied on their previous lived experience as a candidate in the program to inform their instructional practice. That furthermore, their primary vocation is that of a Traumatologist, Firefighter, Tactical Law Enforcement Officer, or Military Special Operations personnel and not as a screener, trainer or educator. While this indigenous operational and cultural knowledge is vital to the success of these teams, the lack of knowledge and precise language regarding teaching and learning has led to growing conflict between a team's mission to evolve and the stories, traditions, mythologies and legacies that define the community.

While current research has contributed deeply to the understanding of teams in general (Devine, Clayton, Philips, Dunford, & Melner, 1999; Devine, 2002), it remains sparse in regards to the training cadres of teams that operate in complex, temporally constrained, high consequence environments (K. J. Klein, Ziegert, Knight, & Xiao, 2006). In a world that is increasingly reliant on teams of integrated experts to respond to emergent threats and opportunities it has become imperative to reconsider their design and professional development. This research will argue for not only new methodologies, but also a new paradigm for preparing Mission Critical Teams to navigate rapidly emergent complex adaptive problem sets.

## RESEARCH QUESTIONS

Mission Critical Teams are small (4-12 agents) integrated groups of indigenously trained and educated experts, that leverage tools and technology to resolve complex adaptive problems (Quesada, Kintsch, & Gomez, 2005) in an immersive, but constrained (5 minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss (Cline, 2014, p. 1). Unlike the Crisis Response Organizations (CRO) that preceded them, the responsibility for the screening, selection, training and education of new Mission Critical Team candidates is held by an internal, indigenous, instructor cadre community of practice (Bishop, 1995) situated in a new adaptive paradigm (Kuhn, 1996). Instead of assessing and preparing candidates for a specific job, they are facilitating the entrance to a unique and established socio-cultural-technical community, with very little preparation. This thesis is aimed at supporting future Mission Critical Team Instructor Cadres in their ability to increase mission success, survivability, and sustainability through answering the following research questions:

### Primary Research Question

Would a University Assisted, Mission Critical Team Instructor Cadre Development Program increase the ability of the Mission Critical Teams to achieve Mission Success, Survivability and Sustainability?

Subsidiary Research Questions

- Do Mission Critical Teams share a common event lifecycle?
- Is there evidence that Mission Critical Teams represent a unique type of team?
- Do Mission Critical Teams Instructor Cadre's represent a legitimate Communities of Practice?

## BACKGROUND AND CONTEXT

Human beings are social animals. Throughout history, they have responded to emergent problems through reorganization. According to the researcher Elman Service, throughout our history we have gathered together in increasingly complex societies that have evolved from Band Societies, to Tribes, to Chiefdoms and finally to States (Service, 1975). Each of these transitions marks a period where society both gains new tools and opportunities while at the same time discarding some old ways of knowing. As the technical problems of food production, transportation, healthcare, and war were increasingly stabilized by the rapid rise of new technology (Diamond, 1999) and ways of knowing (Kuhn, 1996), the complexity of the surrounding social, cultural, and technical ecosystems also increased. This evolution forced us to evolve both our strategies and our conceptual frameworks for navigating uncertainty.

An example of this evolution can be seen in response to structural fires. A structural fire, at its core is a "technical" (Heifetz, 1994), or "obvious" (Snowden,

2007) problem (i.e. the fire), that requires a mechanistic (Burns & Stalker, 1961) solution (e.g. People applying water). But, in the early life of settlers for example, homesteaders were often unable to transport and distribute a critical mass of water in the face of a chaotic house fire, and instead could only flee. As villages got denser, however, communities could rally together enough critical mass of people, and water, to implement successful collective mechanistic actions, to resolve emergent house fires. Over time, some of these early villages eventually grew into cities provoking the emergence of new kind of problem set and response. Because of the density of inter-connectedness of structures in a city, a structural fire went from being an isolated technical/obvious problem to a complicated problem (Snowden, 2007). In this context, the term complicated references the fact that the problem set was no longer isolated from the surrounding socio-cultural-technical ecosystem, but nested within it (Heifetz, 1994; Snowden, 2007). As a result, society now required dedicated experts, in the form of full time fire departments, or Crisis Response Bureaucracies (Weber, 1946), to devise, implement, and coordinate mechanistic solutions (Weber, 1946).

This phase transition from **Collective Action**, to **Crisis Response Bureaucracies (CRB)** that were made up of subject matter experts, was also emerging in Medicine (Hospitals), Law Enforcement (Public Police Departments), and the Military (Standing Armies). Over time, they needed to create stable systems and processes in an attempt to control, and manage, the

socio-cultural-technical systems they protected to increase reliability. To do this effectively they replaced the interpersonal relationships that allowed collective action to function with impersonal rules and laws that standardized behavior and increased predictability. Now, instead of each individual taking personal responsibility for crisis response within their communities, we assigned those responsibilities to the "experts", who too often have become the "stranger" (Simmel, 1950), the "other" (Said, 2001, p. 577), or the hero (Danieli & Dingman, 2014, p. 397). Over time, as Crisis Response Bureaucracies became increasingly successful in stabilizing complicated problems (Snowden, 2007), through deep operational preparation and contingency plans (Vaughan, 1996), there grew the belief that they would not fail when called upon. In addition, both the CRB's and the communities they were nested within, became increasingly focused on the reliability of the specific solutions, rather than the problem sets they were situated against, leading to a gradual divergence in how individuals would conceptualize their relationships and response to risk and uncertainty (Bernstein, 1996; Paul Slovic & Weber, 2002). If you only focused on the solution to the last problem set, you end up fighting the last war and not the current war. As CRB's are built around a traditional mechanistic bureaucracy of command and control they are often unprepared and slow to adapt in the face of novel emergent problem sets.

Over time, however, as the problem set and the responsive technologies became increasingly complex, the bureaucratic systems (designed for predictability and

reliability) found it increasingly difficult to both maintain control and adapt as fast as the problem set was evolving. As a result, some of these crisis response bureaucracies began evolving into **High Reliability Organizations (HRO)** (K. M. Sutcliffe, 2011). HROs are complex socio-cultural-technical bureaucracy made up of diverse stakeholders which operate at the edge of human capacity. Because they tend to have "fewer than their fair share of adverse events" (K. M. Sutcliffe, 2011) they often remain "Invisible until something happens" (Roberts & Rousseau, 1989, p. 133). The task of an HRO is to create systems and processes to make technical, complicated, and complex problem sets more stable and predictable (Schroeder, Linderman, Liedtke, & Choo, 2008), to push back the unknown, to stabilize and secure society against the vagaries of life. At the same time, HRO's continue to remain inexorably nested within the socio-cultural-technical ecosystems in which they emerged.

By the end of WWII, however, HRO's were becoming increasingly decentralized as it was becoming clear that a new type of complex problem set had emerged that prevented the used of conventional solutions. As a result, they created the **Special Purpose Team (SPT)**, which were built around the concept of a military Special Operations Team, which are small, 4-16 member, highly autonomous teams that could rapidly plan and execute specific missions (Bank, 1986; McRaven, 1996; J. C. o. Staff, 2014). Teams demonstrated greater effectiveness than individuals in solving time-constrained complex adaptive problem sets (Hackman, 2011, p. 26). Unlike HROs that maintained constant

systems, SPTs were designed to operate in short mission centric evolutions. HRO's around the world, would begin to adapt this new special operations team model to their particular emergent problem set (E. A. Cohen, 1996) in areas such as medicine (Surgical Trauma Teams), Law Enforcement (Special Weapons and Tactical Units or SWAT teams), and Fire (Special Operations Teams)(Cline, 2014). In each of these cases, the new focus was on small autonomous teams that could maximize speed and impact while remaining nested within a real or perceived (La Porte, 1996) HRO's.

By 2001, however, a new problem set emerged that was beyond the capacity of unilateral or joint Special Purpose Teams. The original SPTs were built around the idea of a unilaterally "Deliberate" or "Pre-Planned Mission" approach (Center, 2002). The typical planning cycle included a period of rigid deliberation that ranged from days to weeks with a subsequent operational cycle measured in hours. In comparison to the HRO's and Crisis Response Bureaucracies that preceded them it was incredibly fast. But, in the wars following 9/11, a new model of "Hasty" or "Time Sensitive" missions (Center, 2002) was emerging. Time Sensitive Mission (TSM) moved from single unit planning and execution, to joint and eventually networked, operations that were often planned in less than an hour (John M. Fyfe, 2005, p. 26) and executed in under five minutes (Hebert, 2003). The new requirement for greater speed, precision, and quality of information meant the focus moved from traditional contingency planning to building the adaptive capacity (Chiva, Grandío, & Alegre, 2010) of the team to

respond to emergent targets or opportunities. These new **Mission Critical Teams (MCT)**, were no longer single entities unilaterally going after a single target, but nested within liquid networks (Johnson, 2010), or teams of teams (G. S. McChrystal, 2015), that were rapidly going after multiple targets simultaneously with very little breaks between missions.

This phase transition from SPT's to MCT's meant that in the first decade of the 21rst century Instructor Cadres at Training sites for Fire, Law Enforcement, Military, and Medical Special Purpose Teams were discovering that the professional development paradigm no longer matched reality. At the same time, the friction between adapting to the new normal while still protecting the teams traditions and legacy meant that ongoing resistance to change was significant. Just like the earlier transition from conventional to unconventional paradigm (Kuhn, 1996), the transition from the special purpose mindset to a mission critical mindset required an entirely new professional development paradigm. Adding to this already daunting challenge was the fact that over the previous several decades the core responsibilities for selection and training of candidates had transitioned from outside experts to the indigenous members of the instructor cadre. In the face of needed innovation, this suddenly created a serious gap as such instructors were experts in their role on the team, not in screening, selection, training or education. Not only did they not have the pre-existing knowledge, they were also not part of networks of thought leaders who could advise them on how to innovate. Given the rapidly emergent context of

MCT's, this lack of knowledge is manifesting as an inability to adapt quickly enough within the candidate lifecycle and is having catastrophic consequences on teams and their missions.

## RATIONAL

On August 6, 2011, during a mission near Kabul, Afghanistan a Chinook helicopter with the call sign Extortion 17, was shot down killing all 30 personnel inside (Wikipedia, 2015). It is "believed to be the biggest single loss ever suffered by the NSW community in the 24-year history of the U.S. Special Operations Command" (Naylor, 2011). I was actually in the process of returning an email to Rob Reeves and Heath Robinson (DOD, 2011), two Navy SEAL's that I had met two weeks prior, when I got call came letting me know they had been killed. By that time, I had been engaged in my research for about three years and they had asked to meet with me to discuss the potential of creating an educational partnership with the University of Pennsylvania.

As I have spent a good part of my life working as a wilderness guide leading kids no one else wanted, in places no one else wanted to be, or working as an Emergency Medical Technician doing search and rescue, or as a risk manager running incident investigations, I was no stranger to death or to sorrow. Yet, even though I had only recently met Rob and Heath, it was somehow different. Up until that moment, I had been going about my research trying to remain a detached professional academic.

Suddenly, that was no longer possible.

As I entered the large convention hall in Virginia Beach there was a sea of uniforms arrayed beneath a series of big screens scrolling through the faces of the fallen. I couldn't help but look at all of my Navy SEAL friends and research partners, standing around in the dress uniforms they rarely wore, wondering if someday I might have to go to their funerals. As I took my seat high in the bleachers, I could not help but also think of my friends in the FDNY that survived 9/11, or my friends in the FBI that face lethal threats every day, and then finally of the Trauma Surgeons that must witness it all. Eventually, however, out of the crowd below a bagpiper stepped forward and began to play and a long line of very young families began to enter the hall. Despite having been to many funerals, this would be my first for not one, but many. For some reason, I had never considered how many of these young men had children themselves. It wasn't until the seemingly endless line of young mothers holding the tiny hands of so many young children that I started to understand what was happening, and it was all I could do to not sob out loud. It was here I thought, that my resolve began to harden, that I began to understand that I would no longer just be doing research. Each of the operators whom I interacted with had dedicated, and in some cases sacrificed, their lives in service to our shared security. I began to realize that if there existed even the slightest chance that my research might be in service to their security, to their survivability, that I must commit myself entirely to the effort. The image of that long line of children is burnt into my memory to remind

myself that, in the end, my research must add some measure of value to the lives of the future operators.

## Significance of Study

In 1998, the U.S. Army released data related to their conventional units, demonstrating that as the speed and complexity of war has increased over time, the threat our personnel pose to one another, has become greater than the threat of the actual enemy (Table 1). "Historically, the Army has had more accidental losses, including fratricide (friendly fire), than losses from enemy action (Army, 1998)"

While this data are specific to the conventional army, there is an entire body of research demonstrating the greatest threat to socio-cultural-technical systems' success and survivability are human factors, not technical or tactical factors (Ault, 1968; J. T. Reason, 1990; Vaughan, 1996; Endsley, 2000; Helmreich, 2000; Army, 2006; Cline, 2013). As the number of Mission Critical Teams has grown, and our technical systems have become more sophisticated and reliable, internal human factors have emerged as an unexpected threat to the team's sustainability (A. Sutcliffe & Rugg, 1998; Helmreich, Merritt, & Wilhelm, 1999; A. C. Services, 2005).

For the modern MCT two variables, the need to adapt against emergent threats and the need to maintain consistent methodologies to reduce accidental loss, remain in constant tension. When you then overlay the cultural factors of

tradition and the shared mythology of the team (Campbell, 2008; Campbell & Moyers, 2011), most efforts at organizational change face some sort of resistance. The centrality of the Human Factor as both the challenge and the solution, however, means that any attempt to influence a positive outcome must start with the training cadre and their ability to train and educate the operators. The challenge with starting with the instructor cadre, however, is that the MCT Instructor Cadres represented within this study do not have access to pool of researchers, nor the time, to help them effectively investigate the validity of their current practices. By partnering with the Instructor Cadres to critically examine the historically informed theoretical framework, that underlies their screening, training, and education practices, it may be possible to discover new strategies for resolving rapidly emergent complex adaptive problem sets. The bottom line is that any research that is able to improve ways to influence the human factor stands a good chance of increasing Mission Success, Mission Survivability, and Mission Sustainability.

## Literature Review

Educational research in general and Collaborative Inquiry specifically, is interdisciplinary by default. As a result, efforts were made to find the most useful theories for the Instructor Cadre Communities of Practice who will read this study. To support these cadres ability to not only better understand their practice, but also the socio-cultural-technical ecosystem in which there practice is nested, efforts were made to include research from organizational behavior,

anthropology, neuroscience, ethnography, and physiology, among others. In a similar manner to a physician moving from a biomedical perspective, one that is focused on symptom relief and factor analysis, to a biopsychosocial model that takes into account the larger physical and social ecosystem the patient is situated within (Engel, 1980). By taking this approach, it is believed that the Instructor Cadres will not only be able to influence their practice, but also the systems in which they are nested.

## Organizational Response to Radical Change Events

The concept of an "Emergence" originally appeared within the domain of complexity theory. Specifically, it "refers to the arising of novel and coherent structures, patterns, and properties during the process of self-organization in complex systems" (Goldstein, 1999, p. 49). An Emergence, in this context, refers to a novel problem set that is not related to earlier problem sets and is typically unresponsive to earlier solutions. Introductions of these novel emergent problem sets, often accompanied by new technology, have always forced society to re-conceptualize their understanding and response to uncertainty in a pattern described by the theory of punctuated equilibrium (Gersick, 1991). The theory holds that human history is characterized by extended periods of normalcy, occasionally punctuated by the emergence of a radical change event(Amis, Slack, & Hinings, 2004) that introduces a new type of problem set(s) which is revolutionary, and not evolutionary, in nature (Tushman & O'Reilly, 1996). Examples include, war, technical innovation, civil rights struggle, etc. The

disturbance to what we consider normal would last only long enough for us to develop and implement a solution, often in the form of a new type of Crisis Response Organization (CRO), before we could adapt ourselves to the new normal. Then when the next cycle of punctuated equilibrium occurred, and a new problem set emerged, the existing CRO would first try to apply its established solutions, and then after exhausting all current options, decide to create a new organization to resolve the novel problem set (Kuhn, 1996). For example, to deal with the emergence of a new type of criminal threat, the Los Angeles Police Department created the L.A. Special Weapons and Tactics Unit (SWAT). Critical to understanding this solution is that the emergent need to create S.W.A.T. did not negate the continued need for the L.A. Police Department. Instead, the new CRO (the SWAT team) increased the adaptive capacity (Folke et al., 2002) of the parent CRO to respond to novel emergent threats.

Because CRO's are nested within dynamic, open, human based, social, cultural, and technical systems (Katz & Kahn, 1978; Nadler, Tushman, & Hatvany, 1982, p. 36) the organization itself can be defined as a complex adaptive system (Arrow, McGrath, & Berdahl, 2000). With that said, the term *Ecosystem* will be used in place of Complex Adaptive System as "Ecosystems are prototypical examples of complex adaptive systems" (Levin, 1998, p. 1) and can be more easily defined and explained. More specifically, the term socio-cultural-technical ecosystems will be used to highlight that these ecosystems are fundamentally human based and any

effort to try and understand or positively influence them must start with understanding that the way human beings adapt is by learning. It is for this reason that this thesis is focused on the CRO's Instructor Cadre.

Given the sheer complexity of the systems that have just been described the challenge now is to identify a rubric that will enable the research and the reader to reasonably track how these CRO's have evolved. Conveniently, because, each new generation of CRO within the same nested socio-cultural-technical ecosystem as those CRO's that preceded them they all share certain categorical similarities. As such, it is possible to contrast one generation of CRO against another by comparing their unique problem set and the subsequent organizational response, as well as, the organizations operational environment, technological and information management profile, and the optimal human factor profile. Using these factors to compare and contrast the CRO's as we track both track their evolution, while at the same time better understanding how they are organized in light of the type of problem set they were created to resolve (Appendix I).

### 1740 - Crisis Response Bureaucracy

#### Radical Change Event

By 1740, Philadelphia had become dependent on immigration to fuel its growth (Morton & Woodbury, 1895). Most arrivals came by sea and given long voyages, with inadequate space, poor ventilation, and substandard food, while living "among closely crowded passengers, scurvy, malignant fevers, and diseases of a

dangerous type" (Morton & Woodbury, 1895, p. 5) meant that they often arrived in Philadelphia quite ill. At the time, however, medical treatment was done primarily in the home using traditional treatments. As a result, there was no formal mechanism to manage a large influx of ill, or injured, people. When not just left to their own fate, the standard practice was a collective action to "place them in empty houses about the city" (Morton & Woodbury, 1895, p. 4) where they might be helped by strangers, or if they had the money a local doctor. Placing sick people within empty houses, in a dense urban environment, however, often meant that the surrounding neighbors were likely to become infected threatening the overall health of a city. The problem of a sick immigrant had now transitioned from an obvious problem, to a complicated one as their impact overwhelmed the collective capacity of the citizens of Philadelphia. In response, Dr. Thomas Bond and Benjamin Franklin successfully launched the first hospital in the America's in 1751 (Morton & Woodbury, 1895). The creation of the Pennsylvania Hospital exemplifies the how the need for a full time Crisis Response Bureaucracy emerges when Collective Action loses its efficacy.

## Problem Set

Crisis Response Bureaucracies were first created to stabilize technical or obvious problem sets that became complicated due to increased human density and advances in technology. Unlike obvious problems that lay people can sense, categorize, and respond with appropriate solutions, complicated problems prevent immediate categorization because they are often novel and

interconnected across a system (Snowden, 2007, p. 2). Experts must analyze such problems before responding with solutions. Doing this reliably and repeatedly requires a group of experts organized in a standard and predictable manner. Exemplars of complicated problem sets during the 1700's were primarily related to the density of cities creating increased threats of widespread fire, pandemics and crime.

## Organizational Response

First studied by Max Webber in the 1950's, bureaucracies were invented to create reliable socio-technical systems to manage complicated problem sets (Weber, 1946). Their reliability was a product of the standardization of rigid scalable systems. The cost to this scalability and reliability, however, is that the systems do are incredibly fragile in the face of variance. Weber believed that bureaucracies were defined by the following specific characteristics: "Hierarchical organization, extensive use of rule, impersonality of procedure, and the employment of specialists on a career basis" (Downs & Corporation, 1967, p. 6). The operational paradigm was based on rational calculation, or what Weber would call the "Rational-Legal Authority," instead of emotion and kinship. To ensure the experts within the bureaucracy performed in a predictable and reliable manner, they were designed with a strict hierarchy where leaders and professional experts could exert power and discipline over subordinates for the purpose of greater control over variation(Clegg & Dunkerley, 1980). These early hierarchical structures were often based on the "great man" theory, which posited

that the best way to steer a large organization or community was the centralization of power and leadership into the hands of one exceptional man (Hoffman, Woehr, Maldagen-Youngjohn, & Lyons, 2011). This movement – from focusing on collective action to focusing on individuals – came with its own set of challenges as "rigid hierarchies have their own special vulnerability to error" (K.E. Weick & Sutcliffe, 2007, p. 16). Thus between the rigidity of the standardized technical systems and the rigid hierarchies, bureaucracies are highly fragile in the face of any variation of process (Taleb, 2007). During the 1700's, in addition to the emergence of the modern secular hospital (Westminster, U.K., 1719), radical change events throughout Europe and the colonies were leading the emergence of CRO's such as the creation of the modern British Standing Army in 1707 (Chandler, 2003), the creation of the Paris Fire Brigade in 1716 (Kenlon, 1913) and at the end of the century the creation of the first professional police force in Paris in 1791 (Stead & Stead, 1983).

### Operational environment

The primary operational goal of bureaucracies, including CRBs, is to accomplish the organization's mission by reliably predicting outcomes and reducing losses. Mechanistic solutions, such as the standardization of processes, procedures, and systems were consequences of the goal. In response to obvious and complicated problem sets, within an unconstrained temporal environment, mechanistic solutions, the use of checklists, are incredibly effective (Gawande, 2010). At the same time, what makes slow moving mechanistic solutions incredibly effective in

the face of obvious and complicated problems also make them terribly fragile in the face of radically changing events as they are highly resistant to change and innovation (Taleb, 2007).

### Technology and Information Management Profile

For CRBs, the overarching goal is to be in control of all variables, such as people, technology, and information using mechanistic solutions. In these organizations the concept of risk is seen in terms of the potential for loss (Krimsky & Golding, 1992). Information flowing vertically, controlled by a strict hierarchy, is the ideal method for controlling and managing information, but at the cost of stifling new ideas, preventing the rapid communication of threats, or capitalizing on new opportunities.

### Human Factor Profile

Crisis Response Bureaucracies (CRB) are organized around individual expertise and experience. The ideal agent within a crisis response bureaucracy is someone biased toward order, standardization, and predictability, while also exhibiting a clear deference to authority (Downs & Corporation, 1967). Individuals work within a strict hierarchy with a steep authority gradient (Sasou & Reason, 1999), and are screened, selected, and trained by professionals who objectively evaluate performance on specific technical tasks using clear metrics. The goal of the CRB professional development system is to improve your ability to do your job with the potential for advancement; it is not designed to educate you for nonlinear or innovative thinking. In fact, in some cases, innovative thinking can have severe

negative consequences on the agent's career if they do not have authority or designated responsibility for innovating. It is these very disincentives to innovate that can make CRB's highly fragile to radical change events (Taleb, 2012).

### 1854 - High Reliability Organization

Radical Change Event

In 1854, Florence Nightingale and a group of volunteer nurses were sent to Selimiye Barracks on the Crimean peninsula to serve in a military hospital during the Crimean war. Modern Hospitals, such as the Pennsylvania Hospital or the Westminster Hospital in London, and their Crisis Response Bureaucracies had existed for over 100 years, and were very effective in navigating complicated problem sets. During times of war, however, the emergence of new complex problem sets interact with the existing socio-cultural-technical ecosystem of a military hospital in ways that make solutions based on the individual expert highly fragile. As a result, the operational focus of the Crisis Response Bureaucracy must be shifted toward systemic solutions (Nightingale, 1863). Nightingale's team arrived to find medicines in short supply, filthy living conditions and greatly overworked staff. The mortality rate, primarily due to disease and mass infections was 42.7 percent (I. B. Cohen, 1984, p. 4). In addition, she was entering into a social ecosystem in which she represented the wrong gender and class to enact change. Yet, even though she faced inhuman conditions and unrelenting criticism from the male doctors, within half a year she had reduced the mortality rate to 2.2 percent (I. B. Cohen, 1984, p. 4). By

focusing on hospital operations (as opposed to surgical operations), obsessing about where failure was occurring, asking the deeper questions regarding what was causing the high mortality rate, committing her team to keep going even in the face of opposition and death, and lastly to standing firm on the importance of professional nurses as experts, she was able to force a reluctant Crisis Response Bureaucracy (CRB) into becoming a High Reliability Organization (HRO). At the emergence of a novel problem set a bureaucracy will often first try, and then fail, to implement an established mechanistic solution (Kuhn, 1996). It is only when these fail repeatedly, that they are forced to create, or evolve into, a more agile solution.

## Problem Set

The emergence of complex problem sets required that some CRBs evolve into HROs. In many ways complex problem sets behave in a similar fashion to complicated problem sets except that they escalate much faster and can result in systemic, rather than local catastrophic consequences. It is the difference between a worker getting injured using a metal press, and the meltdown of a nuclear reactor (K.E. Weick & Sutcliffe, 2007). Unlike complicated problem sets, which are a density of loosely connected problem sets, complex problems are tightly coupled (Roberts & Rousseau, 1989, p. 133) with neither the problem nor the solution immediately apparent. As a result, experts within HRO's have to explore, or probe, the situation to discover, or sense, a solution based on previous experience (Snowden, 2007). Given the size of the system in question, when it

comes time to pass the solution on the next generation the transmission from master to apprentice is no longer viable. As are result, professional level training and educational programs had to developed and delivered.

## Organizational Response

HRO"s are themselves a complex adaptive socio-cultural-technical ecosystem (Levin, 1998; Svyantek & Brown, 2000), designed specifically to counter the emergent threats to the stability of the system. They do this by becoming sophisticated learning communities (K.E. Weick & Sutcliffe, 2007), that are reluctant to simplify problems (K.E. Weick & Sutcliffe, 2007, p. 10) as they recognize that any error, or failure, is a symptom of a larger systemic failure (K.E. Weick & Sutcliffe, 2007, p. 9). At the same time, they are constantly balancing the need for an extreme hierarchical structure, strict accountability and immediate feedback on performance (Roberts & Rousseau, 1989, p. 133), with a strong deference to expertise (K.E. Weick & Sutcliffe, 2007, p. 15). The sheer complexity of this large socio-cultural-technical organizations means that the rate of learning that individuals require can only occur as fast as the system allows. In large human based systems, such as an HRO, culture can often overwhelm the strategy (Bierly III & Spender, 1995). One of the key markers of the introduction of an HRO is the professionalization of the human factor through the establishment of dedicated Schools, Academies, or Manuals. For example, prior to 1800, there were no professional Military Officers (Huntington, 1957), Exemplars of Organizational response in other fields include the foundation of the Royal

College of Surgeons (1800) and the publication of Florence Nightingales “Notes on Nursing” in 1859 (Nightingale, 1863), the establishment of Military Academies, such as the British Royal Military College in 1799 (Gat, 2001, p. 61) and U.S. Military Academy at West Point in 1802 (Gat, 2001, p. 61), the first formal training at Scotland Yard in 1829 (Fido & Skinner, 1999), and the first “Fire College” at the FDNY in 1869 (M. Ward, 2005, p. 122).

### Operational Environment

HRO’s are very sensitive to changes in operations, as that is where errors will appear, and can escalate rapidly (K.E. Weick & Sutcliffe, 2007, p. 12). Given their sensitivity, they are very reactive to emergent problem sets. By focusing on keeping errors small while they implement work arounds they are able to maintain a very resilient system (K.E. Weick & Sutcliffe, 2007, p. 14). For the most part, however, HROs function on a normal predictable timeline which allows for long planning and execution phases. The entire organization would only enter into a crisis event if there were multiple catastrophic failures to the system.

### Technology and Information Management Profile

Unlike CRBs, that may operate multiple separate machines, HROs are built around large tightly coupled technical systems (Roberts & Rousseau, 1989). This requires extreme redundancy of leadership and communication in the form of multiple backup systems (Roberts & Rousseau, 1989). For these systems to remain resilient in the face of error and failure, communication throughout the

organization must move both vertically and horizontally as the need for strict command and control is outweighed by the need to keep the system running (K.E. Weick & Sutcliffe, 2007). As a result, while they do have a clear chain of command, they don't always have a clear chain of communication (Moffit, 2016).

### Human Factor Profile

High Reliability Organizations are built around technical systems that are supported by individual experts. Due to the complexity of those systems, and the inability to completely rely on mechanistic solutions, agents within HRO's must balance their deference to authority with the need to leverage experts to maintain the system. Successful agents within HROs possess "credibility, trust and attentiveness" (K.E. Weick & Sutcliffe, 2007, p. 79) as they have a bias for perfection (Roberts & Rousseau, 1989). They also require strong situational awareness to track potential errors (M. R. Endsley, 1995). They are people who like order and as a result, are often better resolving small errors and failures than dealing with cascading or catastrophic failures (Perrow, 1984).

## 1950 - Special Purpose Teams

### Radical Change Event

In the period immediately following World War II, a series of radical innovations, including the Atomic Bomb, the Jet Airplane and the Vacuum Tube were making the world a smaller, faster and a more dangerous place to live. HRO's were starting to encounter a new type of rapidly emergent complex adaptive problem sets that were two fast or agile for even their adaptive bureaucracies (Weber,

1946) to effectively resolve. It wasn't, however, just the impact of the innovations but also the rate at which they were emerging (Kurzweil, 2004). It was this "rate of change problem" that provoked some theorists to question if punctuated equilibrium, or "the historical pattern- disruption followed by stabilization – has itself been disrupted" (CSI, 2010). To address this rate of change problem, military leaders began to consider the use of full time unconventional forces. Going back to biblical times, during times of war, Military organizations would often field temporary teams of small autonomous commando units (Dobbie, 1944; Thomas, 1983). These teams, were typically released from many of the conventional military structures and allowed great autonomy of selection, training, and mission execution (Jacobs & Sanders, 2005). According to punctuated equilibrium, however, once the problem set is resolved, in this case war, society would adapt to the new paradigm, or way of thinking, and the social system would reestablish itself under a new normal. Traditionally, this meant that the commandos would be disbanded at the end of the conflict due to the fact that unconventional teams create tremendous friction within conventional peacetime, or garrison, military organizations (Beckwith & Knox, 1983). If history teaches nothing else, it teaches that human beings are willing to tolerate a great deal of loss in an effort to have things return to what they believe is normal.

By 1950, the British War Office was being forced to rethink how they navigated emergent problem sets as the nature of war itself was changing. Single large wars were morphing into multiple small wars (Burleigh, 2013) and, as in any scientific

revolution (Kuhn, 1996), it is those at the edge that feel change first. Therefore, just as early communities were forced to create Crisis Response Bureaucracies, the British War Office (A military HRO) decided to do something that had never been done before and permanently reform the British 22 Special Air Service (King, 2009). Like all unconventional units throughout history, the SAS had been disbanded after the war (Beckwith & Knox, 1983), and their reformation would be the foundation of what would become the modern Special Purpose Team (SPT). To be clear, for the purposes of this paper, references to the Special Purpose Team (SPT) model is specifically referencing the major design principles behind the development of the original military Special Operations Teams which emerged in the 1950's (Beckwith & Knox, 1983; Bank, 1986; Asher, 2008). In the next few decades Special Purpose Teams in Trauma Medicine, Tactical Law Enforcement, Fire and Special Operations would emerge as the next evolution of the Special Operation Team model.

## Problem Set

Complex Adaptive Problems (R. A. Heifetz & Laurie, 1997; Holland, 2006) are different from complex problems (Snowden, 2007) in the sense that they are novel, with multiple touch points, that learn and adapt as we interact with them. The result is that these problem sets now require multiple experts, working together on a small team that is capable of rapidly learning and adapting. The terms emergent and adaptive indicating "the arising of novel and coherent structures, patterns, and properties during the process of self-organization in

complex systems (Goldstein, 1999, p. 49)". SPT's often don't have the luxury to probe, or explore the problem, and must be standing by ready to rapidly develop a plan to act. As a result, SPTs need to be fully developed before the identification of an emergence (Naylor, 2009). Exemplars of the problem set include hijacking, hostage taking, tactical urban crime and domestic and international terrorism.

### Organizational Response

Unlike CRB's and HRO's who are focused on systems, SPTs believe that "humans are more important than Hardware" (Naylor, 2009). This focus on the human factor has meant that their development must focus on "quality not quantity" (Naylor, 2009) and as a result "cannot be mass produced" (Naylor, 2009). To address the emergence of the complex adaptive problem set, HROs designed the SPT model around six core principles: "a simple plan, carefully concealed, repeatedly and realistically rehearsed, and executed with surprise, speed and purpose" (McRaven, 1996, p. 8; Schmidt, 2016). While still organized around a hierarchy, the teams have a very shallow authority gradient (Sasou & Reason, 1999) as they are built on the principle of Distributed Leadership, where leadership is "a shared, distributed phenomenon in which there can be several (formally appointed and/or emergent) leaders within a group" (Mehra, Smith, Dixon, & Robertson, 2006, p. 2). Operationally, Distributed Leadership means that the person who has the most relevant knowledge and skills, at any given time, is giving direction (K. J. Klein et al., 2006). This is a strategy that relies on

extraordinary trust, interdependence and cohesion. At the same time, the rate of technological change precludes SPT's from having deep knowledge on every technology or tactic (Moffit, 2016), resulting in a greater need for assistance from outside enablers (Naylor, 2009). The fact, however, that SPT's are able to operate in more adaptive ways often creates tension with both the enablers, and the parent CRO they are nested within, as those entities are still employing mechanistic solutions. Exemplars include the emergence of the British Special Air Service (22 SAS) in 1950 (Asher, 2008) and U.S. Army Special Forces (Green Berets) in 1952 (Bank, 1986), the Interregional Fire Suppression Crew (Hotshots) in 1961, the Philadelphia Special Weapons and Tactics (SWAT) teams in 1964 (Roth, 2001), Los Angeles SWAT in 1966 (Singh, 2000), the British SO19 in 1966 (Salt & Smith, 2005), and the creation of the Emergency Medicine System (EMS) and dedicated Trauma Surgical Teams with the release of the "Accidental Death and Disability Report in 1966 (Trauma & Shock, 1971).

### Operational Environment

As the problem set shifted from complex to complex adaptive, the solution moved from reliance on the system to reliance on the team. The dominant factor in any mission, now became the constrained temporal environment, or as Admiral McRaven explained in his book "Spec Ops" "The X-axis is time" (McRaven, 1996). The term time, however, is inadequate to explain the operational context of SPTs. Unlike HROs, who maintain a system over long periods of time, SPTs operate in iterative and immersive mission cycles.

## Technology and Information Management Profile

As the problem sets have become increasingly complex, so too has the technical and informational ecosystems. Individuals within the early HRO's were encouraged to enact the 70% solution. The 70% solution is predicated in a technology and communication paradigm that assumes that at any given time only 70% of the required information is available and delaying for more information is counterproductive. Over the last several decades, however, the speed and volume of information available to the individual has increased exponentially (Gleick, 2011). The result, is that instead of a 70% solution, we now have a 700% problem where we have so much data and information we are drowning in it or "what we cannot know has grown even faster than what we can" (G. S. McChrystal, 2015). This new flood of information is overwhelming our natural ability to filter weak but important signals (Taylor, Brunyé, & Taylor, 2008). In addition, the speed in which we are expected to communicate the information as acted to decrease the amount of time we have to analyze information; "The workload prevents much time for such reflection" (Bolger, 1990). All of this means that we are getting more information, but are less able individually to decipher and act on it.

## Human Factor Profile

The transition from HRO's to Special Purpose Teams represent the emergence of true teams, meaning that instead of just a collection of individuals, those individuals are organized to be interdependent (Hackman, 2002). This matters

because true teams are able to innovate against complex adaptive problems faster than individuals (Johnson, 2010). Due to issues related to span of control (Urwick, 1922), small group dynamics (Arrow et al., 2000, p. 75) , and agility in performance teams are typically built 4-12 members consistent with the small group theory (Hackman, 2002, pp. 116-117). Research on small teams have demonstrated that to be successful, they require effective leadership, ability to monitor and influence teammate performance, ability to assume teammates role when required, adaptability, and a commitment to team over self (Eduardo Salas, Sims, & Burke, 2005). Enabling factors for these characteristics are the development of shared situational awareness (Nofi, 2000) or Distributed Cognition (Y. Rogers & Ellis, 1994), strong bonds based on mutual trust, and clear closed-loop communication (Eduardo Salas et al., 2005). Above all, however, it meant that instead of selecting someone to do a job within an HRO, SPT's were now selecting for individuals that would fit their adaptive culture.

### Reexamining the Human Factor

In 1979, NASA held a conference to examine air transport accidents in the aftermath of the crash of United Airlines flight 173 (Helmreich et al., 1999). The reason the plane crashed was because the pilots were so busy arguing about a technical issue they failed to recognize that they were running out of fuel. At that point commercial aviation was still a young industry and up until then the focus had been keeping the planes working. Legend has it that at some point during that 1979 conference a scientist got up to say "Ladies and Gentleman, the plane is

no longer the problem."(G. S. McChrystal, 2015, p. 108) It was from that conference that led to what is now known as "crew resources management"(Hartel, 1991) and is an example of the organizational shift in focus from the technical system to the human factor (Reason, 1995). This shift also meant that CRO's needed to reconsider how they would transition from hiring and training people to manage large systems to targeting people who could thrive within small high performance teams (Katzenbach & Smith, 1993). It was this challenge that first led to the creation of the modern Assessment Center and Instructor Cadre, a process which began in Germany in 1927 (Ahrenfeldt, 1958, p. 54).

### 1927 - German Wehrmacht

Note about terms: The term Wehrmacht describes the entire armed forces during the time of the German Third Reich. Out of respect for the modern German's Special Operations community, I have substituted references to "Germany" with the term "Nazi" or "Wehrmacht (Which was the term describing the unified German military under the Nazi political party) in places where it presents a more accurate historical representation.

By 1927, the German Wehrmacht was already planning to rebuild their military after the recent losses of WWI, but the Treaty of Versailles had placed heavy restrictions on potential size of their military. Between the lessons of WWI and the new political environment, it was also evident that the traditional method of selecting future officers from the Prussian aristocracy was no longer viable. It so

happened, however, that the institute for experimental psychology had been founded in Leipzig University 60 years prior at (Mandler, 2007), creating an opportunity for a team of German psychologists to redesign the officer selection process (Earles & Winn, 1977).

The new Wehrmacht Psychological Assessment Program was under the leadership of Dr. Max Simoneit (Fitts, 1946) who believed in "the whole man" approach. (Banks, 1995, p. 38) This approach was predicated on the idea that one needed to assess whole person (Banks, 1995, pp. 34-35) through the observation of action, and not just the component parts, such as intelligence or physical fitness, that emerged from specific testing. At its core, it was designed and implemented by a team of psychologists as a qualitative, rather than quantitative, assessment system (Highhouse & Kostek, 2013). The team was organized into a screening board "consisting of two officers, one physician, and three psychologists and took two full days" (Banks, 1995, p. 37), a design that we will see reproduced many times in the subsequent decades. Below we can see Simoneit's original principles for selection which were translated from the original German and published in 1941 (Ansbacher, 1941):

Simoneit Selection Principles:

1. Scientific psychology must be combined with practical knowledge of human nature. This requires capacity
    a. For a natural attitude toward the examinee as in real life and not as in an experimental situation.
    b. To observe and evaluate symptoms relative to everyday conduct, personality, intellect, and volition.

    c. To express observations properly in a report.
    d. To reconstruct the total personality from single traits and relevant data.
2. The whole personality must be considered.
    a. One must not be led too hastily by the first impression.
    b. One cannot compile a list of the proper attitudes for a soldier and expect someone to have them all. Such an individual does not exist.
    c. One cannot select according to a type. The best soldiers may have quite different personalities.
    d. Selection must not be influenced by the study of great generals. It is a matter of mass selection, not selection of geniuses. The question is rather whether the candidate will be likely to live up to the best in his own personality.
3. The examination must keep close to everyday life. The four fields of the psychological examination are intelligence analysis, action analysis, expression analysis, and life history. For each of these, everyday life approaches have been worked out.
    a. The method of intelligence tests has been abandoned; tasks of a serious character which are in rapport with daily life are given instead. The examination of intellectual faculties is supplemented by an interview between candidate and jury which represents the main part of the examination.
    b. To test will and strength of character, work interest, and work capacity, attitudes and conduct in various concrete situations, including success and failure, are observed.
    c. Emotions and emotional stability are judged through their external manifestations, such as bodily attitudes, gestures, reactions, and mimic expressions.
    d. To learn the details of the subject's life history he is interviewed regarding his family, friends, youth, and school.
4. The candidate's conduct should be observed throughout the entire examination. The candidate's way of performing a task is considered more prognostic than his achievement. Likewise, the facts of his life history are considered more important than his achievement at the examination.
5. Constitution and race must be considered. In line with our previous observations we find only a negative statement to the effect that the examination of constitutional and racial factors is made difficult by their complexity, their variable character, and their sensibility to environmental influences.
6. The possibility of compensation must be considered. In what direction may natural aptitudes or shortcomings influence the development of the individual? Do they or do they not transform the personality?

As Simoneit was interested in identifying a person's character (Banks, 1995) he designed an examination system that looked at four specific variables (Ansbacher, 1941);

1. **General Intelligence:** This was primarily focused on what Simoneit termed
   practical intelligence and was based on his belief that intelligence assessment and personality assessment were inseparable (Harrell & Churchill, 1941)
2. **Use of Will Power:** These were things like: "planning, attention, clear thinking under physical and emotional stress, energy, perseverance, willingness to try with all one's might, and limits of (capacity) and ability to manage (command) people" (Ansbacher, 1941, p. 380).
3. **Expressive Movements**: (speech, face, gestures, handwriting).
4. **Total Personality**: (life history, interview).

The Wehrmacht ended up terminating the screening program in the middle of the war due to a series of political, professional, practical and scientific factors (Fitts, 1946, p. 160) and even though by 1941 there "were between 450 and 500 psychologists working for the Wehrmacht" (Banks, 1995, p. 33) there was "no acceptable evidence was accumulated to show that the program was successful" (Fitts, 1946, p. 160). Ironically, however, because the process had been created by academics, they followed academic traditions and published all of their findings in well-known scientific journals.

### 1939 - BRITAIN WAR OFFICER SELECTION BOARD (W.O.S.B.)

By 1939 the British military had recognized that war with Germany was coming and it would be battle for their nations survival (Ahrenfeldt, 1958, p. 2; Handler, 2001, p. 558). The planners within the British Military knew that if their country was to survive (Ahrenfeldt, 1958, p. 2; Handler, 2001, p. 558) they would need to

radically increase the size of their military. In fact, the British military would grow from just under 400,000 in 1938 to almost 5,000,000, meaning that one out of every ten British citizens were in uniform by 1945 (S. S. Rogers, Ami, 2012).

There was a profound difference, however, between Britain of 1913 and Britain of 1939. Not only was the type of warfare more technologically complex (Crang, 2000, p. 1), but the lingering effects of WWI had to be considered with any plan. The fact was that roughly 15% of all military pensioners "were still collecting pensions due to shell shock from WWI" (Ahrenfeldt, 1958, p. 10). The feeling at the time was that efforts must be made to insure that only those who are capable should be sent into the fight. The problem was that a system to select the "right people" at the scale they required did not exist and for selecting officers the problem was even worse.

Historically, the way in which an individual became an officer in the British Army was to go before a Regular Commissions Board (RCB) (Crang, 2000, p. 36), that was primarily designed to select a candidate from the upper social classes by asking interview questions related to their "school, their father's occupation and income" (Ahrenfeldt, 1958, p. 65). This process was often referred to as the "Magic Eye Technique" (Ahrenfeldt, 1958, p. 52) due to the belief of many officers that they knew a quality candidate when they saw one. The rapid buildup of personnel, however, meant that the traditional system was rapidly breaking down and no one was sure how to fix it (Ahrenfeldt, 1958, p. 52)

By 1941, the shortage of qualified officers was becoming a legitimate threat, so it was decided that two psychiatrists, Lieutenant Colonel T. F. Rodger and Major E. Wittkower, would essentially copy the techniques developed by the Wehrmacht, outlined in the psychological journals (Ahrenfeldt, 1958; Murray, 1990; Banks, 1995) with the intent of creating new War Officer Selection Boards (Banks, 1995, p. 43). The initial challenge was a structural one as the preceding RCB's were historically a "rejection process" (Ahrenfeldt, 1958, p. 54). The rejection rate for officers was "20% to 50%" (Ahrenfeldt, 1958, p. 53) and based predominantly on family reputation. In order for the Army to get the officers they needed, this system would need to change, but to do that they would need to overcome the objections of some of the British General Officers who felt that developing a new "class" of officer would act to limit the "supply from the superior classes" (Crang, 2000, p. 22).

The War Officer Selection Board was made up of "a president (a senior regular officer), a Military Testing Officer, two psychiatrists, one psychologist, and two Sergeant Testers" (Ahrenfeldt, 1958, p. 57; Banks, 1995, p. 44) as well as a medical specialist with the express goal to evaluate the "Quality of social relations with superiors, equals and subordinates; competence in practical situations; stamina over long periods under stress" (Murray, 1990, p. 52). A number of such Boards were set up across Britain as experimental programs using variations of a standard process (Crang, 2000, p. 32):

- Groups of 30-40 candidates were taken to a remote location to spend 3 days being evaluated.
- Completed a detailed personal history questionnaire.
- Completed a group of written tests that looked at intelligence and perception.
- Participated in a series of group tests consisting of a group discussion, and outdoor exercise of a tactical nature.
- A physical fitness test.
- A boxing competition.

One of the key techniques that the British took from the Wehrmacht was the idea of the group test. One of these tests, the Leaderless Group test (Ahrenfeldt, 1958, p. 60) originally designed by Major W.R. Bion, is still being used today with very little modification.

> "The idea was similar to some of those used by the Germans, but it allowed even more freedom to the candidate and provided a different type of stress. Bion would place men in a group of eight or nine other candidates and give them a task to perform, for example, to build a bridge. The men would be given no guidance as to who was in charge, or how to actually build the bridge. As they began to work together (or not), an observer team would monitor their progress. To the candidates, it was clear that their performance on building the bridge was being graded. In fact, the observer team was actually performing personality assessments of the candidates by watching their way of interacting with each other." (Banks, 1995, p. 44)

By triangulating officers, psychiatrists and sergeants the new WOSB's were starting to break down old stereotypes (Ahrenfeldt, 1958, p. 63).

> "The old notion that playing polo and running a Rolls-Royce car are necessarily marks of a good officer is out of date', remarked J.L. Hodson; ' war knocks such ideas on the head. Leadership is the thing; and that springs from a broad field." (Crang, 2000, p. 39)

One practical issue should be noted, as we still see it emerge today. As W.O.S.B.'s began to grow they began to face a new problem. As the supply of traditional officer candidates began to diminish, the Military needed to promote enlisted

personnel into officer billets. The problems began when some Commanding Officers began recognizing that it would be their best enlisted soldiers that would be promoted, so they began discouraging their people from applying. “Many COs feared that if they gave up some of their best men they would seriously weaken their units as a fighting force.” (Murray, 1990, p. 58) While this problem was mostly overcome, the phenomenon would re-emerge almost every time a new Special Purpose Team was formed (Beckwith & Knox, 1983, p. 121; Bank, 1986, p. 192; Marcinko & Weisman, 1992).

### 1943 - The Office of Strategic Services

The Office of Strategic Services, or OSS was created in “1941 to conduct ‘espionage, propaganda, subversion, and related activities,’ including waging unconventional warfare” (Banks, 1995, p. 2). Initially, the rush to get operators into service meant that not a lot of effort was put into selection. In fact, “...the OSS was not uncommonly referred to as "Oh, So Social," because so many of its original members were personal friends, or former Yale classmates, of William Donovan and prominent members of society (Banks, 1995, p. 51). It turns out, however, that just because you were socially adept, or had a degree from Yale, did not mean that you possessed the unique skills necessary to be an espionage agent including “dissembling under threat of torture by the Gestapo, or properly accounting for large sums of money with little supervision” (Banks, 1995, p. 51). Apparently, these were essential skills within espionage and “A significant number of deployed personnel were either incompetent, or in a few cases, had

dramatic mental crack-ups" (Banks, 1995, p. 49). So two years later, in 1943 the OSS gathered together a diverse team of Ph.D.'s including "clinical psychologists, animal psychologists, social psychologists, sociologists, and cultural anthropologists" (Highhouse & Kostek, 2013, p. 566) to create a selection program for spies and saboteurs. Dr. Henry Murray, one of the fathers of clinical psychology and a professor at Harvard University, was brought in to lead the team (Lenzenweger, 2014), and started by reviewing the German and British efforts that preceded them (Services, 1948, p. 3).

Like the Wehrmacht and the British, the OSS adopted the strategy of moving from written tests only to creating opportunities to assess individuals while they were performing some exercise in order "To describe the more holistic, wide-ranging understanding of personality and performance" (Handler, 2001, p. 562). The OSS Assessment cadre was tasked with "developing a system of procedures which would reveal the personalities of OSS recruits" (OSS, 1948, p. 8). More specifically, their intention was to "select and train spies, but just as important was the mission to train people to conduct destructive operations behind enemy lines" (Handler, 2001, p. 562), as well as to "disintegrate the morale of enemy troops and encourage the focus of the underground" (OSS Assessment Staff, 1948, p. 10).

Following the Wehrmacht and British Model, as well as Dr. Murray's research on personality assessment, the OSS assessment program was based on trait theory (John & Srivastava, 1999, p. 26). This meant that the team of Psychologists would

observe candidates and infer ”general traits and their interrelations from a number of specific signs exhibited by a candidate engaged in role plays, simulations, group discussions, and in-depth interviews—and combining these inferences into a diagnosis of personality” (Highhouse & Kostek, 2013, p. 566). In general terms, trait theory espouses that we can understand a person by measuring certain personality characteristics. The theory separates “Traits” from “States” (John & Srivastava, 1999, p. 26). Traits, such as extraversion, perfectionism, impulsivity, etc. (John & Srivastava, 1999, p. 26) are personality characteristics that are considered by some researchers to be fairly stable over time. With that said, the determination of which traits are “trainable” or ”malleable” and which are fixed (Mueller-Hanson, White, Dorsey, & Pulakos, 2005) remains a debate. States, however, are considered temporary, like moods or activities; these include things like being afraid or moments of joy. If we step back and look at OSS applicant lifecycle, we can see that the candidate lifecycle we know today had begun to emerge (Table 1):

Table 1: OSS Candidate Lifecycle

| Stage | Intake | | Selection | Training | Transition |
|---|---|---|---|---|---|
| Phases | Recruit | Screen | Assessment | Training | Graduation |
| Traits | | | | | |
| Physicality | | | | | |

- **Recruitment:** Was done by a number of different branches within the OSS, which included both men and women recruits. (OSS, 1948, p. 60). If the candidate passed the background test, they were sent to an interview in Washington, D.C.
- **Screening:** In Washington an OSS officer, who would supervise the candidate throughout his training if they were successful, would conduct an interview (OSS, 1948, p. 61). If they passed then, in a process reminiscent of a traditional Rite of Passage (Van Gennep, 2011), candidates were first stripped of their identity and then asked to remove all their clothes and personal items an don unadorned military fatigues. They were then taken to a remote location where they would spend three and a half days being assessed (OSS, 1948, pp. 58-63).
- **Assessment and Selection:** "Groups of 15 to 20 recruits would spend three and a half days there being observed by a team of psychologists and others as they underwent a series of tests and situational problems designed to evaluate mentality, personality, emotional stability, and aptitude (Chambers & John, 2010, p. 74) to determine if they would enter the training pipeline.
- **Training:** Depending on the branch, and the necessary skills training could then take anywhere from 4 to 10 weeks before being sent overseas to their assigned job. (Chambers & John, 2010).

- **Graduation:** At this point, once the candidate finished their training they were immediately sent to their first posting.

It is important to understand that psychologists who were designing the system "Had little or no first- hand knowledge of the jobs the selectees would be performing" (Handler, 2001, p. 563). To make up for this deficiency they sent a brand new OSS staff member, USMC Lieutenant John Gardner, to the various branch chiefs in Europe to obtain the "next best thing to job descriptions" (OSS, 1948, p. 30). It is worth taking a moment to illuminate Lieutenant Gardner, as he had just received his doctorate in psychology from the University of California, Berkeley when Pearl Harbor was attacked. In order to do his part, he joined the U.S. Marine Corps. The U.S.M.C., not sure what to do with a Doctor in Psychology from Berkeley, promptly dispatched him to the OSS. The OSS psychologists, excited to have an actual U.S. Marine working with them, promptly sent him to Europe to interview all of the OSS station heads, who had lived through Bill Donovan's first recruits, to get a "list of abilities." After what can only be imagined as some very interesting discussions, Dr. Lieutenant Gardner came up with "A list of abilities and qualities which these officers considered necessary for the accomplishment of the projects planned by their section" (OSS, 1948, p. 30). Upon returning to the U.S., the Psychologists at the Assessment Center took Dr. Lieutenant Gardner's list of attributes and then "by resolving differences in terminology and by combining related factors under a single term" (OSS, 1948, p. 30) and then combined them into seven major attributes:

- **Motivation for Assignment:** War morale, interest in proposed job.
- **Energy and Initiative:** Activity level, zest, effort, initiative.
- **Effective Intelligence:** Ability to select strategic goals and the most efficient means of attaining them; quick practical thought-resourcefulness, originality, good judgment-in dealing with things, people, or ideas.
- **Emotional Stability:** Ability to govern disturbing emotions, steadiness and endurance under pressure, snafu tolerance, freedom from neurotic tendencies.
- **Social Relations:** Ability to get along well with other people, good will, team play, tact, freedom from disturbing prejudices, freedom from annoying traits.
- **Leadership:** Social initiative, ability to evoke cooperation, organizing and administering ability, acceptance of responsibility.
- **Security:** Ability to keep secrets; caution, discretion, ability to bluff and to mislead.

In addition to the above "General Qualifications," there were also a few "special qualifications" that were needed by specific branches" (OSS, 1948, p. 31). These were listed below.

- **Physical Ability:** Agility, daring, ruggedness, stamina.
- **Observing and Reporting:** Ability to observe and to remember accurately significant facts and their relations, to evaluate information, to report succinctly.
- **Propaganda Skills:** Ability to apperceive the psychological vulnerabilities of the enemy; to devise subversive techniques of one sort or an-other; to speak, write, or draw persuasively.

Shortly after the war was over the OSS was disbanded, with its personnel being divided between the new Central Intelligence Agency (Weiner, 2008) and the soon to be created U.S. Army Special Forces (Green Beret's) (Bank, 1986; Banks, 2006, p. 4). Just prior to disbanding, however, the OSS Psychologists, like the German and British Psychologists before them, published their assessment designs, and list of attributes, in a book called the Assessment of Men (OSS, 1948). One thing worth noting is that despite what the title and much of the text

would have you believe, “about 15% to 20% of the candidates assessed were women” (Handler, 2001, p. 1). While this omission was considered normal at the time, it should also be noted that some of those unnamed and uncelebrated women, including the woman only known as “Adrienne”(Alcorn, 1962, p. 148), endured unimaginable suffering and death after being captured behind enemy lines in service to our country (Alcorn, 1962; Banks, 1995, p. 11).

From these early assessment centers, similar programs have spread throughout the world in both corporate and military settings (Murray, 1990, p. 65). In some cases, the same attributes first created by Dr. Lt. Gardner for the OSS, are still in use today (MacKinnon 1980). What is not clear, however, was whether the OSS Assessment System actually worked; “And did it work for the OSS? The war ended and everyone went home, so no one really knows” (Howard, 1974).

### 1954 - Critique of Assessment Centers

After the war the use of the Assessment Center model spread throughout the world as a tool to screen future leaders for both public and private organizations (Earles & Winn, 1977, p. 3) By 1954, however, a researcher named Dr. Paul Meehl was the first in a surge of researchers who began to question the efficacy of Assessment Centers, in part calling into question the idea that holistic and qualitative assessment programs were superior to the quantitative ones that simply measured test scores (Meehl, 1954; Highhouse & Kostek, 2013). This was by no means a new debate, considering that in 1926 two leading academics Freyd and Viteles had debated the merits of selection procedures, with Freyd making

the argument: “Psychologists are unable to agree, even among themselves, on a person’s abilities by simply observing the person” (Highhouse & Kostek, 2013, p. 567). Dr. Ann Howard, in her 1974 article entitled “An Assessment of Assessment Centers,” argued that “Most of the procedures used to predict future job success are the very ones experience has demonstrated do not work” (Howard, 1974, p. 115). Her critiques included (Howard, 1974, pp. 115-116):

1. That candidate observation, not test score predictions, were most often relied upon to predict candidate success, even though most research shows test scores to be more accurate.
2. Multiple data points are used to predict success, even though it reduces accuracy due to the unknown way that the data points interact.
3. Research shows that interviews, while common, are unreliable predictors.
4. “Managers are asked to integrate all this information and predict behavioral traits as well as potential success, even though psychologists are still struggling to demonstrate that even they can do it well” (Howard, 1974, pp. 115-116).

Almost 40 years later, in 2013, Highhouse and Kostek would write another article critiquing holistic assessment programs and found that there were “surprisingly few studies on the relative effectiveness of holistic assessment for employee selection, especially as it regards individual assessment” (Highhouse & Kostek, 2013) and the ones that did exist had mixed results. Specifically, the research regarding college admissions was showing “that evidence for the superiority of holistic judgment is quite rare in educational and employment settings” (Highhouse & Kostek, 2013, p. 570). One of the main challenges that an Assessment Center methodology faces in regards to an MCT screening and selection process is that it is dependent of the fact that the people doing the assessment need to be both educated in Assessment methodology and rigorous in

its application (Spychalski, Quiñones, Gaugler, & Pohley, 1997). A current MCT Selection program, however, is run by an Instructor Cadre made up of current operators who, may or may not include outside psychologists, and may or may not know how to rigorously implement their existing methodology.

To better understand how trait theory is currently being used by MCT's, the Screening Attributes, or traits, of 11 domestic and international military and national law enforcement Special Operations Counter Terrorism teams from the Australia, Canada, New Zealand, the United Kingdom and the United States that represent the members of the UKUSA Agreement (NSA, 2010) were collected and analyzed (Cline, 2016) using qualitative research methods (Saldaña, 2012) within a collaborative inquiry framework (Bishop, 1995). Nine of the eleven teams in the study are what one key informant calls "destination teams" (Anonymous, 2014). They represent the last stop, or terminal destination, in the SPT screening and training pipeline for operators within their own HRO. The original raw data provided 148 attributes and 2,219 descriptor words. It was through this methodology that we arrived at the initial 302 attributes (codes) and 2,035 descriptor words. Of those 302 attributes, 73 were unique (Appendix A). In other words, ten of the teams shared "Adaptability" as a trait while only seven teams shared "Agency." When the data was coded for the last time (Saldaña, 2012, p. 9) 20 attributes emerged that were shared across all of the teams. The codes were then ranked by the aggregate number of times they occurred in the data with "peer acceptance" being the most common.

**TABLE 2: COMMON MCT TRAITS**

| | | | |
|---|---|---|---|
| 1. Peer Acceptance | 6. Aptitude | 11. Mindfulness | 16. Fitness |
| 2. Adaptability | 7. Integrity | 12. Discerning | 17. Confident |
| 3. Drive | 8. Toughness | 13. Discipline | 18. Loyalty |
| 4. Professional | 9. Agency | 14. Leadership | 19. Trust |
| 5. Bias for action | 10. Communicative | 15. Accountability | 20. Courage |

If we take a closer look at some of the above attributes, the following details come to light:

**Peer Acceptance:** Is a term that describes an individual's sociometric status within a group, or put another way the degree to which an individual is accepted by their peer group (Gifford-Smith & Brownell, 2003, p. 237). It may be tempting to dismiss this as a question of popularity, but the question of peer acceptance is related to group cohesion (MacCoun, 1993), which has significant implications for team performance. In addition, most of the teams in this study already use some type of peer evaluation to evaluate their candidates.

**Adaptability:** It could be argued that a core requirement of all potential candidates for MCT is the ability to adjust to rapidly changing situations, conditions and environments (Kozlowski, 1998; Mueller-Hanson et al., 2005; Raybourn, Deagle, Mendini, & Heneghan, 2005).

**Aptitude**: Historically, in the context of the MCTs, the term aptitude has primarily been used in regards to physical aptitude (Bailey, 2000), for example, do they have natural athletic talent. As will be discussed in the analysis, in this context, aptitude is broadened to include whether the candidates have the necessary level of neural plasticity to be ability to continuously learn and adapt.

**Agency:** Ability or capacity to act or exert power (Simpson, Weiner, & Oxford University Press., 1989; Schwandt, 2007). Within this category can be included terms such as Internal Locus of Control (Rotter, 1966) and Self Efficacy (Wlodkowski, 2011). At its core, this refers to the operators' ability to operate completely autonomously, and not require the close direction, approval or praise of another to function.

In order for the above traits to be useful to Instructor Cadre's however, we need to be able to rely on them to remain stable over time and then be able to consistently define, measure and influence the. In terms of longitudinal stability, there is a body of research that shows that some traits, specifically the "Big 5", extraversion, agreeableness, openness, conscientiousness and neuroticism (John & Srivastava, 1999) remain stable over time. It is also true, however, that researchers remain unclear on how major life events such as war, death, serious injury impact that stability (Pervin, 1994). Considering that things considered major life events for an average person, are considered relatively common within an MCT, we cannot assume that an Operators traits will remain stable

throughout their career. In fact, there is emerging evidence that issues such as traumatic brain injury can have significant and lasting effects on individuals personality (Perry, Pollard, Blakley, Baker, & Vigilante, 1995).

If we put aside the question of longitudinal stability, and just look at identification, measurement and influence, we also run into significant challenges. If we look at the list of 20 attributes in Table 2, number 20 is courage. It is doubtful you will find anyone that would disagree that courage is required to be a member of a Mission Critical Team. The problem is, how does one measure an individual's courage in a two week screening program? If we decided to score someone on a 10 point scale, what does a courage score of 7.5 even mean? How would a member of the cadre describe the observations that led them to a score of 7.5? How would they be able to reliably tell the difference between someone who, for example, has been startled (a "state") vs someone who lacks courage (a "trait"). Lastly, even if they could tell the difference, it is unclear whether they could then influence that trait given that there is an ongoing academic debate regarding which traits are "trainable" or "malleable" and which are fixed (Mueller-Hanson et al., 2005).

All of this leads us to a final complication with Trait Theory which is that not everyone in the community agrees on how to prioritize the attributes. For example, a number of the key informants related to this research study were asked the following question. "If a candidate had all of the attributes that were

necessary to do the job, but had low peer acceptance and were a bad fit for the community, would you take them?" The answer was a unanimous no, they would not accept them. Where it gets complicated is when the opposite scenario is proposed. If a candidate was a great fit for the community, with solid acceptance by their peers, yet they still needed to develop some of their tactical skill proficiencies, would you take them? The answer was that "it depends."

The point of this critique is not to dismiss the validity of either the Assessment Center or the use of trait theory, but to recognize that MCT's are selecting candidates on issues that are "broader than just task performance" (Ryan & Ployhart, 2014, p. 696) . The research shows that "Assessment centers are useful tools for predicting the future success of potential managers" (Klimoski & Brickner, 1987, p. 243), but MCT's are not selecting for the role of future managers and the overall efficacy of Assessment centers is not settled science (Meehl, 1954; Howard, 1974; Klimoski & Brickner, 1987; Spychalski et al., 1997; Arthur, Day, & Woehr, 2008; Lance, 2008; Monahan, Hoffman, Lance, Jackson, & Foster, 2013). With that said, it must also be noted that without rigorous outside support, MCT Instructor Cadres are at risk of repeating previous mistakes such as the use of the "Magic Eye Technique" (Ahrenfeldt, 1958, p. 52) or neglecting to seek out new evidence or techniques because they trust their own lived experience "more than they trust research" (Pfeffer & Sutton, 2006, p. 64).

## 2005 - The Mission Critical Team Instructor Cadre

In the aftermath of 9/11, Mission Critical Teams throughout the world had to adapt and evolve to a new type of Rapidly Evolving Complex Adaptive Problem Set (RECAPS). In turn, this meant that the instructor cadres, who were tasked with staffing those teams, were also required to adapt and evolve. What the operators who began rotating back to the school house in 2005 found, however, was screening, selection and training program that had largely unchanged from when it was first designed for World War II military or espionage organizations (Ansbacher, 1941; Burt, 1942; Fitts, 1946; OSS, 1948; Ahrenfeldt, 1958; Crang, 2000). Those initial programs were designed and run by teams of psychologists (Burt, 1942) focused on selecting future leaders (Earles & Winn, 1977) using assessment research (Highhouse & Kostek, 2013) such as, Trait Theory (John & Srivastava, 1999) for specific jobs or tasks. By 2005, however they had evolved into programs run by Instructor Cadres made up of indigenously trained operators, who had created a legitimate community of practice (Wenger, 2000) focused on identifying candidates with extreme adaptive capacity (Kozlowski, 1998) in order to guide them through a rite of passage in order to join a close-knit community (Turner, 1995; Van Gennep, 2011) with its own distinct cultures and mythologies.

The concept underlying a community of practice is as follows. “Communities of practice are groups of people who share a concern, a set of problems, or a passion

about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4). Much like the communities of practice that preceded them, such as "a tribe around a cave fire, to a medieval guild, to a group of nurses in a ward, to a street gang, to a community of engineers interested in brake design" (Wenger, 2000, p. 229) they represented a close knit culture with its own distinct lexicon. Example of this phenomenon can be found in the fact that Navy SEAL's commonly refer to their collective members as "the community," and refer to their peer MCT's as "Tribes" often using the symbology of Native American Tribes or Spartan Warriors. In New Zealand, the New Zealand SAS has long had a deep relationship with the Maori (Crosby, 2011).

Given that one of the foundations of this dissertation is accurate representation (Bishop, 1995) the term "Community of Practice" will be used in place of the term "tribe" as it is a term (Fried, 1975) that typically connotes notions of kinship and spirituality and can be perceived as being coopted from native peoples (Lowe, Brimah, Marsh, Minter, & Muyangwa, 1997). Therefore, the more appropriate educational research term for an MCT is a community of practice (Wenger, 2000). One of the core principles of these communities is that "competence is historically and socially defined" (Wenger, 2000, p. 226), which is why status within an MCT's is most often "conferred by expertise and not rank" (Jacobs & Sanders, 2005, p. 13). Communities of practice are built around three major

commitments, commitment to mission, commitment to community and commitment to developing and evolving a shared language (Wenger, 2000, p. 229). They are typically populated by communities elders (McIntosh, 2009) who hold unique "Funds of Knowledge," which are "historically accumulated and culturally developed bodies of knowledge and skills" (Moll, Amanti, Neff, & Gonzalez, 1992, p. 133) that enable the community to function effectively (Bishop, 1999).

Evidence of how funds of knowledge can impact MCT Selection is well illustrated by the experience of U.S. Special Forces between 1988 and 2010 when the attributes required to become a member of the Green Beret's changed six times (Jenkins, 2014). Out of context, this seems odd, but Green Berets were part of at least 8 major conflicts during those 22 years. As the conflicts changed the perspectives and priorities of the operators, the cadre began changing the screening attributes. This in turn recalibrated the archetypes of their culture. This example emphasizes the fact that a fund of knowledge, or way of knowing, for an MCT can often be different than that of the CRO it is nested within. This is because the nature of RECAPS require a type of learning that is experientially based and situated in the same context in which it is applied (Dewey, 1938; David A Kolb, 1984; Lave, 1991; Lave & Wenger, 1991; Bishop, 1995, p. 224), unlike more theoretical knowledge. This difference in learning priorities can often create a gap between the Instructor Cadres language and epistemological

framework, or way of knowing, (Bishop, 1995, p. 224) and that of their parent organizations.

This gap between what knowledge is valued by an MCT and the CRO it is nested within can create discordance between the strategies that are used to navigate uncertainty and which information, or experts, are considered valid. In terms of strategy, it must be remembered that a CRO must continuously respond to the emergence of not just RECAPS, but also pre-existing technical, complicated, and complex problem sets. It does this in using a variety of strategies that are implemented by a long standing network of CRB's, HRO's and SPT's. In other words, just traditional surgeons created a separate group of Trauma surgeons did not mean that we no longer needed traditional surgeons or that they two groups would not have to collaborate. If MCT Instructor Cadres are only focusing on the problem sets they were designed to address, then the existing friction they already experience with their parent organization will be exasperated as their potential solutions, are creating new problems for other parts of the CRO.

The second challenge is that the MCT dominant way of knowing is both tacit and pragmatic. Most people best understand tacit knowledge as the knowledge associated with riding a bike or swimming. It is one thing to know how to do it, it is another thing to try to explain it to someone else, either verbally or in writing, given that we all "know more than we can tell" (Polanyi, 1968, p. 30). When you couple a tacit way of knowing with a bias toward Pragmatic theory which states

that “a statement is true if it works” (Seale, 2004, p. 20; Miles, Huberman, & Saldaña, 2013, p. 7; Patton, 2015, p. 152), we see teams that tend to value understanding above knowing, and what is useful above what is interesting. A worldview that privileges tacit and pragmatic knowledge is also biased toward experiential learning (David Allen Kolb & Fry, 1974; David A Kolb, 1984); the on the job training and “notes to self” that mostly say “don’t do that again.” The problem is that without objective evidence, “lessons learned” can lead to what are called miseducative behaviors (Dewey, 1938). For example, if a cat touches a hot pan in the kitchen they may become cautious about all pans, all stoves, and all kitchens (Twain, 1897). While it is true that some theoretical knowledge is neither practical or relevant, unless MCT Instructor Cadre are able to objectively assess both their lived experience and the research, they risk believing strongly in something that no longer works, or worse, is counterproductive (Pfeffer & Sutton, 2006; Rousseau & McCarthy, 2007; De Neys & Goel, 2011).

### THE PROFILE OF THE MISSION CRITICAL TEAM CANDIDATE

In the same way that evolving problem sets have forced organizations to reexamine their assessment methodologies, and Instructor Cadres, they have also had to reassess the optimal human factor as an individual who might be successful as an OSS agent, or British Officer, may not be successful within a modern MCT. What most people don’t realize is that we don’t leave adolescence until we are about 25 years old. This is because it takes that long for the human

brain, specifically the prefrontal cortex, to stop developing (Spear, 2000; Lenroot & Giedd, 2006). The prefrontal cortex is the part of the brain responsible for things such as problem solving, making predictions, forming strategies and assessing risk (Casey, Jones, & Hare, 2008; U. S. H. a. H. Services, 2013). These are actually great characteristics for front line U.S. Army Soldier, who on average is 22 years old (Army, 2013) who needs to charge an enemy hill, but suboptimal characteristics for an Operator within an SPT who is in the late 20's and early 30's (Couch, 2005). Given that the majority of military education was built for those younger soldiers, it makes sense that they did so utilizing traditional training pedagogy. Pedagogy is a Latin term used to describe the "art" and "craft" of teaching, but its literal translation means "leading of children." It is also one of the historical underpinnings of the modern public educational system, which was originally designed to prepare middle and high school students, in large numbers, for the industrial revolution at the turn of the 20th century (Committee, 1999).

Most military boot camp methodologies are designed around using operant conditioning to generate schematic behaviors (Grossman & Christensen, 2004). First developed by B.F. Skinner in 1937 (B. F. Skinner, 1937), operant conditioning describes how we can influence people's behavior through positive and negative reinforcement. The strength and weakness of Operant Conditioning is that it fosters convergent (linear) thinking and problem solving, while expressly discouraging divergent (nonlinear) thinking and problem solving

(Woodman, Sawyer, & Griffin, 1993; Csikszentmihalyi, 2001). The benefit of this methodology is soldiers can be conditioned to override the fight, flight or freeze response, or an "amygdala high jacking," to react predictably under great stress and danger using schematic behaviors. To better understand schematic behavior, picture a novice mechanic learning to assemble a car engine. At first, the sheer number of parts and the precise movements required to reassemble them will feel overwhelming to them, but then through consistent and iterative practice it seems to become automatic, requiring little thought. Much like the schematic drawing used to identify the parts of the engine and their sequence of installation, your brain creates a schema, and schematic behavior is when the novice no longer has to think about what part comes next, they know. Younger brains have less sophisticated networks, meaning they can be proficient in knowing how to build an engine without needed to understand how it will be used, so the process of integrating new knowledge can appear easier (Knowles, 1978).

As those novice mechanics begin making the transition to experts they begin to develop the ability to "chunk" information (Gobet et al., 2001). Chunking is a theory that states that the brain breaks down information in two major ways, Perceptual Chunking and Goal Oriented Chunking. Perceptual Chunking is a precognitive process that refers to the way we organize our senses, sight, smell, sound, taste and touch into patterns. For example, over time the young mechanic begins to understand what the engine should look, sound and smell like when it

is working correctly and organizes all that cues into a chunk labelled “good engine”. Any sight, smell or sound that shows up that is not in the normal range of “good engine” is experienced as dissonant, like a singer suddenly hitting a bad note, attention is immediately drawn to it. On the cognitive level, the process is called Goal Oriented Chunking, and experts use this to help maintain their situational awareness by using a much more efficient cognitive pattern of looking for breaks in established patterns (mental models and heuristics) to determine what “feels right” or “feels wrong.” So much so, that it is common to hear a special operations instructor use the expression “that is what right should feel like,” when training new candidates. As the mechanic gains competence and expertise in the engine building process, they begin to grow confident in both the rightness of the system or construction and their own expertise. At some point, however, that feeling of rightness can begin to work against them as complacency and overconfidence (Helmreich et al., 1999) start to creep in, which is why many HRO’s rely on checklists (Gawande, 2010; Useem, 2011).

In addition to complacency and overconfidence, the other challenge with working with experts is that the very things that made them experts can now act to slow them down as learners. The expert strategy of targeting dissonance, is now working against them, because as they are asked to learn new things it often “feels” wrong, because they are in conflict with an existing schema and mental models. If the candidate does not have a certain level of neural plasticity

(Draganski et al., 2004; Bezzola, Mérillat, & Jäncke, 2012), a measure of a brains ability to adapt to new information or actions, they can often begin to feel incompetent, which can rapidly cascade into a lack of confidence. It is this reason that older learners will often retreat to prior competence and justify their entrenchment as it is "good enough" and "worked so far" even if they know that competence is flawed because the new information is simply to threatening to their identity as an expert. While this may present like stubbornness or apathy, keep in mind that for someone responsible for making rapid, high consequence decisions a loss of confidence in either themselves or the system can be catastrophic. "Habits, values, and attitudes, even dysfunctional ones are part of one's identity. To change the way people see and do things is to challenge how they define themselves (p.27)" (R. A. Heifetz & Linsky, 2002). In an effort to compensate for these feelings, some candidates will try to predict what is happening in training or what the operators often call "choreographing." The problem with trying to predict what is happening within the immersion event, or liminal zone, is that when the candidate encounters a reality that does not match their previous expectations they have to pause to reconcile the two, or to quote the boxer Mike Tyson "Everybody has a plan until they get punched in the mouth." The challenge with an uncontrolled pause within an immersion event is that it can often be the difference between success and catastrophe.

For candidates to overcome the lure of choreographing, they need to have the ability to engage in Reversal learning, the process of overwriting old habits (what are sometimes called "training scars" by the operators) with the new habits being asked of them by the instructor cadre, within the timeframe required (Kalyuga, Rikers, & Paas, 2012). Not only is the rate of learning, or relearning, critical but it is also important how learning effects the competence and confidence.

### THE CANDIDATE DEVELOPMENT AND ASSESSMENT PIPELINE

When the OSS spoke about selection, they were primarily speaking about using a three and half day assessment for entrance to a training pipeline that would prepare them to do a job. Once "selected" the candidate would then attend several weeks of training prior to being deployed. In a modern MCT, the line between Selection and Training has become increasingly indistinct and overall the process has become harder, longer, and more sophisticated (Table 3).

Table 3: Modern Candidate Development and Assessment Pipeline

| Candidate Development & Assessment Lifecycle (Selection is ongoing) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Intake (Separation) | | | Development & Assessment(Liminality) | | | | Transition (Incorporation) |
| Recruit | Test | Screen | Induct | Select | Train, Ed, Exp. | Crucible | Graduation |

In one form or another all MCT's have some sort of Anthropological Rite of Passage (Jacobs & Sanders, 2005, p. 18), which is why the above table has been organized into the three phases. The First Phase, Intake, includes the stages of;

recruitment, testing and screening. This phase encompasses the separation aspect of the Rite of Passage where a candidate has chosen to enter the selection process, and in doing so, has decided to part from their old life, and old identity, with no guarantee of success. The Second Phase, Development and Assessment, is entered upon making it through the initial screening and includes the stages of; Induction, Selection, Training, Education and the Crucible. Once they enter the professional Development and Assessment pipeline to the moment they leave, they are in a liminal space, meaning that they are neither what they once were or yet what they might be, they are without identity (Turner, 1995, p. 107). The third and last phase, Transition, refers to graduation stage, where the candidate leaves the liminal space and incorporated into a new team, with a new status and identity (Van Gennep, 2011).

1. **Stage One: Intake (Separation) –** This is the stage to determine if the candidate is eligible to enter the Selection and Training pipeline and separate from their former life.
    a. **Recruit:** A targeted approach to find applicants with potential to succeed.
    b. **Test:** The administering of cognitive, physical and tactical tests to inform the screeners if the applicant meets the minimum requirements to become a candidate.

c. **Screen:** The face to face interview process to assess the candidate's potential, which includes a review of their past history and test scores, in order to enter the selection and training pipeline.

2. **Stage Two: Professional Development & Assessment (Liminal Stage) –** Increasingly, this phase recognizes that whether the candidate meets the standards of the MCT, or not, they will remain within the CRO and should be improved in some way by the MCT selection process.

   a. **Induction:** The candidates initial exposure and understanding of the MCT culture including its folkways and Mores (Sumner & Sagarin, 1979). These are terms that describe the shared behaviors, manners, and customs of an MCT community. Mores "distinguish the difference between right and wrong, while folkways draw a line between right and rude"(Macionis & Gerber, 2010, p. 65). Put another way, "We are not joining you, you are joining us" (Anonymous, 2014).

   b. **Selection:** This term is used differently among the teams. For some teams "Selection is Ongoing" (Anonymous, 2014), while for others there is a specific 30 day (approximate) period where candidates are exposed to the team's culture, and tested against documented standards before being eligible to enter the training

pipeline (Anonymous, 2014). This is often a product of the size of the applicant pool. Those who are selecting from a pool of 2,000 are likely to have a separate selection phase, while those selecting from a pool of 200 are able to merge selection with training.

c. **Training, Education and Experience:** According to the U.S. Army Command and General Staff College, training is for certainty and education is for uncertainty (Draude, 2011; Army, 2012). Put another way, we train people to fix a car; we educate people to invent one. In this context, experience refers to experiential education, which has elements of training and education, but is facilitated to insure that a transition of the learning back to the lived experience (Dewey, 1938; David A Kolb, 1984).

d. **Crucible:** "A transformative experience through which an individual comes to a new or an altered sense of identity" (Bennis & Nanus, 2004, p. 40). This can be the entire training process of an individual or group event that is difficult, but universal, that culminates the experience (Hell Week, etc.).

3. Stage Three – Transition

Graduation marks the transition phase of the Rite of Passage, where the candidate leaves the liminal stage to move on to a team.

a. **Graduation –** This marks the end of the Development & Assessment pipeline. Typically, the candidate will now enter a new team as the person with the lowest status and is inducted again into the unique culture of the team through storytelling or the oral tradition (Foley, 1988). It is in this way that new members of an MCT develop a new way of thinking, a new way of navigating uncertainty, and a new personal and professional mythology (Campbell, 2008; Campbell & Moyers, 2011).

Typically, if a candidate fails their selection program, they do not leave the larger High Reliability Organization, which is why it is critical that MCT Instructor Cadres begin, or continue to, recognize the importance of their role as a learning community (Wenger, 2000). For those who do graduate, however, they will be going on to enter an entirely new type of team, a Mission Critical Team, which is nested within a network or team of teams (G. S. McChrystal, 2015).

## 2006 Mission Critical Teams

### Radical Change Event

By the mid 1980's, the twin emergence of the Crack Cocaine and Aids epidemics were overwhelming hospitals across the U.S. (Caulkins, 2002). At the time, many tier one hospitals had already put in place trauma surgical teams after the release of the, "Accidental Death and Disability" report 20 years earlier in 1966 (Trauma

& Shock, 1971). The report had presented evidence that a soldier had a greater chance of surviving being shot in combat than the average citizen did surviving a car accident on a U.S. Highway. The resulting outcry led to the creation of both Emergency Medical Services as a whole and dedicated Trauma Surgical Teams (Mullins, 1999; C. W. Schwab, 2013a). These SPT's were based on the Special Operations Team Model (Trunkey, 2007) that was organized around the doctor/officer, who stood at the side of the patient providing primary care and acting as a directive leader to the rest of the team (Reeves, MacMillan, & Van Soeren, 2010).

The emergence of Aids and Crack Cocaine, however, had led to a massive spike in trauma patients who could threaten the health of the trauma teams. The SPT strengths of contingency planning, deep preparation and directive and empowered leadership were breaking down as it could not react to the problem sets quickly enough. Some of these Trauma Teams, however, were led by doctors who had worked during the Vietnam War (Holmes, 2013), and had been trained in the "command by negation" leadership model. Originally created for naval officers who needed to make rapid decisions within the complex physical and social ecosystem that is a ship, the model is based on a distributed leadership model that assumes officers will carry out their missions unless negated by a superior officer (Sharp, 2006). By the 1980's, the increased education of the Trauma Nurse coupled with numerous technological innovations created a

situation where attending physicians could physically move from a directive leadership position at the side of the patient to a command by negation role at the foot of the patient (C. W. Schwab, 2013b). This new approach meant that trauma teams could now rapidly accelerate care as they no longer needed permission to act. Instead, during critical events such as resuscitation, the attending surgeon only intervened when the team needed de-confliction or the intervention of their more advanced set of skills (C. Schwab, 1993). What they found was that within Trauma Teams, this transition from directive to empowered (or distributed) leadership, resulted in a statistically significant improvement in the quality of healthcare (Yun, Faraj, & Sims Jr, 2005). While tactically, this transition from directive to empowered leadership was proven successful it also created significant structural and cultural friction as it contradicted the parent HRO's historical roles and traditions. By 2006, various SPT's around the world had made or were transforming into Mission Critical Teams.

## Problem Set

Rapidly emergent complex adaptive problem sets (RECAPS) are identical to the problem sets that HRO's and SPT's are facing, but in emerge in with a radically different temporal profile. Instead of having days or weeks to respond to a specific emergent problem sets, Mission Critical Teams have minutes or seconds to simultaneously resolve multiple problem sets. Exemplars include; Terrorist

networks, multivehicle car accidents, and interagency response to emergent networked problem sets.

## Organizational Response

Similar to SPTs, MCT's are designed as small (4-12 agents) integrated groups of indigenously trained and educated experts, that leverage tools and technology to resolve complex adaptive problems (Quesada et al., 2005) in an immersive, but constrained (5 minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss (Cline, 2014, p. 1). The reason I am benchmarking 5 minutes or less is that it is the amount of time the average human brain can go without oxygen (Suominen et al., 2002). On average, it takes 9 minutes for the Fire Department of New York (FDNY) from the time they first get a call about a fire to having it under stabilized anywhere in New York (New York (N.Y.). Fire Dept., 1970). Trauma Surgical Teams have approximately 4 minutes to stabilize a patient once they arrive at the hospital (C. W. Schwab, 2013b). A Hostage Rescue Team has only seconds between the moment they breach the door to putting their hands on the victim, or it is unlikely they will survive (Anonymous, 2014).

Where MCT's are unique, is in the fact that they are an integral rather than separate part of a larger network. In the same way that the technology moved from isolated machines, to inter-connected machines when we transitioned from CRB's to HRO's the Human Factors are now inter-connected as well. This means

that while SPT's are nested within a Crisis Response Organization (CRO), an MCT is nested within a Crisis Response Network (CRN) The strength of being part of a larger CRN, or what Steven Johnson would call "liquid networks" (Johnson, 2010) is that integrated networks are capable of greater adaptive and generative learning (Chiva et al., 2010). Liquid networks are communities of experts that that engage in generative ideation, or a lot of new ideas which lead to rapid innovation, at a faster rate than a single person can in the same timeframe. Exemplars include in the Military with the creations of Task Force 714 in 2003 (S. McChrystal, 2013, p. 93), in medicine with the introduction of distributed leadership after the crack wars of the 1980's (Yun et al., 2005), in Fire with the move to the All Hazards Approach after the attacks of September 11, 2001 (Pfeifer & Merlo, 2011).

## Operational Environment

Because of the rapid emergence and evolution of new complex adaptive problem sets, the SPT paradigm of contingency planning and deep preparation was, in some cases, now a liability. When military special operations entered the Iraq war, after the events of 2001, Special Operation missions were built on a "Planned Target," which required a 96 hour planning cycle (4 days) in order to accomplish one mission a night that may last 2-4 hours (Willink & Babin, 2015, p. 211). This model was built of a doctrine which originated in missions such as the famous Israeli Special Operations raid on Entebbe, to rescue hostages, in 1976

(McRaven, 1996). The Mission took place over an 8 day period, with a great deal of contingency planning and deep preparation, with the actual ground mission lasting 51 minutes (McRaven, 1996, p. 333). The mission was a tremendous success, but its model assumes a planning cycle measured in days, for a mission that may be measured in hours. By around 2003, MCT's were moving through joint planning exercises in much less than an hour to run missions that may last less than 5 minutes. At the same time, the transition from planned target to time sensitive target required a different paradigm for how teams would decide to navigating uncertainty.

For example, within military special operations, much of the doctrine on things like clearing a room with a bad guy in it was settled by the mid 1990's (Anonymous, 2014). The priority had always been to maximize the speed of operations, as the belief was that "speed creates security" (Ruiz, 2014). It is the part of the action movie where a Special Operations teams blow in the front door and stream into the building firing their weapons, killing the bad guy and saving the hostage. Unfortunately, by about 2002 all of our enemies had also seen those movies, and had watched them play out in real life in their cities and villages as well. In response, they started placing machine guns behind the doors and waited for the operators to rush in. The strategy was effective and the U.S. body count was starting to increase. Different units started to re-examine the urgency

of entering the room. In the absence of a hostage, why not simply contain the bad guys and engage them from a more secure location.

At the same time, one of U.S. Special Operations coalition partners, the Israelis, were asking "what's the hurry?" Israeli Special Forces have a lot of experience in urban warfare, and had already realized that if they have the house surrounded and no one is coming to reinforce the bad guys, why not just tell them to come out, instead of the team going in? The process was referred to as "call outs", and while seemingly useful, were not implemented by other SPT's immediately. The problem was that it was not simply the breaking of old habits, but the fact that some operators saw "call outs" as... cowardly. The fact is that Modern SPT's are not just a team made up of some common attributes, but an established complex social ecology with their own beliefs and mythology. The emergence of "call outs" as a tactic seemed to be incongruent with the culture and mythology of an SPT war fighter. As MCT's began to come on line, however, the teams started to understand that they now had greater "throttle control". Instead of it just being an on/off switch, they could throttle up, or throttle down, as appropriate and if necessary take tactical pauses to reassess. A similar transition had occurred two decades prior as Surgical Trauma Teams transitioned from a directive to empowered leadership model (Yun et al., 2005), which also led to a transition from followership to membership as the teams flattened (Mattson, 2016).

Technology and Information Management Profile

The effective use of liquid networks requires training and technology to increase Shared Situational Awareness (SSA) (Nofi, 2000), or distributed cognition (Y. Rogers & Ellis, 1994), through Joint Cognitive Systems (JCS)(David D. Woods & Hollnagel, 2006) so that teams are able to develop "a group dynamic mental model" (Nofi, 2000). If the training is effective, research has shown that increases in SSA can improve team performance (E. Salas, Cooke, & Rosen, 2008). Training alone, however, will not suffice as these teams operate in a tactical environment saturated with data and communications. A Joint Cognitive System (JCS) is defined as the "...combination of human problem solver and automation/technologies which must act as co-agents to achieve goals and objectives in a complex work domain" (Potter, Woods, Roth, Fowlkes, & Hoffman, 2006). It is the integration of human, computational and communication systems that "uses knowledge about itself and its environment to monitor, plan, and modify its actions in the pursuit of goals (Mission)" (David D Woods, 1985, p. 86). It is not enough to have a lot of great data if we don't have the time or ability to interpret that data. MCT's in Fire, Trauma Medicine, Tactical Law Enforcement and Special operations are still trying to figure out how to take big data and condense it to actionable data and integrate it into their lived experience(Tufte & Graves-Morris, 1983; Tufte, 1991).

Human Factor Profile

As complexity increases it becomes increasingly important that both the experience and the cognitive diversity of the teams are increasing. By focusing on the older candidate, who already has mastery of the basics, it allows teams to rely more on principles than rules which allows for more rapid and sophisticated problem solving. The downside of recruiting experienced agents is that they arrive with pre-existing habits. For them to successfully navigate the MCT selection and training program they need to have the ability to accomplish what is termed reversal learning (Kalyuga et al., 2012). Reversal learning is term used to describe the process of overwriting old habits (what are sometimes called "training scars" by the operators) with the new habits being asked of them by the instructor cadre. The ability to relearn a skill set is not simply about neural plasticity, but how the agent can cope with the emotional impact on their competence and confidence. "Habits, values, and attitudes, even dysfunctional ones are part of one's identity. To change the way people see and do things is to challenge how they define themselves" (R. A. Heifetz & Linsky, 2002, p. 27). At the same time, the MCT training pipeline is not indefinite, and as such they need be able to be capable of adaptive and generative learning (Chiva et al., 2010) in multiple domains (Gardner, 2006) at a certain rate. By generative learning, we are specifically referencing the type of learning that can lead to additional learning (Wittrock, 1992). Issues such as rate of learning, neural plasticity,

adaptive capacity and other previously developed protective factors (Waller, 2001) are critically important but do not reduce the impact of culture. Like SPTs, MCTs require candidates that embrace the values of the community, but unlike SPTs, MCTs are not looking for Cultural Fit, as that can lead to cultural stagnation, as much as they are cultural contribution (Grant & Sandberg, 2016). The need to evolve and adapt requires that their culture and traditions do not become in conflict with their evolving mission set.

## Research Methodology

Initially my intent was to study Mission Critical Teams through observations and interviews then return to the University to create a grounded theory upon which I could base my dissertation. Grounded theory is a process of generating a theory about the focus of the study through a rigorous analysis of the data that is collected, typically using a series of coding cycles and analytic memos (Robson, 2002; Glaser & Strauss, 2009; Miles et al., 2013, p. 8). In the aftermath of Extortion 17, and the death of Rob and Heath, the idea of being a detached researcher that could sit back and interpret the data in isolation felt inappropriate. Foundational to my belief about this research is the understanding that it is being conducted by a trainer and educator, for and with other trainers and educators. As a result, I made the decision to move from grounded theory to a specific form of Practitioner (Cochran-Smith & Lytle,

2009), or Participatory Action (Herr & Anderson, 2005), research called Collaborative Inquiry (Bishop, 1999), that allowed me to partner with, rather than study, the Instructor Cadres I had been interacting. The major difference between Collaborative Inquiry and a Grounded theory approach in the sense that the "it is the research participants together, in a dialogic manner, who are developing the explanations in terms of the cultural contexts of the participant, rather than that of the researcher" (Bishop, 1995, p. 53).

It was through the Collaborative Inquiry Process that I arrived at both my research Questions and my research methodology. My primary research is: Would a University Assisted, Mission Critical Team Instructor Cadre Development Program increase the ability of the Mission Critical Teams to achieve Mission Success, Survivability and Sustainability? It emerged from the fact that the teams did not have the internal capacity to either innovate at the rate they now required or hold on to the institutional memory of those innovations because of the rate of personnel turnover. In order to answer that primary question, however, certain subsidiary research questions also needed answering:

- Is there evidence that Mission Critical Teams represent a unique type of team?
- Do Mission Critical Teams share a common event lifecycle?
- Do Mission Critical Teams Instructor Cadre's represent a legitimate Communities of Practice?

For the research to gain traction within a collaborative inquiry framework, however, the Instructor Cadres needed to recognize that they had a legitimate

voice. Up until the 1980's, most Instructor Cadres, made up of staff or for the military Non-Commissioned and/or Warrant officers, were there to implement and support the predetermined plans of the Officers and Psychologists. Over the last several decades, however, the Instructor Cadre has assumed the dominant role in determining who enters their community and how they are trained and developed. At the same time there remained structural and cultural barriers that prevented these Cadre's from taking up their authority as Community Elders (McIntosh, 2009) who had evolved unique "Funds of Knowledge" (Moll et al., 1992). What some in the Cadre believe is that there continues to be leaders and academics who feel quite strongly that it is a waste of time to develop and educate the "diggers" and the "sled dogs," as their job is to act, not think. The problem with that narrative, however, is that it is only half the story. The other half of the story is the fact that behind closed doors, most MCT Instructor Cadres will tell you "no one wants to be the smartest kid in class" (Anonymous, 2014).

The dominant archetype among the staff or enlisted operators is to be self-depreciating to a fault and never let on that you are too smart. The flaw in this narrative is that the modern selection pipeline has steadily required greater intelligence and aptitude over the years, meaning that anyone with an average or below average intelligence is removed from the selection and training pipeline long before they are able to join the team. This paradox, between operationally selecting for intelligent operators while culturally downplaying the importance of

intelligence is one of the primary drivers behind the Collaborative Inquiry approach to this research. If the Instructor Cadres are ever to see themselves as a legitimate community of practice(Wenger, 2000), they themselves first needed to be empowered to recognize that legitimacy.

Ultimately, while it was I that originally initiated the research, it was only when I understood that I needed to conduct research with the cadre, rather than on the cadre (Heron & Reason, 2006, p. 1) that I the research began to take shape. I created a methodology that I would facilitate, but that the Instructor Cadres would control, with the intent that they would "undertake a formal, reflective process for their own development and empowerment" (Patton, 2015, p. 221) using a generative (Miles et al., 2013, p. 56) collaborative (P. Reason, 1996) and narrative (Connelly & Clandinin, 1990; Bishop, 1995) inquiry process. In 2002, the American Anthropological Association published the findings of the El Dorado Task Force on working with indigenous peoples (Association, 2002). One of their primary recommendations was that research among indigenous peoples should rely heavily on "the collaborative model, with its intrinsic recognition of their full and unfettered right to define their own futures" (Association, 2002). Recognizing that their might be similar issues and dynamics taking place with MCT Instructor Cadre's, I decided to use the collaborative inquiry model developed by the Maori communities of New Zealand called Kaupapa Maori (Walker, Eketone, & Gibbs, 2006). "The objective was to engage

in a process of critical reflection and connect epistemological questions to indigenous ways of knowing within the context of actual research projects" (Bishop, 1999).

## KAUPAPA MAORI

The Kaupapa Maori research model is based on five engagement principles; initiation, benefits, representation, legitimation, and accountability that were developed by Dr. Russell Bishop to honor the Maori way of knowing (Smith, 1992; Bishop, 1995, 1999, 2003; Walker et al., 2006). While MCT's are neither Maori, nor indigenous people, the intention is to utilize the principles as way to honor the MCT Instructor Cadres unique ways of knowing and help empower them as legitimate Communities of Practice.

### Initiation:

The Principle of Initiation within Kaupapa Maori is focused on the questions of who initiated the research, why did they initiate, and what are the goals? I began pursuing my research as part of the naturally occurring practice as the Director the Wharton Leadership Venture Program, at the Wharton School in the fall of 2008. My position at Wharton, and the number of former SPT members to come through our program, it did not take long for me to be introduced to the key members of MCTs. Through a number of conversations, as well as insights from my own experience on Wilderness Guide, as well as Emergency Response Teams, I began to notice some similar perspectives across a variety of what I began to call

Mission Critical Teams. So, on November 15, 2008 I invited 7 people to join my spouse Amy and Myself for dinner at the White Dog Café (Appendix D). At the time, my goal was to see if there were commonalities across perspectives to help me in my work in the Wharton Leadership Venture Program. With that said, I was a stranger to their worlds, and wanted to create a dialogue that start to uncover "the relationship between theory and experience" that was grounded within their socio-cultural-technical ecosystems (Bishop, 1995, p. 46). The intent of the conversation was to determine if members of these diverse teams shared perspectives about their training, their work, and their understanding of the teams they worked on. It was technically an unstructured group interview (Weiss, 1995), but it was more accurately an ongoing dialogue linked by individual narratives as the group would illustrate their answers with stories. Repeatedly, I was told that it would be easier for me to understand their responses if I could visit their training sites.

Following that meeting, from 2008 – 2016, 15 Crisis Response Organizations participated in the collaborative Inquiry partnership (Appendix B), an enabled me to visit and/or observe 22 Mission Critical Teams (Appendix E) for the purpose of immersing myself within their training cycles to identify both surface data and deep structures (Light, 1979). Given that many MCT's experience a turnover of leadership about every 2 years some partners would enter or exit the Collaborative Inquiry community periodically depending on the interest and

commitment of the current leadership. In the case of one command, the research has spanned 5 changes of command, with 5 different individuals taking the research partner role. It was this experience that made me realize that MCT's are currently structurally unable to maintain any type of long term innovation and learning process without outside support.

I was able to gain access to the sites by using "Snowball" or "Chain Referral" sampling methods, where a key informant of one team would refer me to a key informant of another team (Robson, 2002, pp. 275-276). If I added some value, I would be either invited back, passed on to some new contact, or both, with my status slowly becoming that of a trusted outsider (Herr & Anderson, 2005, p. 31). In an interesting turn of event, it was the failure of this process that led me to entering the doctoral program. In 2010, after a couple of years of informal observations I had the opportunity to interview the then Assistant Director of the U.S. Secret Service, Richard Elias (Elias, 2010). I met with Mr. Elias at the Office of the Secret Service in Washington D.C. to ask him about their approach to building teams within the Secret Service. After the discussion, I asked if it was possible for me to visit their training facility in Beltsville, MD and he agreed to put me in touch with their training department. About a week later, I get a phone call from the Secret Service Training Site asking "Who are you? ...and who is your research associated with?" When I explained it was just personal interest, they

replied that the Secret Service did not open its training facility to people who are just curious." In hindsight, that does seem reasonable.

It was this experience that made me decide to pursue my doctorate. The decision to choose a professional degree, an Ed.D, as opposed to a research degree, a Ph.D., was deliberate in the sense that my goal was to improve MCT Instructor Cadre Practice. It was shortly after I entered graduate school that I experienced another large shift to my perspective during my first visit to one of the Joint Special Operations Command training sites. I was there to observe training in what is called a "Shoot House." A shoot house is basically a large warehouse that contains a series of one story buildings that have walls and doors, but no ceiling. It is sort of like a maze for mice, but human sized. Built along the top of all the walls is a walkway for instructors to observe the training below. Because, I was observing live fire exercises, I was required to wear ballistic Eye, Ear, and Body protection. A few hours into that first visit the lead instructor asked me what I thought. It is important to understand that I had arrived with the deeply held assumption that these were the best instructors in the world and I was just there to record what they told me so I could move on to other parts of my research. Parts of it, however, were really confusing.

For example, it is no secret that military training involves candidates being yelled at. Some teams call this verbal noise "friction". It is meant to simulate the disruptive nature of combat as a form of stress inoculation (Saunders, Driskell,

Johnston, & Salas, 1996). At the same time, research clearly indicates that if a person is too stressed they cannot learn (LePine, LePine, & Jackson, 2004). Basically, you teach someone or you can overwhelm someone, but you cannot do both at the same time. Yet, what I was observing was that some of the instructors were applying "friction" not only during testing evolutions, but also learning evolutions. Given my assumption about their competencies, I just assumed they knew something I did not. As a result, I sheepishly replied to the lead trainer that I still hadn't quite figured out what was going on, due to my apparent misunderstanding of the research. The instructor paused, and asked me to explain in more detail the research I was referring. So, I did. He then considered what I said and then repeated it back to me to confirm he understood. I affirmed he did, and he stated "Okay, we will do that now". I was genuinely shocked, and quickly protested, suggesting they should think it over before they made any changes to the training program. His reply was "no need, it is a better way." Then he waited until the candidates left the shoot house and gathered his instructors together to explain that friction would now be restricted to testing evolutions, because we wanted to make sure they had the opportunity to learn. There were a few questions regarding implementation and then they went back to work. Just like that, with absolutely no intention to do so, I had just influenced the training curriculum of Joint Special Operations Command.

Throughout the rest of that observation, various members of the Instructor Cadre would ask me questions regarding their Instructional Practice. My reply was to first have them explain the context, and in the dialogic process of having to break down their question in a way I could understand it often ended up answering their own question (Bishop, 1995; Heron & Reason, 1997; Herr & Anderson, 2005; Cochran-Smith & Lytle, 2009). By the end of that observation, it had become very clear to me that what started out as *my* research had suddenly turned into *our* research. Ultimately, it was through this process that I began to build my conceptual framework, the tool that researchers utilize to construct and maintain a rigorous and appropriate academic argument (Ravitch & Riggan, 2012).

Benefits:

The Principle of Benefits is focused on questions regarding what and who benefits from the research. Two significant criticisms of participatory action research (PAR), such as Collaborative Inquiry, are: (1) that the researcher sacrifices the ability to authentically criticize the partners of the study, and (2) the validity of informed consent (Cochran-Smith & Lytle, 2009, p. 104). These are fair critiques, considering that over the past eight years I have spent a great deal of time with many of the operators, stayed at their houses, met their families, or attended their memorial services, as was the case for both Rob and Heath,. Through these experiences, many of the operators have become good friends.

Equally important, I will always remain a stranger in a strange land, as is true for all who have not successfully passed through each community's respective selection and training pipeline(Herr & Anderson, 2005). I state all of this to both be clear about my bias toward the individuals that make up the instructor cadre and to articulate the paradox that comes with that bias. Individuals who make up the Mission Critical Team community have "an almost mystical devotion to mission accomplishment" (G. S. McChrystal, 2015, p. 3) and as a result are suspicious of too much praise and demand frank feedback. As a result, my growing relationship with the teams has actually increased my willingness to critique.

In terms of informed consent, much of the data has been provided by people and teams who, in some cases, do not officially exist. There are a number of reasons for their needed secrecy, but the one that is relevant for this paper is that many of these teams, and the operators who belong to them, have bounties placed upon their death or capture. What this also means is that the sites where my observations and data collection have taken place are, in every case, secure facilities, and as a result I am required to state both my purpose and my intentions, so my strategy from the beginning has been total transparency. This type of secrecy is both a strength and weakness to the Instructor Cadre. They are measured in what they discuss to outsiders, which inherently limits their opportunities to receive new research, new ideas, or spark innovations through

synergies with academics or the private sector, despite the merits in such diverse interactions for tackling adaptive problem set (Roberts & Rousseau, 1989). By engaging in a process of cooperative, or collaborative, inquiry (P. Reason, 1996), the Instructor Cadre is both able to gain access to research and ideas while simultaneously ensuring no inaccurate or sensitive information is disclosed.

Representation:

The Principle of Representation is focused on the questions regarding whose voice is heard, who does the work, whose interests are represented, and who can edit the data? During the chain referral period, not all teams I was referred to seemed appropriate for the purposes of my research. As a result, I worked with the existing Collaborative Inquiry Partners establish a criteria for determining which teams were eligible to join the Collaborative Inquiry community (Appendix C).

For those teams that did meet the criteria, and decided to join the MCT collaborative inquiry community, it was also necessary to identify who within their community of practice was a considered a community elder, or are what are sometimes referred to as “greybeards” and act as the arbiters of cultural and historical truths. Identifying the Greybeards was important because, they own the narrative, within most of the MCT communities. For example, in the context of medicine it is often the nurse that “owns the narrative” of a patient. While specialists will come and go from a patient’s bedside, a nurse will consistently

interact with that patient for the entirety of their treatment. As a result, are the only one who has knowledge of the patients entire lived experience and the narrative that represents that lived experience (Meleis, 2016). A narrative, or story, is an "account accepted as true by virtue of great age or long tradition." (Simpson et al., 1989) Historically, stories are "used to collect, deposit, analyze, store, and disseminate information as instruments of socialization" (Chilisa, 2011, p. 138) In other words, as new Firefighters join the FDNY they are told stories of past fires to help them understand what that community values and what is expected of them in the future. They provide the social and cultural guiderails on expected behavior. The challenge that comes with documenting those narratives lie in how they are interpreted by the researcher (Schwandt, 2007), a process qualitative researchers refer to as hermeneutics (Nakkula & Ravitch, 1998). In order to insure that the narratives were accurately represented we needed to find a way to develop an epistemology, or framework, of knowledge generation and definition. To resolve this challenge our Collaborative Inquiry Community developed a dialogical process of telling, and retelling, their stories accompanied with clarifying questions. This joint construction of their lived experience, through collaborative storytelling, that resulted in a narrative that blended their lived experience with an often more precise and accessible language (Connelly & Clandinin, 1990; Bishop, 1995). Ultimately, it developed into an

iterative process that was almost identical to the development of the craft of storytelling within the oral tradition (Foley, 1988).

In addition to stories, almost all of the teams use proverbs to express one of the communities "truths," often in the form of short adages or metaphors to describe a general truth or way of knowing (Chilisa, 2011, p. 132). One common example of this is the military special operations proverb "slow is smooth, smooth is fast." It is a proverb that is both referencing the use of a sniper rifle but also the community's expectations about the general performance of its operators. It was often through these dialogues that I began to learn each of the communities Shibboleth (McNamara, 2005), a term that was first used in the bible to describe a catchword, phrase or acronym, used as a test for detecting foreigners or outsiders by its use or pronunciation. For example, it took time to realize that the term "operator" is an informal term used by the MCT community in reference to another person. For someone to call themselves an operator, would be similar to someone referring to themselves as cool or humble.

This required an iterative dialogic process that focused on exploring tacit knowledge, and deeply held assumptions and beliefs, supported by a more precise academic language when appropriate. Sometimes, I was told to "stop with the big words" and sometime I helped the Cadre move from the "you suck, suck less" conversations to more specific types of feedback using a more specific academic language.

Legitimacy:

The Principle of Legitimacy is focused on the questions of who defines what is accurate, and true and complete in a text. Who constructs theories to explain the findings? A primary tenant to Collaborative inquiry is the concept of "power sharing" (Patton, 2015, p. 221). The outcomes needed to be co-constructed if they were to be seen as authentic and correct, as "Agency comes from collective participation" (Bishop, 1995, p. 37). As I and the cadres interact knowledge emerges through multiple conversations that rely on many "different discourse, each with their own assumptions. Critical to this is that the research method is that the discourse must emerge from and be validated within the MCT Instructor Cadre (Smith, 1992, p. 12; Bishop, 1995, p. 26). The importance of this discourse can best be understood through the work of the French Post-Structuralist Michel Foucault who understood "discourse as a system of Representation" (Hall, 2001, p. 72) and understood that when an MCT Instructor Cadre discuss their work, they use groups of statements that represent the communities knowledge and history (Hall, 2001). This is important, because it is through these discourse that the historical truth of the community is established (Hall, 2001, p. 74). This iterative dialogic process within the Collaborative Inquiry Community allowed the community to develop a shared understanding and explanation of the lived experiences across MCT Instructor Cadres.

In multiple instances when I would present my explanation of a specific phenomenon, the partners would reply with an appreciative understanding on how I could reach a false conclusion, and then partner with me to help me illuminate what I did not see. At the same time, inherent in the iterative dialogic process is the exchange of language and it is not uncommon for a cadre member to exclaim "that is the word I have been looking for!" as they suddenly had access to new words to describe an old phenomenon or obtain access to a new perspective. In this way key theories and themes are being co-constructed in an ever evolving way as the community finds ways to understand and articulate tacit knowledge with the newly acquired language of the researcher (Bishop, 1995, pp. 72-73).

The iterative dialogic process would often take the form of unstructured group interviews with the intent to both create generative outcomes while at the same time "implement the enhanced research relationship" insuring that the ultimate product is "more than just people's ideas encapsulated within the words and ideological frameworks of the researcher" (Bishop, 1995, p. 70). Over time, what became clear that imperative to this process was an active sense of empathy, that emerged from a prior lived experience. It mattered, when talking to the Instructor Cadre's, that I knew what it was like to be cold, wet, tired, hungry and confused, or that I knew what it was to live through death of a teammate.

Knowing how to use a weapon, or fire hose, or a scalpel was incidental, but having a deep understanding of suffering, mattered.

Lastly, within the dialogic process remained the challenge of making sure the Instructor Cadre's voice, and way of knowing, remained intact, while at the same time communicating their narratives in way that maintains rigorous academic standards needed to ensure reliability. A challenge that required that I navigate the razors edge (Maugham, 1944) between the emic and etic (Schwandt, 2007, p. 81). Emic is a term that refers to the language of the operators. In fact, the term "operator" is an emic term that is used to describe a person who has achieved the cultural status of mastery on a MCT. That said, any "operator" that provided me access is referred to as a "key informant" in the etic language of academic researchers because "they are well informed, are accessible, and can provide leads about other information" (Creswell, 2007, p. 243). Lastly, a glossary at the end of the document will include both emic and etic terms.

Accountability:

The Principle of Accountability is focused on questions such as, who the researcher accountable to, who has accessibility to the research findings, and who has control over the distribution of the knowledge? There is a long history of researchers coming in to engage in research and then either disappearing entirely afterwards or writing up the findings in a way that the operators could not understand. It was one of the reasons that Kaupapa Maori is being used as a

methodological framework as it was originally designed to help the Maori achieve "increased autonomy over their own lives and cultural welfare" (Smith, 1992, p. 12; Bishop, 1995, p. 25). It meant that from the very beginning, this research has been co-created within the forum created by the Collaborative Inquiry Community. Everything you are currently reading has already been seen by the people that helped create it, or shape it.

## Research Methods

As per the principle of representation within the Kaupapa Maori research methodology, I had both developed a criteria for membership into the Collaborative Inquiry Community (Appendix C) and then used that network to identify key informants (Creswell, 2007, p. 243) that were recognized as community elders (McIntosh, 2009). There was an intentional effort to choose MCT's from multiple domains (Fire, Medicine, Law Enforcement and the Military) to offset early criticisms that cooperative or collaborative inquiry could not be generalized to other populations (Foshay, 1994, p. 3; Herr & Anderson, 2005, p. 19). In addition, efforts were made to encourage the Collaborative Inquiry partners to go beyond examining the practice and find ways to interrogate their praxis. While similar in meaning, a cadre members practice speaks to the mechanics of how they teach, while Praxis refers to the process of determining why they teach that way (Schwandt, 2007). To that end, it was important that the research methods the Collaborative Inquiry Community

utilized to engage in the community were experiential in nature (Lave, 1991; Wenger, 2000; Heron & Reason, 2006):

Unstructured Interviews

From 2008-2016 I engaged in a series of unstructured interviews, as part of my naturally occurring practice, than enabled me understand the community I was working. “This type of interview offers the opportunity to develop a reciprocal, dialogic relationship based on mutual trust, openness and engagement, in which self-disclosure, personal investment and equality is promoted” (Bishop, 1995, p. 70). Furthermore attempts at constructing meaning through unstructured interviews utilize the theory of collaborative inquiry to promote dialogical symmetry of validity (Bishop, 1995, p. 41; Herr & Anderson, 2005). These “Interviews as conversations” (Bishop, 1995, p. 70) create an environment where interviews act as “the 'coding' exercise, as a product of shared meanings, becomes part of the process of description and analysis” (Bishop, 1995, p. 77).

Narrative Inquiry

The stories that we tell are the faded representations of our prior lived experiences. “ The study of narrative, therefore, is the study of the ways humans experience the world (Connelly & Clandinin, 1990, p. 2; Bishop, 1995, p. 78).” At the same time, we all experience the world a little differently (Cunliffe, Luhman, & Boje, 2004). As a result, when collaborating with a narrator there is a constant tension between telling the story in a way that is both authentic and accessible by

the reader (Bishop, 1995). For the purposes of this research I reached out to specific key informats to ask if they would tell me a story that was situated within the Learning Event Review Process (LERP). This was done in one of two ways. Either the narrator would draw up the first draft on paper, or tell it to me verbally and I would write up the first draft. From there, multiple iterations would occur as the story was situated within the LERP model. Once the narrator had agreed upon the final version, they would sign the consent form allowing the story to be used in the dissertation. While they were informed of the document in the beginning of the process, it was until they were fully satisfied that they signed it. The process and the consent form (Appendix H) was approved by the University of Pennsylvania Institutional Review Board as meeting the eligibility criteria for IRB review exemption authorized by 45 CFR 46.101, category 2, with the protocol number: 826499. Dr. Sharon Ravitch, the chair of my dissertation committee, agreed to serve as the principle Investigator.

### White Papers & Presentations

From 2013 to 2016, I partnered with some of the teams to produce specific white papers on specific subjects. These papers were all written in a collaborative manner and then presented to the entire MCT to insure that I captured the truth of the community (Association, 2002). Some of these white papers are still taught at those teams (Cline, 2013, 2014, 2016).

Mission Critical Team Summits

Then, in 2012, after 4 years of observations, I gathered a group of people (Appendix F) at the Wharton Campus in San Francisco to discuss whether it made sense to bring together the various Instructor Cadres to share best practices. The result was the start of an annual Mission Critical Team Instructor Cadre Summit at the end of June (Table 4). Run in partnership with Fire Department of New York (FDNY) and the San Diego Fire-Rescue Department (SDFD), and supported by the Wharton Leadership Program the purpose of the summits were to gather together all of the research partners into one place to engage in collaborative Inquiry that might trigger a diffusion of innovation (E. M. Rogers, 2010). It was held at the fire departments due to the fact that Fire Departments are "neutral" in the sense that they do not compete with other teams for funding, status or missions (See Appendix G).

Table 4: Mission Critical Team Summits

| Year | Location | Teams | Participants | Category |
|---|---|---|---|---|
| **2012** | San Francisco | 11 | 16 | Summit Proposal |
| **2013** | NYC | 12 | 42 | Summit #1 |
| **2014** | San Diego | 15 | 45 | Summit #2 |
| **2015** | NYC | 14 | 52 | Summit #3 |
| **2016** | San Diego | 17 | 65 | Summit #4 |

## University Assisted Instructor Cadre Retreats

Three of the research partners now come to the Wharton School to spend three days doing an After Action Review of their past development cycle (Morrison & Meliza, 1999) and help transition in the new members of the Instructor Cadre. In this way the partnership between the MCT's Instructor Cadres and the collaborative inquiry research partnership is embedded in their own developmental cycle (Harkavy, Hartley, Axelroth Hodges, & Weeks, 2013).

## Mission Critical Team Instructor Cadre Development Programs

After the third Mission Critical Summit, the Wharton School was approached by three of the members of the Collaborative Inquiry Community to request that Wharton create some professional development programs based on the recommendations in one of the earlier white papers (Cline, 2014). This led to the approval of a Mission Critical Team Instructor Cadre Development Program Pilot. This program consisted on two week long executive education programs for select members of the MCT Collaborative Inquiry Community (Harkavy et al., 2013).

# Findings

In order to answer whether a University Assisted, Mission Critical Team Instructor Cadre Development Program would increase the ability of the Mission Critical Teams to achieve Mission Success, Survivability and Sustainability, it was

necessary to both identify a common lifecycle (the What), as well as a structured way to engage in that model through Collaborative Inquiry (The How). Given this research is focused on both the improvement of both practice and praxis, the identification of a Mission Critical Event Lifecycle also requires a method to influence that cycle. Therefore, while this research has identified a shared event lifecycle across the collaborative inquiry partners the lifecycle is being investigate as a learning event lifecycle, which has been labelled the Mission Critical Team Learning Event Review Process (L.E.R.P.). Having identified the model however, it was also necessary to propose an ongoing and sustainable forum where the model could be improved upon over time and beyond the current generation. This led to the recommendation for a University Assisted Mission Critical Team Instructor Cadre Development Program.

Mission Critical Team Learning Event Review Process (L.E.R.P.)

The primary focus of an MCT Instructor Cadre is the Assessment and Development phase of the operator lifecycle. Given that the methodology is primarily focused on Experiential Education (David Allen Kolb & Fry, 1974; David A Kolb, 1984), the challenge is always going to be on how instructors take their experientially gained tacit knowledge into explicit knowledge they can transfer to the candidates. One of the chief barriers to an MCT Instructor Cadre being seen as a valid community of practice is that they often lack a precise language to enable learners to improve. The “you suck, now suck less” form of

feedback that is often so common and equally unhelpful. The Learning Event Review Process is designed to build upon the MCT Instructor Cadre's two major strengths. The first is that both operations and training cycles are built around the concept of an evolution and that secondly they often use storytelling (Bishop, 1999), or the narrative (Connelly & Clandinin, 1990), to communicate lesson's learned. In almost every case the evolutions follow similar stages and we are able to diagnose which stage a candidate is struggling then we are better able to measure their aptitude (or potential to improve) in the time available, and then better able to target strategies to move them toward their potential.

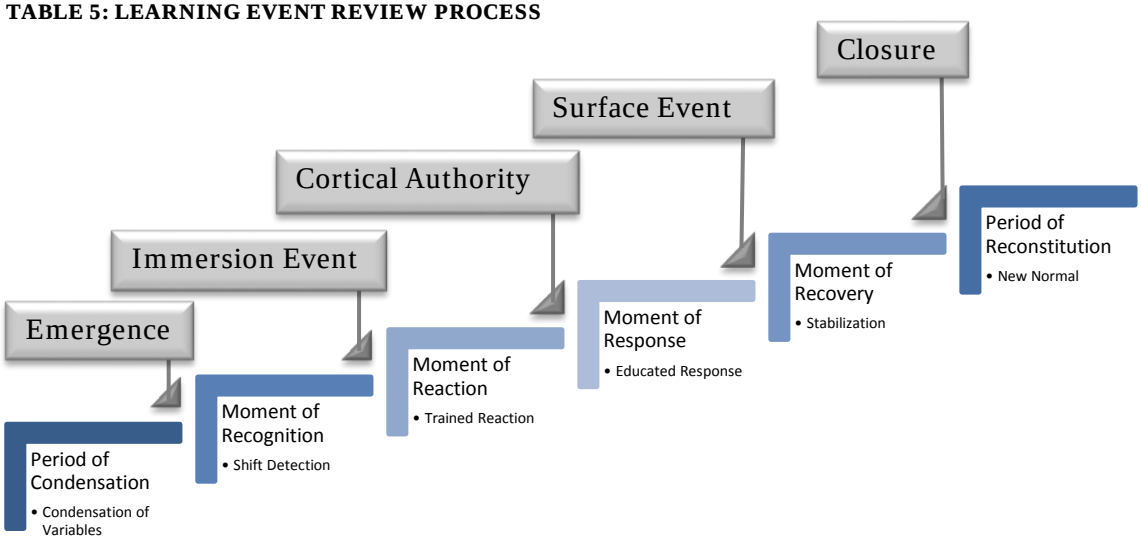
One of the established methodologies of Participatory Action Research, or in this case Collaborative Inquiry, is Appreciative Inquiry (AI) (Cooperrider & Whitney, 2011, p. 25). In its purest form, AI is the act of looking past peoples behaviors and partnering with them to explore their potential, by asking questions (Cooperrider & Whitney, 2001). It is the intentional change in mindset from seeing a candidate as a problem to be solved, to seeing them as a mystery to be understood (Cooperrider & Whitney, 2001). For the model to work, the Cadre must commit to what a Zen Buddhist would call "Shoshin," or the beginners mind, "In the beginner's mind there are many possibilities, in the expert's mind there are few" (Suzuki, 2010).

The use of AI is based on three main principles, which have been modified from Cooperrider and Whitney's original theories (Cooperrider & Whitney, 2001,

2011); The principle of Understanding, The Principle of Potential, and the Generative Principle. The Principle of Understanding, is based on the idea that we "should seek first to understand, before we are understood" (Covey, 1989). Before we can critique, we have to listen to a person's story, watch them as they train, and try to understand their intention before we judge their behavior. The Principle of Potential is that people need to see what is possible in order to let go of what is known. In many cases, it is a potential they cannot see themselves (Luft & Ingham, 1961), so it is up to the Instructor to help the candidate or the team reveal what "lies half asleep in the dawning of their own knowledge"(Gibran, 1997). The third principle is that our inquiry should be generative, which is to say that any learning from our inquiry could, and should, be both useful and contain the possibility of leading to additional learning (Wittrock, 1992).

## OVERVIEW OF THE MODEL –

**TABLE 5: LEARNING EVENT REVIEW PROCESS**




**Equilibrium:** This model is nested within a larger socio-cultural-technical ecosystem that is typically in Equilibrium. This is what most people call "normal" and what the military call "Left of Bang," their way of describing the events prior to a radical change event. In the context of MCT's these periods of equilibrium are also Periods of Condensation.

- **Periods of Condensation:** This is a period of time, prior to the emergence of a radical change event where variables are slowly accumulating. Under the right conditions, human, technical, informational and environmental variables have the potential to condense into a radical change event (threat or opportunity).

- **Emergence**: Introduction of a Radical Change Event characterized as novel, complex and adaptive.
- **Moment of Recognition:** This is the moment that an emergence, or radical change event is recognized by the individual through a process of threat detection (Öhman, 2005) or pattern dissonance (Ploran et al., 2007) and by the team through joint cognition (David D. Woods & Hollnagel, 2006).
- **Immersion Event Horizon:** Marks a boundary in space time that marks the transition between equilibrium and chaos (Arrow, Poole, Henry, Wheelan, & Moreland, 2004). Once the event horizon is crossed, there is no pause button, there is no time for a cup of coffee to collect your thoughts, there is only performance or catastrophic failure.
- **Moment of Reaction:** The immediate trained reaction to an acute negative event.
- **Cortical Authority Threshold:** A threshold marking when the Prefrontal cortex asserts cortical authority over limbic system.
- **Moment of Response:** The assertion of cognition over reaction.
- **Surface Event Horizon:** The moment in which the event stabilizes. In some cases it marks the moment where a problem set undergoes a phase transition from a more complex problem set to a technical problem set. It

is the moment that the team is able to “catch their breath” and regain control of the clock.

- **Moment of Recovery:** The moment that the team starts to understand the outcome of the event and begins to clean up, drink water, sit down, etc...
- **Closure:** After the After Action Review, Hotwash, Debrief, M&M, post mortem or post evolution meeting, it is the formal recognition that the evolution is complete, which hopefully brings a feeling of resolution, or conclusion.

**Return To Equilibrium: The New Normal:** What is important to understand is that this model is a progressive cycle, meaning, that while the model should return to equilibrium at the end of the event, it is a new equilibrium, a new normal, the result of new learnings. It is within this new normal that the team undergoes a **Period of Reconstitution**: Where the team is restored to effectiveness, commensurate with new knowledge, personnel, technology, threats and opportunities (Staff, 2013).

Mission Critical Team Event Lifecycle

One of the ways this model is unique, is that it takes place in a distinct temporal evolution. From the moment an individual recognizes the emergence of a radical change event to when they cross the surface event horizon, no more than five

minutes can pass. This timeline matters for a number of reasons, but for the Instructor Cadre it matters because the brain behaves differently under different temporal environments. It has different priorities and processes for reading this document versus saving someone from drowning, or experiencing a car crash. In order to work effectively with MCT's it is critical that we understand that a training reality will never be their operational reality, and those who supervise MCT's from relatively calm and sterile environment with limited distractions are experiencing a different perceived reality (Marks, 2001).

In his book, Thinking, Fast and Slow, Daniel Kahneman talks about the two different systems for thinking (Kahneman, 2011). System 1 thinkers operate "automatically and quickly, with little or no effort and no sense of voluntary control (Kahneman, 2011, p. 105)." This has also been referred to a naturalistic decision making process (G. Klein, 2008) where the operator is rapidly responding to new stimuli while they execute their mission. Within this research, we will refer to System 1 processes as reaction. System 2 thinkers focus their "attention to the effortful mental activities that demand it, including complex computations (Kahneman, 2011, p. 21)." This process has been referred to as a deliberative or analytic decision making process (P. Slovic, Finucane, Peters, & MacGregor, 2004). Within this research we will refer to System 2 processes as response. What is important to understand is that during the planning phase of a mission you need people who are system 2 dominant. One might then assume

that you would then need those who are System 1 dominant during the execution phase of the operation, but as we will see it is actually more complicated than that. For operators with MCT's competence as System 1 and System 2 thinking is a requirement to get on the team, to be successful however, you need to ability, the agility, to rapidly transition between the two systems on an ongoing basis.

## EQUILIBRIUM

> "Any living system ...is in a state of continual fluctuation, even when there is no disturbance. Such a state is known as homeostasis. It is a state of dynamic, transactional balance in which there is great flexibility." Fritjof Capra (Capra, 2005)

Equilibrium is a state in which the system we inhabit is able to balance all of the competing influences, in other words we are able to bail the water out of the boat as fast as it is coming in the boat. At any given time, this is what "Normal" is. Whether it is systems theory or ecology, all complex systems have integrated feedback loops, so that the system can maintain homeostasis, or dynamic balance (Capra, 2005; Holland, 2006). While there are continual fluctuations, like conflict within a team, they remain within the limits of what is considered normal (K. J. Klein et al., 2006). What we have to remember, is that normal is socially constructed. It is a product of our culture and place in time. What was normal during a civil war, or even in another country as you read this, may not be "normal" to you (Q. Skinner, 1969).

## PERIOD OF CONDENSATION

> "Seventy-three seconds after lift-off, one of the shuttle's fuel tanks failed, generating a rapid cascade of events that culminated with a fireball in the sky, eventually killing all the passengers on board." - Jessica Orwig (Ebeling, 2016)

Rarely are incidents and opportunities a result of catastrophic failure or sudden radical change events. They are more often the small accumulation of connected human, technical, informational and environmental variables that condense into a radical change event, like water droplets condensing on a glass that suddenly become a stream of water. It is during this period that teams need to be engaged in evidence accumulation. What makes this challenging is that that there is often so much information available, it is often hard to track weak but important signals (Taleb, 2007).

Location: New York City

Narrator: Chief Joe Pfeifer, Chief of Counterterrorism and Emergency Preparedness for the New York Fire Department (FDNY).

Narrative:

*The New York City Fire department (FDNY) was officially founded in 1865, which meant that it was 116 years old when I joined in 1981. At that time the city was still burning, which gave me an opportunity to learn the skills of firefighting. By 1987, I was promoted to Lieutenant and later to Captain in 1993. Through the eighties and nineties the world was changing and as a result the FDNY was evolving. Not only did we put out fires, but we began to build*

*capabilities to manage hazardous material incidents and building collapse. In 1996, FDNY took over EMS and was responsible for pre-hospital emergency care of the sick and injured.*

*On February 26, 1993, people at the World Trade Center heard a loud explosion. This was from a van loaded with explosives on the lower level of WTC. Six people were killed and more than one thousand people injuries. I remember being part of the team that was detailed as a watch line in case of fire. We were positioned right outside the damaged area, which was almost a football field wide and six stories deep. The plot was devised by a man named Osama Bin Laden, who was the founder of the terrorist group Al Qaeda. The aim was to topple the 110 story building into the adjacent skyscraper. Little did any of us know at the time that this was just the first attempt.*

*In 1997, I was promoted to Battalion Chief and assigned to Battalion One, which is the tip of lower Manhattan. Over the next four and a half years I responded to the WTC hundreds of times. In 1999, we ran a full scale exercise with over 100 firefighters and EMS personnel for a fire on the 93rd floor of the WTC. It is strange to think that within two years a commercial airline would crash into that same floor.*

*These exercises and response set the stage from one of the largest rescues in history. The date was September 11, 2001. On that fateful day firefighters*

*saved more than 20,000 people. Years of experience and getting to know the firefighters who worked in lower Manhattan allowed me to make a critical decision to evacuation firefighters from the North Tower after the South Tower collapse. Firefighters heard my voice ordering the evacuation and they knew it was time to go. The one thing we did not know, was that time was running out.*

Appreciative Inquiry

Principle of Understanding: Everyone who has been involved in this research was changed by the events of 9/11. In the years that would follow, it is human nature to wonder if we could have done something different to prevent the attacks. While logically this makes sense, the process of judging whether past actions were appropriate are subject to a number of what are called cognitive biases (Gilovich, Griffin, & Kahneman, 2002). One of the more common cognitive biases is what is called Hindsight Bias (Fischhoff & Beyth, 1975). It is the perception, in the aftermath of an event that the event was predictable, despite there are so many variables as to make prediction near impossible. It a mechanism the human brain uses to reduce uncertainty in the short term, at the cost of increasing it for the long term. When we look back on a specific event, are we looking at it with the knowledge that we had at the time?

Principle of Potential: The fact is that Rapidly Emergent Complex Adaptive Problem Sets (RECAPS) emerge rapidly from many weak signals. As a result, traditional contingency plans won't work. Instead, we need to consider how we

are building the adaptive capacity of the team to respond to whatever emerges. CRO's have to start asking the hard question of what can and cannot be controlled.

The Generative Principle: When we look at our selection, training, education and professional development pipelines we need to ask: Are they actively building adaptive capacity?

## EMERGENCE

> "The phenomenon of emergence takes place at critical points of instability that arise from fluctuations in the environment, amplified by feedback loops. Emergence results in the creation of novelty, and this novelty is often qualitatively different from the phenomenon out of which it emerged." - Fritjof Capra (Capra, 2005)

Emergence is a term used in complexity science to describe a process where a Radical Change Event emerges from the interaction of other non-related entities, like discovering a new invention or the start of a pandemic (Goldstein, 1999). Every day there are variables in our life that, under the right conditions, can undergo a cascade of events or failures that coalesce into a novel event. It is the moment when the condensation on the outside of a glass turns to a stream of water. It represents threshold, or phase transition, between our old reality and our new reality even though we might not yet recognize that the garbage can behind us has caught fire or that we have just purchased the winning lottery ticket. Once this happens, we must respond. The question is how do we

effectively prepare for that response beforehand and judge the effectiveness of the response afterwards.

When High Reliability Organizations (HRO) first created Special Purpose Teams (SPT) they passed on many of their best practices, including contingency planning and training. In the event that the original mission plan fails, the team would identify the most likely alternatives (contingencies) and prepare and train for those possibilities, in a similar way to a candidate trying to choreograph their next move within a training evolution. In a technical system, where most of the reasonable variables are known, this is can be a very effective strategy. As you increase the amount of uncertainty into the system, however, at some point the effects of chaos theory start to emerge. In the context of Rapidly Emergent Complex Adaptive Problem Sets, such as period of condensation prior to 9/11, the sheer number of variables defies effective contingency plans. Toward the end of General McChrystal leadership at the Joint Special Operations Command (S. McChrystal, 2013) an operator named Jeff Tiegs, was involved in seeing how a "Team of Teams" or a liquid network effectively transitioned from building out a team's contingency plans, to building out the adaptive capacity of the network the team was nested within.

Location: Al Anbar Desert Iraq, Objective Tarpon- November, 2008

Narrator: Jeff Tiegs, (USASOC, LTC Ret.) 25 years in U.S. Special Operations Command, with service in multiple combat operations throughout the world.

Narrative

*By 2008, high level Iraqi insurgents had started to elude us by remaining mobile. They knew that if they remained mobile, it would be more difficult for us to locate, fix their position, and launch an assault using our current planning and execution models. Our response was the creation of the Vehicle Interdiction Force (VI), which was a rapid response network of teams that began working together, at first ad hoc, but with time and dedication evolving into a critical tool of our counter terrorism strategy. Since 1980, our teams had moved from unilateral action where the spotlight was on the individual team to joint operations where teams were working together. Over the years, however, it came to be understood that joint did not mean collaborative. For example, within USASOC we had access to some of the best pilots and helicopter platforms in the world, but too often we saw them as only a means to get to the target. The emergence of this new highly mobile complex adaptive problem set meant that those practices would no longer be adequate. The need for a precise, and potentially lethal solution, was heavily reliant on the quality of the intelligence, timing, practice, rehearsal, and flawless execution by an integrated and interdependent team of operators, pilots, air crews, and Tactical Operations Center (TOC) support. It was quickly realized that its utility as both a shaping tool and a decisive one was incredible, but the real uniqueness of this force is most apparent when the initial plan is disrupted. The structure of the VI*

*is such that this fast moving, armed armada, is able, and often required, to make split second decisions that can be the difference between success and failure, and even life and death.*

*The western desert in Al Anbar has been a safe haven for smugglers, bandits, thieves, and traffickers for millennia. Just because it was 2008 did not mean that any of this had changed. The influx of foreign fighters and suicide bombers from the desert expanses of the west into the population centers of Iraq was growing and the devastation to the civilian population was terrible. The VI Force was mobile and moved around the battlefield to deliver very specific effects. Sometimes these were designed to force the enemy to move, sometimes this was to strike fear and limit their freedom of movement, and other times it was simply a standalone force designed to hunt an elusive, mobile, and dangerous enemy. The VI Force had been relocated to Al Asad Air Base as a strategic tool to support operations in that region. On this day, however, we were just hunting on our own. We had other priorities that were going to govern our choices for the next few weeks but on this day, we had free rein to hunt.*

*As we were going through our normal routine, we got an anomalous indicator that a High Value Target (HVT), might be somewhere out in the western desert. The target was a significant facilitator responsible for moving foreign fighters and suicide bombers from Syria into Iraq. Rarely had we seen him on this side*

*of the border, as the pressure we had been applying on his network was keeping him across the border, just out of our reach. The intel was so sparse, such a small glimpse, that we were all immediately skeptical. Could the target have made a mistake? Did he reveal himself, if ever so briefly for us to go after him? We scanned the empty, moonscape desert for any sign of life. From the geographic point where we picked up the targets scent, we scoured the desert in an approximately ten-mile radius. There were huts and tents smattered about but we only saw one vehicle, a white Toyota pick-up truck, alone in the desert, with the hood raised. Could this be him?*

*The Team assembled around the operations table and monitors in the TOC and quickly went over our options. The truck was about 70 miles away from where we were standing. We unanimously decided it was worth closing the distance on this potential target, conducted hasty planning, and moved to the helicopters. We added details to the plan while in flight and would figure the rest out upon first contact. Because the information we were moving on was so sparse and wholly uncorroborated, this one was a little different. We were closing on the target with the intent to investigate more than engage. This posture was a tenuous one that gave the enemy a slight timing advantage. We adjusted our formation slightly to make up for this unknown. We needed to get close to see with our own eyes what was going on but not so close that we were in danger of getting one of our helicopters shot out of the sky.*

*As we flew closer to the target and tracked the vehicle on our monitors it did a few seemingly random acts that we knew from experience were indicators that this truck was filled with bad actors. We grew more confident that we were coming in on some foreign fighters but still had a lot of doubts that this would actually be our HVT?*

*We were now, within the vast expanse of the western Iraqi desert, in visual contact with the vehicle and began the intricate moves that make up the VI. We "communicated" to the pick-up that we wanted them to stop and at first it appeared as if they would comply. I thought that perhaps, this might end up being an easy one. After a slight hesitation, the Toyota began to speed away in full disregard of our presence and what at this point were our clear intentions. This evasive driving was another indicator of the enemy. But how could we know for sure? We could not engage this vehicle with how little we knew at the time. The helicopters flew even closer, speeding alongside the truck so we could peak inside. The dust began to envelop the scene as the truck finally slowed to a stop. In an instant, two men excited the vehicle, both with AK47s, automatic fire erupted and bullets came streaming at us, some of them striking the helicopter frame.*

*At this point, I gave the code word for a full attack and the VI Force went into its well-rehearsed movements. As I released control to the individual operators and the mini- gunners I was able to look down through the dust and stare straight*

*into the face of the target and knew instantly we had the found the terrorist leader we had been searching for.*

*As we looped around to land and begin our ground assault it might appear as if chaos had been unleashed, but, it was quite the opposite. The silence on the radio giving proof that each member of the team, and the network, knew exactly what their role was and how what their responsibility fit directly in with everyone else's. While I no longer "controlled" the situation, we had practiced this and exercised it for real 100s of times, and this combination of men, machine, operators, air crews, pilots, sensor operators, and shooters was truly an incredibly balanced team of teams.*

Appreciative Inquiry

Principle of Understanding: To understand the nature of both a period of condensation and a subsequent emergence, we need recognize that it is occurring within a dynamic Socio-technical- cultural ecosystem. To this end we have to try and understand what they individual and teams expectations prior to the emergence. What was their original mission or deliverable? What were the norms on the team at the time? How much time did the team have? How large was the operational space?

Principle of Potential: The challenge with evolving and adapting is often not with finding an appropriate solution, but with finding the will to engage with that

solution. The true success of the tactic of Vehicle Interdiction (VI) was that it was the manifestation of an operational liquid network. At the end of the day, liquid networks and Mission Critical Teams are human based systems and human beings must believe in where they are heading in order to let go of what makes them secure, but holds them back. In the aftermath of a novel emergence, the Instructor Cadre voice needs to be more compelling that the negative inner monologues within the candidate, or the negative gossip of those who no longer want to adapt.

The Generative Principle: Modern MCT's continue to utilize contingency planning in the face of technical problem sets, but they also use it as a tool to increase the neuroplasticity of the candidate. Capacity can be increased through information, technology, skills, and experience, but what holds all those variables together are relationships and trust. For a team to fully exploit their capacity they have to have iterative shared positive experiences. When the consequences are life and death the importance of these relationships become critical. The questions then are how are teams building trust between members? How are they identifying who has adaptive capacity? What are they prepared to do about members who are unable, or unwilling, to increase their adaptive capacity?

## MOMENT OF RECOGNITION

> "The difficulty of accurate recognition constitutes one of the most serious sources of friction in war... War has a way of masking the stage with scenery crudely daubed with fearsome apparitions."- Karl von Clausewitz (Clausewitz, 2004)

Anagnorisis (Ancient Greek: ἀναγνώρισις) or "Moment of Recognition" describes a transformative moment within an ancient Greek play. It is a moment when an actor makes a critical discovery that allows them to understand things as they really are, along with the willingness and motivation to act (Baracchi, 2014). The ability to recognize threats and opportunities are core to maintaining an operator's situational awareness (SA). "[Situational awareness is] the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future" (Endsley, 1988). With that said, we must also remember that recognition, or situational awareness, is not action. That nuance is especially critical within Mission Critical Teams as they are at some levels nodes within a larger CRN. They not only need to be able to recognize emergent events, but they must be able to rapidly and effectively communicate that recognition. In order to solve a problem, we first must see it, but we also cannot fix what we are unable to talk about. One the foundational examples of bridging recognition across teams within a network, a team of teams (G. S. McChrystal, 2015), is the work done by General Stanley McChrystal when he ran Joint Special Operations Command.

Moment of Recognition: Team

Location: 2004, Iraq, Situational Awareness Room.

Narrator: General Stanley McChrystal, 34 years in the U.S. military, concluding with his command of the Joint Special Operations Command.

Narrative:

*By 2004, Task Force 714 had been running Special Operations in Iraq for over a year. We had set up in a big old Iraqi air hanger about the size of a basketball court, it was pretty big. Everything was organized around the large main room, with private offices and meeting rooms attached to the interior wall of the hanger. The primary entrance happened to be on the opposite side of the hanger from my office, which was brilliant because it forced everyone to interact with me on a daily basis. As you walk in you immediately note the smell of guys and girls who have been at war for years, dust, sweat, chewing tobacco, and old coffee. A lot of the people dip tobacco, so there are a lot of dip cups around, but not a lot of trash, we were pretty anal about that. There are folding tables, laptops, rolling chairs, and cables everywhere. Most people are in in uniform, but some will be in work out gear as they will be coming or going from their physical training. It is an old windowless concrete bunker lit with florescent lights hanging from a high ceiling, which means that the acoustics are not great, so we hung these pieces of foam to dampen the sound. During the day it's not really a problem as only a few people are in the room chasing down*

*leads and coming together in small quiet groups to help connect the dots regarding existing targets. At the height of the evening, however, in the middle of operations it can be pretty loud. It was always controlled, and nobody was yelling, but it got loud. The Commander sat in the middle of a large U shaped table, bracketed by 12 of his staff. The table was positioned in front of a wall that mounted 12 large video screens. Behind the table a series of folding tables fanned out in rows allowing the commander to stand up and talk to anybody in the room.*

*By about one in the afternoon, intelligence is starting to mature because we've had reconnaissance looking the night's potential targets. By 2 pm about 100 men and women, ranging in age from 18 to 60, from numerous military and government organizations begin arriving to prepare for the 4pm teleconference and finalize operations. Everyone knows they are going to do operations that night, they just don't know which ones. At any given time, the room is working on about 40 potential targets and they are trying to isolate which ten they are going to hit that night. In addition, there are about two or three more that will emerge during the evening as operations begin to come back with new information. At 4pm several thousand people involved in prosecuting the war join me on a video teleconference to review current data, plans and potential leads. The teleconference lasts 90 minutes and as soon as it is over at 5:30pm the place takes up a new energy. Everyone is suddenly walking with purpose,*

*starting their engines in preparation for night operations. By about eight o'clock at night targets we were able to confirm from the previous evening or earlier in the day get confirmed and helicopters start to launch carrying task forces toward their targets. The screens at the front of the room start to populate with operations, with each labeled with a digital sign noting the name of the target and the location.*

*As the preplanned mission start to go, other intelligence is starting to come to fruition. Much like the moment where enough puzzle pieces come together where you can make out the overall picture. When that starts to happen you can literally see and feel it in a room. It will start in various parts of the room, but in this case maybe it is a signal intelligence officer come out of one of the offices to talk with someone on a floor. They have intercepted something regarding a known bad guy, let's call him Suspect X. He will head over to one of the desks that are run by one of the intelligence organizations only to find out that they are talking about Suspect X as well. At this point, they will then grab a couple of other people who are looking at similar data and another little meeting happens. They then might walk over look at a couple of computer screens. Little by little, what started out as an idea in the head of one signal officer has now grown in mass and momentum as more people get added to the group, adding new information. That group will move about the room, slowly circling toward the center of gravity, which is the commander, as they gain ever*

*more mass and momentum. Then suddenly, the team will realize they have enough information and send someone to brief the U shaped table and get the initial approval to start building a target package. After a quick briefing the commander makes the decision to bring up current reconnaissance on one of the screens. Now everyone in the room knows that Suspect X is being looked at and starts to go, okay, wait a minute I might have something on that. This exact scenario may happen fifteen or twenty times a night where you have something that's gotten significant potential to come to fruition. In order for it to come to fruition, however, we needed confirmation in real time of precise location before we could act. So, in this case we might have gotten the location of the target or the identification of the target, but we're lagging it in time or we are not postured to get there. So, it's not enough yet to act, but it's enough to whoa, get our attention, to get us leaning forward. On any given night, only about ten of these plans will be mature enough to cross the trigger point allowing us to execute on the target. In some cases, you will cross the trigger point, but not be able to execute maybe ten nights in a row. At the height to the fight in Iraq, we are doing ten or more raids a night.*

*At this point, the commander gives preliminary approval and Suspect X now becomes Operation Ajax. You start to get operations and support people involved asking, okay, what are our options? Could we get there? Could we do this? You see member of the team walk back to their desk to call back to their*

*home organization to identify current assets and put them on standby. If it was a really important target, you might have three or four commanders showing up in the early afternoon, due to critical mass and intelligence coming together. We'd be circling the trigger point, but wouldn't have it perfect. Each target would have concept of operations put together for what you all do, but it's flexible enough to take into account that might not be where you thought it was exactly. Little by little, everybody starts to get more and more focused.*

*Finally, you will see a group of 5 or 6 people come up to the U shaped table. They will lean over each other for about five minutes and brief the commander and then, no break, they go back to their areas and look for the next targets. Throughout all this, the communicators are talking nonstop to assets in the field helping to piece together the conditions for success. And then as it gets closer and closer, eventually we hit the trigger and someone says, okay, we got that, Let's go. Throughout the night, this may happen 10 or 20 times, meaning that about every 20 or 30 minutes a commander will announce the launch of an operations. In this case, he stands up and says, okay, everybody listen up, we are triggering Operation Ajax, it will be executed by task force 14. This announcement will be followed by about a 7 to 8 minute brief on the operations plan which has already been built, staffed, resourced and approved. Then one of the 12 screens lights up with Operation Ajax, Fallujah and suddenly everyone is focused as the assault force hits the target.*

*Typically, there are three levels controlling an operation. The first level controls and supports the tactics of the operators hitting the target, the next level up controls fire support and enabling efforts, the final level (my level) controls larger assets, like moving additional helicopters, etc., while at the same time makes sure all levels work in concert. Usually the assault force hits the ground and it's fairly uneventful. We will watch the Operation Ajax screen as the assault team captures suspect X and loads him on the helicopter. Every few missions, however, there is suddenly a firefight. Suddenly everybody in the room is focused on that. People talking about how do we get the medivac? How do we get more fire support? While the tactical operations are controlled in another room, everyone sees the same video feed, so these people aren't just getting reports, they are seeing the exact same feeds, and they are on the same chats. My team is thinking about how to leverage assets to support the entire package.*

*It can stay pretty high energy until late into the night, sometimes as late as dawn. But typically then about four in the morning, you start to bring back the casualties and the detainees. There are other command centers tracking all of those logistics, but we still get monitor the feeds. Then, just about when the sun is starting to rise the day shift will start to arrive and the rest of us will head off to bed and sleep from about six in the morning to about eleven or noon only to wake up and do it all again.*

*We spent about 5 years in that hanger, from about 2003 to about 2008 before the Pentagon built us a new state of the art situational awareness room. Unlike the old flat hanger it was built like a NASA command center or a tiered movie theater, with all the latest gear and steps moving up and down wide aisles. You would think that the addition of all that new technology would improve our shared situational awareness. The problem was that this new setup meant that you did not just bump into people walking around, you wouldn't walk by people's desk, you wouldn't bump into me, 80% of interactions went away. Instead, people went down their own aisles and stayed with their own tribes. Because of the new tiered system you couldn't roll your chair over or lean over someone's desk to compare notes, I we all were so steeped in the old way of doing business I didn't predict the loss of capacity, because I didn't pay enough attention to the dynamics before we changed. You think that we would have adapted and not lost much, but actually just a physical change meant we lost access to a lot of the informal relationships that made the system work. We lost a lot of opportunities.*

Appreciative Inquiry

The principle of Understanding: In his book, Team of Teams (G. S. McChrystal, 2015) General McChrystal describes how as Task Force Commander in Afghanistan he "began to view effective leadership in the new environment as more akin to gardening than chess" (G. S. McChrystal, 2015). Meaning that

instead of examining specific technical moves, he transitioned his team to work on creating the optimal environment and conditions for success “we nurtured holistic awareness and tried to give everyone a stake in the fight” (G. S. McChrystal, 2015, p. 217). The General was acknowledging the fact that we are facing a new kind of problem set where every operator, not just the leaders, needs to be empowered to engage with the problem set.

The Principle of Potential: The idea was that the role of the gardener is to create environments in which the plants can flourish as such to nurture the “structure, processes, and culture to enable the subordinate components to function with a “smart autonomy” G. S. McChrystal (2015, p. 225) and “shared consciousness” (G. S. McChrystal, 2015, p. 225). It turned the commander’s intent from a static document to a living system that adapted as the ecosystem adapted, with the understanding that “Within our Task Force, as in a garden, the outcome was less dependent on the initial planting than on consistent maintenance” (G. S. McChrystal, 2015, p. 225). At the same time, the system required that multiple Crisis Response Organizations, with their own bureaucracies, legacies and pride had to be willing to actively place themselves, and engage with the larger Crisis Response Network.

The Generative Principle: MCT’s and the Crisis Response Network that it is nested within is a human based system. As a result, the questions that emerge are: Are the existing Joint Cognitive Systems (JCS) effectively leveraging and

amplify the underlying human based systems. Does the environment, both physically and culturally, support and prioritize cross functional communication and relationship building.

Moment of Recognition: Individual

One of the assault teams working for General McChrystal during his leadership of JSOC was a team led by Doug Taylor. While General McChrystal's team was learning to rapidly recognize and react to emergent problem sets, it was the assault teams that would ultimately carry out those plans. Within a team of teams, there are operational cycles nested within larger cycles, and all of them have different requirements for recognizing emergent problem sets. At every level emergent weak and strong signals are vying for attention even while attempts are being made to implement prior plans and maintain operational momentum. All of those signals are in a perpetual state of condensation, and in the right conditions can emerge, or ignite, into a Radical Change Event. In highly kinetic environments, however, precognitive threat detection will automatically pull people out of response and into reaction. Those individuals and teams will be unable to shift back to response until they are able to pause from the immediate threat. In situations where multiple threats begin to immerge, the ability to recognize the larger context may be delayed.

Location: Objective Albion – 2004 – al Qaim, Iraq

Narrator: Doug Taylor, (USASOC Maj. Ret.) 25 years in U.S. Special Operations Command, with service in multiple combat operations throughout the world.

Narrative:

*The warm arid dessert wind was coming through the open door of the single rotor Sikorsky MH-60 was warm that late evening in April. I was on the lead helicopter, sitting with a team of 11 operators flying over the flat top stone and mortar houses of the village of al-Badawai north of the Euphrates river adjacent to the Syrian border. My legs dangled out the left door, by the left front wheel, as we approached the target. The "little bird" helicopters in front of us elicited no opposition as they flew over the target about one minute before we arrived. My thoughts remained focused on maintaining my orientation to the target building as we approached. I listened as the pilots were making radio calls about timing to target, i.e. 1 minute, 30 seconds, etc. Then we were over the target and the MH-60s began to flair, which meant it slowed and pitched upward, in preparation of our team fast roping to the ground. I remained focused on what was supposed to be the target building based upon where my bird was located until I suddenly noticed a white pickup truck with an attached large caliber machine gun that opened fire on us. This rapidly overtook my focus. Around the truck milled a bunch of militants and I wanted out of that aircraft soonest possible, as I could not help thinking about the experience in*

*Somalia and avoiding another Black Hawk Down Scenario. I tossed the thick fast rope out the door, grabbed hold and hopped out of the helicopter and slid 20-30 feet to the ground. Once on the ground, dust and sand were flying around with gunfire resonating inside my headset. I killed one guy immediately after landing and then focused on finding Jay, my Combat Controller. Jay's job was to call in aircraft to take out the truck, so my troop could remain focused on seizing the target building. Once secured, I then began moving toward the target building, listening to the radio traffic while making my way to the target. My focus at that point was on securing the target building and eliminating the external threats and moved to the roof. It was at this moment, after calling the Squadron Commander; I was informed that we were not on the target building.... In other words, I had this sudden moment of recognition that everyone knew where I was, except me. At that point, I am now dealing with militants maneuvering around the target building, calling in reports from the troop, and attempting to locate myself on the Grid Reference Guide (GRG). The GRG is literally a satellite image of the target site with a grid overlaid on it to orient the team. A GRG is only helpful, however, if you are actually on the grid, which at that point I wasn't.*

Appreciate Inquiry

The Principle of Understanding: By most accounts, Doug Taylor was one of the most talented operators within any battlespace. As a result, the challenges he

faced that day could not be written off as lack of training, lack of experience or low aptitude. It needs to be understood that in order for Doug to live long enough to recognize the larger problem, he had to recognize and react to the immediate threats. Researchers have repeatedly demonstrated that when faced with friction between our expected reality and actual reality, we will often convince ourselves to reject facts that counter our expectations (Gilovich et al., 2002; De Neys & Goel, 2011). The trick then is to train enough to build out the heuristics and mental models for rapid reaction and response, without creating habits or assumptions that will decrease our ability to adapt. The whole point is that we need to remain oriented within the immersion event toward the emerging enemy or opportunity, not the plan that we came up prior to entering the immersion event, or we will end up believing that the map IS the territory. We can become so confident of the plan that we end up fighting the plan not the target/enemy. Within a Liquid Network, the point of any plan is to position the MCT for an optimal launch.

The Principle of Potential: If the candidate is not appropriately recognizing the emergent patterns or the problem sets, there are number of interventions we can put in place depending on whether it is a lack of experience, too much experience, or a collection of experiences that led to false conclusions. Core to those interventions is the timely and appropriate intervention or support of the larger network. In regards to perceptual response, even though research measures

moments of recognition in milliseconds, we can improve performance (Paulus et al., 2010). Additionally, specific training in goal setting, arousal regulation, mental imagery, and positive self-talk has been shown to positively influence the behavior of the autonomic nervous system(Barwood, 2006).

The Generative Principle: In order to influence a person's ability to recognize an emergent problem set, we need to determine whether the problem is related to their limbic system through Perceptual Chunking or their heuristics through Goal Oriented Chunking (Gobet et al., 2001). If the candidate simply does not have enough exposure to the sensory cues (sight, smell, sound, taste and touch) to trigger threat detection, than the solution is about iterative exposure, or operant conditioning, to those contextually appropriate cues. If the problem is that they do know how to evaluate the given pattern's for their "rightness", then Instructors need to provide iterative simulations where the candidate is show what right looks and feels like in a given pattern of operation (Kellman, 2013). Lastly, when evaluating a particular behavior after the fact, instructors need to ask themselves whether the candidates were exposed to, or trained to react to, a given set of stimuli. If not, it should be taken into account that a reasonable human response to a novel threat is to default to an untrained limbic response.

## IMMERSION EVENT HORIZON

> "So it is that we must weather that dark time, the period of transformation when what is familiar has been taken away and the new richness is not yet ours"- Ram Das (Dass & Goleman, 1990)

The Event Horizon is the threshold in space and time that marks the entrance to the immersion event. One consequence of this transition is that traditional theories of both decision making and contingency planning can be degraded. To illustrate this concept it is worth noting an observation made by Robert Fowler, a Canadian diplomat, who was taken hostage by Al Qaeda. By his own admission he is more of a diplomat than a tactician, so he was relieved when the U.N. provided him with a training course in tactical decision making (Fowler, 2012). The course even came with a plastic card that outlined key decision making steps in the face of challenges such as, evaluate threats, generate options, prioritize options, etc. It is a variation of decision making processes that are taught at business schools and Mr. Fowler liked it so much that he kept the card in his breast pocket for easy reference. When the day came that he was run off the road by terrorists he really had no idea what to do, so he pulled out his decision making card as his car was forced off the road. Unfortunately, he only got to the "review your options" step on the card when they pulled him from the vehicle, and then unfortunately lost the card as they bounced his head off the hood of the car (Fowler, 2012). Mr. Fowler was held by the Islamic Maghreb (AQIM) in the Sahara Desert for 130 days before being released (J. Ward, 2008). The point of that story is not to criticize Mr. Fowler, who behaved heroically under horrendous conditions for an extraordinarily long period, nor is it to criticize decision making models. It is to clarify that most of the recognized decision

models, which can be incredibly useful if to clarify a path forward under periods of great uncertainty, require time to think. The nature of an immersion event is such, that we do not "think" within those events, in the way that is commonly understood. On good days, we experience more of what Mihály Csíkszentmihályi would call a "flow experience"(Csikszentmihalyi, 1990) a period of effortless calm and focus where solutions seem to emerge as fast as the problem sets. But flow is not accidental. It is something that comes after long practice and preparation.

Location: Autumn evening, 2010, Washington Heights, NYC
Narrator: Captain Michele Fitzsimmons (a lieutenant during the story), of the FDNY who is the granddaughter and great granddaughter of FDNY firefighters.

Narrative:
*During the fall of 2010 the weather in NYC was just starting to cool down after a hot summer. I was the lieutenant, or officer in charge, of Engine 67 in Washington Heights which is on the northern end of Manhattan. It was around 8pm and the guys were cleaning up from dinner. The tones went off and we received a phone alarm for a fire about 10 blocks away. We are the first on the scene as we turn onto the street it looks like something right out of the movies. On one side of the street a six story apartment building is pouring smoke from the windows and on the other side of the street is a crowd pointing*

*toward the fire. As the chauffeur stops the vehicle and the 4 other firefighters pile out I notify dispatch we have a 10-75, the code for a working fire.*

*As I move from the rig to the apartment building I glance towards the chauffeur and he points at which hydrant he is going to use and I call out to make sure my guys are stretching hoses toward the building. By stretching the hose, I mean that they will need to drag the hose on the back of the rig up to the apartment. On this night our attack line is 8 lengths long creating 400 feet of hose line in order to reach the sixth floor. I enter the building with total confidence that the team is right behind me. As one of the few women officers in the FDNY I often get asked what it is like to lead a bunch of guys into a fire. To be honest, once a firefighter climbs into a rig and head toward a fire everyone is focused on doing their job and looking after each other. Issues of race, gender, culture, etc. fade as we focus on putting out the fire and getting people out of harm's way. The nature of firefighting requires that we depend on one another so that everyone goes home at the end of the tour. The heaviest burden I carry on the job is making sure I get them all home in one piece.*

*It is this trust, shared experience and a lot of training that allows me to focus on the fire and not on the team. As I head up the five flights of stairs, the people that live in the building are heading down the stairs. Because of the time and location of the fire, everyone is able to get out, which allows us to focus on just fighting the fire and not rescuing residents. There is no smoke in the stairway,*

*but people are moving quickly. They let me know that they think that the fire is in apartment 6g or 6f. Which means somewhere on sixth floor, on the left side of the building. I transmit for my guys to come to the left side.*

*As I get to 6G the door is open and the room beyond is filled with smoke. Not enough for me to put on my mask, but enough that I know this is the right apartment. If I had encountered a wall of black smoke I would have taken a knee and got my mask on immediately. I came back out into the hall to find my guys behind me ready to go, but the chauffer is reporting that the hydrant is bad, in other words we don't have a positive water source yet. The truck holds 500 gallons and at 180 gallons a minute it means that we have about 2 ½ minutes of water. This also means that the chauffeur has 2 ½ minutes to find us a working hydrant or things are going to get interesting. Inside my head, my internal timer begins to count down from 2 minutes and thirty seconds. It is not an exact clock, as time stretches or shrinks inside a fire, but I have learned to tell time using certain markers, like how long it takes to get the team into position or to start ventilating, or by how much water is collecting on the floor from the hose.*

*The trucks inside team arrive on the fire floor. This team consists of the Officer, Can, and Irons. The can is named that way because they carry a portable fire extinguisher (a "can") as well as a pike pole for opening up walls and ceilings. The Irons is carrying the metal tools required to force entry thru locked doors*

*and open up walls to ventilate and expose the source of the fire. I follow them into the apartment. We search around and still no visible fire. I walk into another room, call the Can in, and ask him to "open this up for me" which is short hand for them to start making holes in the roof and the wall to find the source of the fire. Immediately, as he opens holes in the ceiling fire is exposed and it begins to move down toward us which makes it clear that the fire is above us between the ceiling of the room and the roof, an area called the cockloft. A cockloft is a space created by the builders to provide a pitch to drain rain and a vented air space to reduce top-floor temperatures. The problem is that these spaces stretch the length of the building and can enable a fire to quickly spread to other apartments. I mask up and call in my nozzle team in who operate and direct the firehose. At full pressure the hose is pushing 180 gallons of water a minute, it takes two people to manage the operation of the line. They come into the room masked up and ready to operate. Once in position they open up the line and start to knock down the visible fire.*

*The room never gets what I would call really hot, more like someone set the thermostat too high. With the hose line in operation your senses are under attack. The roar of the hose hitting the walls and ceiling sound like being inside of a car going thru a car wash, only much louder, making it hard to communicate at all. After a few moments, I have my nozzle team shut the line down to assess the situation and check with my chauffer about the water*

*situation. He quickly replies that we are now on hydrant water, crisis averted. I have the nozzle team continue to operate the line. Once the bulk of the visible fire is knocked down, in this immediate area, I take my mask off so I can better assess the situation. Without the barrier of the mask the environment suddenly comes into clear focus. The room has the typical smell of the job, burning tar and the chemical smell of lumber on fire. As piece of a ceiling comes down on my helmet and my mouth is filled with the taste of plaster dust and soot, while my nose starts to run as it attempts to filter it out. As I move around, I can feel the saturated carpet and broken plaster under my boots. There is a lot of chatter about smoke and fire in other locations and I also hear from the conversation between the fire sector chief on our floor and the incident commander that the fire has spread over other apartments on the sixth floor.*

*Additional alarms are transmitted. Each time an additional alarm is transmitted 4 more engines and 2 more trucks, chiefs and other resources are added. When all is said and done I think this went to a third alarm, with over 100 firefighters on scene. As a lieutenant, my job is to fight the fire right in front of me. After what feels like a fairly long time, I feel the tide turn and we begin to get our face of the fire under control. By this point our masks have come off as they only have 15 to 20 minutes of air. Looking around we are all soaking wet, covered in soot, red in the face, sweaty, and spent. Looking down at my watch I*

*know that what feels like 30 minutes will be more. Yup, an hour and change has passed. It is time for us to pull out and let fresh bodies come up to finish the job.*

*After the fire and we make sure everyone is accounted for, we stand outside the rig and go through our after action review. It turned out that a tenant had run a dryer vent up through an old dumbwaiter shaft and a lint fire had started. But our AAR was more focused on the what, not the why. I ask them to tell me what they did, how it went and what they would change next time. We talk, we listen, and then we head back to the fire house finish cleaning up dinner and see what else the night has in store for us.*

Appreciative Inquiry

The Principle of Understanding: For those who operate in Immersion Events they need to find ways to operate and thrive within the "liminal" space (Van Gennep, 2011). In Anthropology, liminality is a term which literally means threshold and describes the place "betwixt and between" (Turner, 1995, p. 107) equilibrium and chaos. Experienced operators like Michelle understand that time and space move differently within immersion events. So, they develop mechanisms and temporal markers to help them keep track of where they are on an operational timeline. They get a sense of when things are taking too long, or are still on track. They understand that when they come out the other side time will either have sped up or slowed down.

The Principle of Potential: To use a metaphor, if you are standing on the beach, you are on land. If you are out past the waves, you are in the ocean. But if you are in the surf zone, where the waves break, you are in liminality. In the surf zone, you are neither on the land nor in the ocean, but in a dynamic spatial and temporal environment that exists between those realities. To extend the metaphor, individuals and teams who enter liminality either learn to understand and adapt to its power and rhythm, or they drown. Instructor Cadres need to both determine if candidates are able to adapt to liminal spaces and "swim with the current and waves" or whether they simply do not have the aptitude. For those who do have the aptitude, they then need to develop the ability to sustainably interact with uncertainty.

The Generative Principle: One of the questions that you can ask someone who works in an immersive environment is "How long is 60 seconds?" At first glance, it may seem like an odd question, but anyone who has ever fought one round of Martial Arts, or has saved someone from drowning, or gone parachuting, knows that it is actually a very hard question to answer. The cadre needs to constantly be constantly inquiring as to which temporal environment they are developing within a candidate.

### MOMENT OF REACTION

> "Man's last freedom is his freedom to choose how he will react in any given situation"- Viktor Frankl (Frankl, 1985)

The moment that our brain recognizes a radical change event, we cross the Immersion Event Horizon and begin to react. This reaction can happen in a number of ways. Unconsciously, a pattern of sensory cues (bad smell, loud sound, etc.) can exceed a threat detection threshold and trigger what is called a "startle response" (Koch, 1999). In an untrained person these response can emerge from the limbic system as metabolically taxing defensive behaviors such as Attack, immobility, or escape (fight, flight, freeze) and may act independently of higher cognitive processes (Bracha, 2004; Öhman, 2005). The way in which we override our limbic response is through iterative training, education and experience that allow us to "rewire" or limbic system. A common example of that is military boot camp. Through iterative behavioral modification and stress inoculation most people can be trained to move toward threats while carrying out tasks. Specifically, this kind of training experience builds the neural networks that allow us to construct mental models, heuristics and patterns of normal within chaotic events. Even experts, however, will occasionally encounter events in which they are untrained and may default to their primary limbic response.

Moment of Reaction (Individual)

Location: July, 1998, Brevard County, Florida wildfire

Narrator: Rowdy Muir, District Ranger, Flaming Gorge Ranger District, USFS. During a career spanning over three decades, rowdy has been a dedicated student of fire, a teacher of fire, and a leader of firefighters.

Narrative:

*In 1998 I was assigned to be the Operations Section Chief on a Type I Incident Management Team to help suppress the growing wildfires in Florida. I was assigned to the Orlando complex, which consisted of four counties, Brevard county, Seminole county and Osceola county and Orange county. When we arrived to suppress the fires, a lot of people breathed a sigh of relief as the professionals showed up and we assured them we would do our best to suppress every fire, and protect every house, within those four counties, end of story.*

*We entered into a unified command with State of Florida, Florida Division of Forestry, but it wasn't a unified command with the local and county fire departments. 1998 was the first year that wildfires in Florida began to interact with the growing urban populations. Back in 1998, most of our big wild fires are in remote settings out west, so we don't have to spend a lot of time managing people, so automatically it's a square peg in a round hole for us because there are just lots of people in Florida with lots of urban interface. It was the first time that wild land fire was actually asked to do things that we really didn't know much about.*

*When we first arrived we tried to get a sense of normal fire behavior in Florida. To do that you first have to see that it is a large peninsula, bracketed by two large bodies of water, the Gulf of Mexico and the Atlantic Ocean. If you are on the Gulf side of Florida, there is what locals call the gulf coast breeze that blows*

*inland over land. On the Atlantic side, you get Atlantic sea breeze that blows inland over land. So basically in Florida you have two sea breezes that blow inward toward the center of Florida. The problem in 1998 was that there was a gulf coast breeze, but no Atlantic sea breeze at all. This meant that the wind was blowing the fire toward where there was the most people and infrastructure, the Atlantic coast.*

*We established our Incident Command Post (ICP) in Cocoa Beach but had a rest stop off Interstate 95 that I used for a briefing/safety area. Interstate 95 is the interstate highway that goes north to south. On the west side of the highway ran the huge power line and on the east side ran US 1, also a north south highway. This matters, because the key to fighting big fires is to create breaks in the fuel source. Deny the fire fuel, by creating wide stretches of barren ground and the fire will stop. Highways did that naturally, and we used bull dozers to plow the land under the big powerlines, or potato patching, it is a huge space and the local experts are telling me the fire won't jump the power line. This matters because east of that power line, lie Cocoa Beach, Daytona Beach, Kennedy Space Centre, Cape Canaveral, and the Space Shuttle Landing strip. The only big thing on the west side of Interstate 95 was Walt Disney World. Keep in mind that in 1998, cell phones had just come on the market, and when they handed me one to help manage the fire, it was a relatively new experience. They also gave me two radios, one for my resources and the other to*

*talk with the fire Chief in Brevard County who was not part of our unified command. As the Type I IMT Operations Chief I was now technically the highest Federal fire authority in that county.*

*On the 6th day of the event, we were managing 5 separate fires west of I95. The next day, July 1st, the outside temperature had climbed to 106 degrees before noon, and my counterpart with DOF lets me know that 39 fires have started during the night and they needed resources to start the initial attacks. Unlike the military that has satellite images a real time tracking of people and equipment, in fire you need to actually go see what is going on. So that morning I get word that the initial five fires have grown into one and its threatening Faun lake subdivision. So I climb into my jeep and head northbound to assess the situation. As I am driving, I notice that the south bound lanes are packed tight as both counties north of us, Volusia and Flagler, have issued evacuations. During the ride up the Air Attack calls me to tell me that there are a number of unknown aircraft in the air around the fire, and unless we can ground them we need to pull back the firefighting aircraft, the risk of collision in all the smoke is too much, so I tell them to pull back while we sort it out. As soon as I get to the Faun Lake subdivision I find out that the astronaut Buzz Aldrin lives there and he made some calls that put the unknown aircraft in the sky to protect his house. I then call back my air attack and tell him that I think I have found out why we have unknown aircraft and that I have asked them to return to their units so we*

*can continue fire suppression efforts. I tell him to send the aviation back and just "do what you can – whatever you can and I will try to help you the best way I can."*

*As soon as I get off the phone with them, a mayday comes in over the radio, one of the dozer bosses responsible for directing dozer and tractor plow lines to create fire breaks has gotten lost in the smoke. He is on the radio and doesn't know what to do. We quickly figure out that he has a compass in his cab and we begin the process of turning him around and talking him out of the smoke. While we are working on that I get a call from another division saying, "I hate to tell you this but fire has jumped into the power line." Not only was this a problem because of the threat it represented to the coast, but it also meant the power company had to turn off power to the wires. This meant that for all the houses that ran off well water, they no longer had power to run the pumps to get water on their own houses.*

*I hand off the lost Dozer boss and Faun Lake issues to the division group supervisor and climb back in my jeep to head to the power line. As I arrive, I find that the Fire Chief of Brevard County has called all his counterparts from around Florida for help, and there are 63 Type I fire engines, moving in to fight house fires. At this point I am trying to use the cell phone and both radios at once but I am not really in control of any of it as we are not in unified command. Meanwhile, homeowners have realized that they picked up the*

*phone and called 911 a fire truck would be dispatched to their house, but because the fire was moving so fast by the time the fire engine at engine got to that house, that house burnt down and by the time they go back to what they were assigned to protect, it had burnt down. So I finally got a hold of the Brevard Fire Chief and said "Look, that's not going to work, we burning every house down instead of saving at least half of them. So please just keep people in place, let's do what we can."*

*Then I suddenly realized that we had a hell a lot of traffic on the interstate and if don't get to shut the interstate down, I am going to kill some people, I am going to kill a lot of people. So I get back on the cell phone trying to find out who can shut down the highway, and after a bunch of debates the word came down from the Governor that Daytona 500 is happening tomorrow and you are not shutting the interstate down. I explained that every death would be on their shoulders if you don't shut the interstate down. The interstate got shut down, mostly because they realized they could shift traffic from I95 over to US 1. Unfortunately, by the time they got the interstate closed down fire was already across the US 1 as well and now I have no way to evacuate 10,000 people because I have the interstate closed. After a bunch of work by a bunch of people we were able to clear a path south and got everyone out.*

*I then get the call that a Dairy Queen, near route one just burned down which suddenly made me realize that I had a whole bunch of resources with me and all*

*of our exits are engulfed in fire. At this point I ask my team to get me some bolt cutters. Given everything that was going one, they were curious why their boss needed bolt cutter, and my reply "Just find the bolt cutters." No bolt cutters were found, but they were able to get me a pair of pruning shears to prune trees with. I then walked to the end of a road that lead to the interstate and worked my butt off to cut the chain link fence out between us and the interstate. I then let everyone know, that I am pulling the plug and, I want everyone to come out through that hole in the fence and directly on to the interstate, to meet at the next rest area. When I arrived at the rest area about 300 people reported in, but we were missing one. I hop back in my truck and head back into the fire, and find him swatting out fire with a palmetto leaf thinking he was doing a great job. I get him in the car and head back to the rest area. On my way out, I see a small boy about six, seven or eight years old on his bicycle coming down the road heading into the fire. I stopped and waved him over. It turns out that he is heading back to get his dog, who he left in the house. I ask him to come closer, telling him I couldn't hear him and when he got close and I just reached out and pulled him straight through the window. He came kicking, screaming and crying. He reunited with his dog the next day, as someone had turned his dog loose and he had run toward town. His house burned to the ground.*

*Not long after we got back to the rest area the guy who had I driven back to pull out of the fire came up to me. He wanted to know why I pulled the plug. "I was*

*doing great, why did you come get me?" To this day, some people still ask me why I pulled them out of that fire. During our time in Brevard County we fought 532 fires. When it was all over, seven Type I engines burnt to the ground and 54 municipal firefighters either had heat, exhaustion or heat stroke. The gear that is used to fight structural fires is different then what is used in wildfire, and in 120 degree heat, before you get to the fire, you can't drink enough water to stave off heat sickness.*

Appreciative Inquiry

The principle of Understanding: It took 16 years for Rowdy to first tell that story. Even though in some peoples mind he had made all the right decisions, he felt that he had engaged too early. As he talks about it now, he talks about the pressure and responsibility he felt to keep his commitment to save every house. A commitment he made without having ever fought fires so close to an urban interface. In his effort to try to resolve ever emergence, he never had time to take a tactical pause and as he says "Hey let's just go to the rest area, let's think this thing over before we do any kind of engagement." Looking back, he believes that just by doing that we would have been much more effective. It is critical to remember that expertise is an accumulation of prior training, education and experience. When experts are placed in novel environments containing numerous emergent novel events, they will often default to using those aspects of their expertise that provide them a sense of control. They know they need to

react, so they react to the things they understand and can influence. Then due to hindsight bias, they judge themselves in retrospect as if they did have the training.

The Principle of Potential: Without a strong network, or adequate time to recover from the last emergent event, individuals and teams will have a difficult time transitioning from reaction to response. The way for Instructor Cadre's to influence a candidates moment of reaction is similar to how we influence the moment of recognition. In its most basic form our initial moment of reaction is a "Startle Response" which is a fast twitch of facial and body muscles evoked by a sudden and intense tactile, visual or acoustic stimulus" (Koch, 1999, p. 108). The time it takes our body to move from recognition to reaction is approximately 30 milliseconds (Koch, 1999). The potential for improved reaction resides in both the individual and the human based system they are nested within. In some training scenarios, candidates will become so overwhelmed they will stop reacting at all. They key to helping them, however, is being able to diagnose why they have stopped reacting. Is it because they have no habits (inexperience), the wrong habits (training scars), or because they have so many options they cannot determine which one is optimal (failure to discriminate).

The Generative Principle: Depending on which of the above issues are inhibiting the potential of candidate will determine which solution is pursued. Lack of experience requires facilitated iterative immersion events where candidates are

coached toward their potential. The wrong habits, on the other hand, require that the cadre assess their neuroplasticity required to engage in reversal learning at the required rate. If the there is enough adaptive capacity, then the cadre has to partner with the candidate to first reveal and then find ways to replace the suboptimal habits. If the problem is that the candidate is failing to rapidly discriminate between reactions, the cadre must develop and provide principles to base their future actions.

Moment of Reaction (Team):

In the face of complex adaptive problem sets, Mission Critical Teams need to be able to react in organic but coordinated ways. Due to the speed and complexity of emergent events the ability to create comprehensive contingency plans are limited. Instead Mission Critical Teams now need to be able to build the capacity of the team to react and respond to whatever problem set emerges. In the setting the concept of “leaders” and “followers” begins to give way to “members”. While there is still a command authority members of the team are not waiting to be told what to do. In fact, given their expertise they may be stepping in and out of what are historically seen as leadership roles.

Afghanistan Suicide Vest Mass Casualty (MASCAL)

Author: Military Emergency Medicine Physician (Name withheld)

Narrative

*We were located at a small Forward Operating Base (FOB) in a kinetic area of southeastern Afghanistan in support of Light Infantry and Special Forces. Our "trauma center" consisted of two small plywood buildings, a limited blood supply, the capacity to perform two simultaneous surgeries, and two separate but highly integrated medical teams. Medical personnel consisted of two general surgeons and one orthopedic surgeon, an emergency medicine physician, a Certified Registered Nurse Anesthetist, a critical care nurse, a surgical technician, and approximately ten medics, two of whom were 18 Deltas, which are specially trained U.S. Army Special Forces trauma medical technicians. Shortly after dark, with minimal notice, we received a total of twelve injured Afghan civilians, four of them children, over the course of an hour after a suicide vest attack at a local bazaar; eleven of these patients had sustained immediately life or limb threatening injuries. Our facility had limited patient holding capacity and, at the time, no ability to evacuate patients. Additional casualties were treated at local Afghan medical facilities. We had trained for this specific scenario and, after working together for two months, had treated seven multi-patient events, over thirty severely injured battle trauma patients, and multiple other injured patients. However, in terms of both the number of patients and the severity of their injuries, this was our greatest medical challenge to date. Furthermore, we were short an experienced*

*Physician Assistant, senior medic, and critical care nurse and security concerns and space limitations required that patients be cared for in several separate areas, meaning our team was spread out. Over the next few hours six patients underwent surgery and five additional patients underwent at least one critical care intervention; these interventions included intubation (placement of a breathing tube down the throat into the windpipe), cricothyrotomy (placement of the breathing tube through the neck directly into the windpipe), chest tube placement, blood transfusion, and/or procedural sedation. One patient, a child with a penetrating head injury, died despite aggressive care. Nine of our patients were evacuated to a higher level of care the following morning. The father of a tenth patient refused to have his young son evacuated. The boy had a severe open fracture of his left upper arm that placed him at risk of losing the limb.*

*The fundamental challenge of a MASCAL (mass casualty) response is not medical, it is operational. The operational complexity was magnified by the fact that this MASCAL occurred within an emerging and uncertain security threat. The suicide bomber targeted and killed a local pro-government, pro-US militia commander, two of his fighters, and a civilian in the immediate attack. Intelligence had indicated that insurgents would exploit a MASCAL response to target our Forward Operating Base. The initial hours of the event engaged approximately one-hundred US military personnel, a significant proportion of*

*all personnel operating out of our location, to help in providing medical care, security, and logistics support.*

*By any measure in any medical facility the patient outcomes achieved in this MASCAL response were a success. This is more remarkable in light of the constellation of material and personnel resource limitations, the fact that patients needed to be treated in different parts of the compound, and the uncertainty regarding the evolving security threat. Medical personnel executed the fundamentals of their training and demonstrated adaptability and leadership. Of the thousands of critical decisions and actions the majority were initiated by individual medics leading treatment teams composed of infantrymen while physicians and nurses performed surgery and critical care interventions and coordinated the overall medical response. The event was never chaotic. At every level it was simply a process of executing.*

Appreciative Inquiry

The principle of Understanding: The ability of an MCT to effectively react to RECAPS rests on the ability of the individual to react, and the ability of the CRN that the MCT is nested within to tolerate that reaction. Looking back on the event, the narrator notes that the dynamics of the immersion event stressed the system, and in doing so validated the training and real world Tactics, Techniques and Procedures (TTP's). Furthermore, the narrator identified three specific protective factors, gained through previous training and experience, that were

critical to success: First, a consistent focus on technical proficiency in fundamental medical and tactical skills, secondly a clearly articulated framework for managing dynamic tactical-medical events that included both a conceptual approach and specific critical decision endpoints, and thirdly the expectation and ethos that all medical personnel, down to the most junior medic, a Private, must own and lead the medical component of a mission or their subset of that medical component.

The Principle of Potential: To be able to influence the speed and volatility of a RECAPS both the MCT and CRN need to be able to rapidly react and adapt in organic but coordinated ways. Individual operators, who are part of extraordinary teams, can still fail to resolve RECAPS if the system they are part of is not flexible enough. A dramatic illustration of this need for adaptability was demonstrated during the battle of Mogadishu in 1993 (Bowden, 1999).

> "Ranger elements had been trained in a much more stereotyped manner, and thus, though valiant in the extreme, were at a loss in coping with the chaos of the ambush sprung by Somalian irregulars in October, 1993. (MCT) members provided the key leadership required for effective response. Ranger unit training has since been modified to enhance the capacity of leaders to cope with uncertainty and chaos." (Jacobs & Sanders, 2005, p. 17)

The above comment is not meant as a criticism of the U.S. Army Rangers, who many consider to be the finest light infantry force in the world, it is only meant to recognize that at their core they are intended to be an operational extension of the conventional U.S. Army. When a Ranger acts, there are very large systems

grinding forward immediately behind them. Any action they take must move the mission forward, while at the same time stay in concert with, and supportive of, the enormous green machine they are an integral part. To do this effectively requires a very hierarchical conventional military structure.

Because of the speed and volatility of RECAPS, however, concepts of "leaders" and "followers" need to give way to "members" within a liquid network. While there is still a command authority members of the team have tremendous latitude to execute the commander's intent, and may be stepping in and out of roles of authority. Just as importantly, unlike HRO's and SPT's, MCT's function under principles, that can adapt to dynamic situations, rather than rigid sets of rules.

The Generative Principle: When selecting and developing candidates it is critical to first understand the problem sets they will be reacting too, and the socio-cultural-technical ecosystem they will be working within. What is the problem set the team will be responding too? What is the optimal response? Will the CRN tolerate that response?

### CORTICAL AUTHORITY THRESHOLD

> "Consciousness has developed the ability to override its genetic instructions and to set its own independent course of action." Mihaly Csikszentmihalyi (Csikszentmihalyi, 1990)

The Cortical Authority Threshold is the point where your prefrontal cortex is able to assert cortical authority (Monat & Lazarus, 1991) from your limbic system

enabling you to transition from reaction to response. The limbic system cannot think abstractly and can only do one thing at a time. In complex adaptive environments, new problem sets are emerging both while you are in reaction and because of your reaction. As a result, you need to have the experience and tactical maturity to be able to step back from reaction, to organize your thoughts and respond to the larger event, and then transition back to reaction. The ability to have cortical authority is determined by how rapidly and consistently you are able to transition from reaction to response.

Cortical Authority Threshold (Individual)

Location: Coronado, California, Naval Special Warfare

Narrator: Tom Maher, Chief Warrant Officer (Ret.), Naval Special Warfare.

Narrative

*Each year Navy Special Warfare, or the Navy SEALS, select and assess roughly a 1000 new candidates(Couch & Hollenbeck, 2001). Part of that process is a 24 week initial training challenge called Basic Underwater Demolition School (BUDS) which is broken into three phases. Only about 30 percent of the candidates make it through the first phase, which includes a section called "hell week." In the below story, Tom Maher talks about an experience in Phase two where he is being asked to solve a problem while holding his breath.*

*Phase two of BUDS includes what is called "Pool Completion". During that section of training the candidates are tested in how well they know their*

*equipment and whether they can remain calm while running out of air. During my time, you were given 4 attempts, 2 on Friday, and 2 on Monday and if you don't pass, you're out of the program.*

*On Friday, during the first test, I put on my SCUBA equipment and headed down to the bottom of the pool. Soon after, the instructors where on me ripping off my mask, turning me around and tying my air lines into knots cutting off my air. At that point, I have to determine if I can untie the knot and regain air, or recognize that it is a "impossible knot"( also known as the "Whammy knot.") and ditch my equipment and head to the surface. Keep in mind, that during this evaluation your brain is screaming at me that I am drowning. I quickly scanned my equipment, tried to work the problem and then gave up and headed to the surface.*

*I failed the exercise. It wasn't a Whammy Knot.*

*As I sat on the pool deck shivering and waiting for the next attempt, I began think about my mindset. I decided that I needed to approach the problem with the assumption that all knots, even the whammy knot could be untied. Once I started to believe I could untie any knot, It was simply just me and my problem. All else escaped my mind and I began to think back on my experience as a boxer. Boxing for me, like many individual sports, was a sport involving multiple event horizons. I had fought before in front of 1000 plus spectators,*

*and the noise is deafening, and scary if you were stupid enough to concentrate on it. But when the bell rings, it all goes away, almost like a snapshot in time, where the crowd is frozen, like a mural. It just becomes you and the problem — the opponent — capturing your full attention. Nothing else really matters. When the bell rings to signal the end of the round, you snap into another dimension of information, one that involves listening to advice, learning about what is working and what is not, from another's perspective. Crowds can only be heard, or even better, brought into the event, when you have the ability to process information faster than the opponent, such that you're not only winning, but you feel like you own the problem.*

*Eventually, they called my name for the second test. I had already determined that I would drown myself or finish the task. A sense of timelessness took place, where I could linearly concentrate with zero sense of anything but the problem, such as the endogenous dangers of losing air, or exogenous effects, such as what the instructor, hovering over me like a shark, thinks of my performance. I could ignore those things, because I felt that I owned the problem. I don't mean own the problem from an accountability standpoint, rather from a confidence level. I felt confident that I was superior to the problem I was dealing with.*

*In the end, they the instructors did give me a whammy knot and sitting there on the bottom of the pool holding my breath, I untied it.*

Appreciative Inquiry

Principle of Understanding: In the absence of prior training an individual will have a very difficult time overriding an “Amygdala Hijacking” or a limbic system trigger that will launch an unconscious fight, flight, freeze response. Because Tom was able to access his prior experience managing his fear and emotions in boxing, he was able to use his mindfulness training to exert cortical authority in a pool environment.

Principle of Potential: There is an increasing amount of research to suggest that the use of specific psychological skills training (PST), such as, goal setting, arousal regulation, mental imagery, and positive self-talk, can improve performance (Barwood, 2006). When the cadre is evaluating any candidate, we need to insure that any deficiency is actually related to their true potential and not as a result of our inadequate teaching tools and techniques.

The Generative Principle: With the continued emergence of innovative neuroscience and sports performance tools and techniques it is becoming clear that we are just starting to understand the true potential of the human brain. It is critical that cadre’s continue to investigate ways to exploit a candidates potential rather than just dismissing obvious weaknesses.

Cortical Authority Threshold (Team)

Location: Spring 2007, Upper Manhattan Fire in Brownstone

Narrator: Battalion Chief John Regan (captain in story)

Narrative:

*It was spring 2005 in Flatbush Brooklyn. I am the Captain of one of the busiest fire engines in New York City. To give some perspective to what that means, you need to know that NYC responds to more fires in a year then the next three largest Americans cities combined. I had been on the job for 15 years and was working for the FDNY before, during and after the events of September 11th. It was early afternoon on a clear and warm spring day when the alarm sounded and the response ticket reported a fire in a private dwelling. You know those old movies where they show the people talking on the steps of a classic New York City brownstone, picture that on fire. Our company responds with both a truck and an engine, with four firefighters to each vehicle plus a chauffeur for each. The engine company extinguishes the fire while the truck forces entry into the building and searches for trapped or unconscious victims. As my Engine company turns the corner we see a man jumping from the second floor window with heavy smoke pushing out over his head. The dark brownish colored smoke along with the way it was rolling under pressure out of the window is an indication fire would be exiting that window within just a few seconds. The truck company removed the civilian and entered the second floor window to*

*search for more victims. My experience with fires in this type of building made it vital for me to check the basement for fire regardless of what I was witnessing from the exterior. A large number of fires begin in the basement and extend to the upper floors quickly as a result of the type of construction. And rule #1 is you never want to find yourself above the fire. The members immediately begin stretching a hose line to the front of the building. While the truck company is forcing the front door I look at the basement door and windows for any sign of fire or smoke. With no indication that there was fire in the basement, we began putting our mask and helmets on and entered the first floor through the front door. Two members of the truck company, after forcing the front door, entered ahead of my team to begin their search for victims. As I lead my team into the first floor it quickly became apparent that I was wrong - we did have fire in the basement. In fact, the basement was "fully involved". In other words, the fire had extended from the floor to the ceiling and from the front of the building to the rear. My company was in real trouble and was getting burned as if we were in a skillet. I quickly radioed the Chief that we had fire below us. Normally, this type of situation I would back my company out. There was a real risk that the floor would burn out from beneath us and we would fall directly into the fire. However, this was not a normal situation. Members of the truck company had committed themselves to searching the second floor for victims. If we left our position, the fire could easily and quickly spread to the*

*second floor trapping those members. A stair case acts just like a chimney and would have quickly drawn the smoke and fire to the upper floors. Shortly after radioing the chief, fire was blowing out the front basement windows. The windows had failed due to the intense heat. At this point I began filling with a sense of urgency and despair. My experience told me this was easily the hottest fire I had ever been in and being above the fire made the situation even more precarious. None of this really factored in when I made the decision to "sit tight" and protect the stairs. I had been in many fires before and experienced the same feeling of despair; somehow I always survived. Furthermore, the FDNY is a team and there were members on the floor above that were counting on and trusting that we would keep them safe at all costs. The decision to stay wasn't much of a decision as it was a sense of duty - a moral imperative. Even though it seemed like eternity, I eventually could feel and hear the water from a hose line hitting the floor below us. Another engine company was extinguishing the basement fire. My company remained at the base of the stairs until the main body of fire had been knocked down and we were relieved. When we left the building our coats where literally steaming and a few of us had second degree burns. There were a number of people questioned why I didn't pull my team out sooner. For me there was no question or doubt on what my team's role was. We are successful at our job because we trust and believe in the rest of the team. That they will do, without hesitation, what is necessary to protect our*

*members. After being relieved I spoke with the chief. He explained he understood our precarious situation and had contingency plan in place. The chief had a hose line placed at every basement window. If my company and I had fallen into the basement he would have ordered all the hose lines to "dump" or flood the basement with water.*

Appreciative Inquiry

The Principle of Understanding: In the initial few moments of that fire, John is reacting based on his training. He is implementing his years of experience to execute using schematic behavior. He is able to do that because his mental model and heuristics are in synch. The mental model, however, is built on the idea that the fire is in the kitchen, *ahead* of his team. When he realizes the fire is *below* his team, the mental model no longer matches the heuristics. His training tells him that if he stays in that position, the floor will eventually collapse taking him and his team into the fire below. His threat detection mechanisms are flooding his system with metabolically taxing messages to GET OUT OF THE BUILDING. But this is not John's first fire. He has been in very hot fires before. He can contextualize what is brain is telling him in the same way that free divers first learn how long they can hold their breath. So, he is able to engage with his prefrontal cortex to move from reaction to response.

The Principle of Potential: Threat detection and the subsequent reaction is not a choice, in the way that we choose the kind of coffee we buy. Threat detection is

an emotional reaction which some individuals can develop greater cognitive control (Ochsner & Gross, 2005). For this to happen requires initial aptitude, a willingness to learn and effective iterative training and experience. It also requires a socio -cultural-technical ecosystem that is supportive and reliable. The key to understanding cortical authority is to understand that it is not a switch, but a scale. It is about where the dominant functions of the brain are located at any given time, and how smoothly and individual can move those locations around.

The Generative Principle: While we know that effective training can we inoculate individuals against the type of stress they will encounter within an immersion event (Saunders et al., 1996). We also know that certain levels of stress increase a student's learning, but that too much stress will prevent an individual from learning (LePine et al., 2004). As a result, due to the intensity of stress inoculation, Instructor cadres need to determine before a training evolution whether they are having the students engage in cognitive learning or stress inoculation as they cannot do both at the same time.

### MOMENT OF RESPONSE

> "Between stimulus and response there is a space. In that space is our power to choose our response. In our response lie our growth and our freedom." - Viktor Frankl (Frankl, 1985)

This is the moment of choice, where the operator asserts their will upon the unfolding events. Our ability to respond well depends upon how well we

understand and diagnose the complex system we are nested within. This is primarily developed through education. If there are no pre-existing mental models or heuristics that have been gained through training and education, operational momentum can stall. We train people to improve their reactions to expected technical events; we educate people to improve their response to unexpected adaptive events. Trauma surgeons are unique in the sense that they must be both trained and educated, because they simultaneously work in both a technical and adaptive domain. Below, Doctor Babak Sarani (MD), the Director of Trauma and Acute Care Surgery at the George Washington University Hospital talks about the moment in a highly chaotic environment where he has to constantly balance his, and his teams, reaction and response.

Location: July 27th 2015 – George Washington University Hospital Trauma Center, Washington, D.C.

Narrator: Dr. Babak Sarani, Director of Trauma and Acute Care Surgery, George Washington University

Narrative:

*On Monday, July 27th at around 3pm in the afternoon Patient X was wheeled into the Trauma Center at George Washington University. The patient had been intentionally run over by a car, twice, as was apparent by the clear tire tracks that ran across the patient's chest and body. Very rapidly our relatively small trauma bay was filling up with the anesthesia staff, trauma team of*

*nurses and residents, as well as the emergency room doctors, nurses and residents. A small red line on the off white floor separated those who required the blue scrubs and purple gloves from those who were just observing. As usual the Trauma Bay was hot and under my lead vest and plastic apron, my undershirt was already damp with sweat.*

*As the close knit team gathered around the patient, they began yelling out findings as they were discovered. The energy and the volume in the room were increasing and I focused on keeping a methodical and commanding tone so as to not get caught up in the ruckus. As the results from chest and pelvis x-rays, the ultrasound of the abdomen, and the various vital signs begin to arrive it immediately became apparent that we did not know what the problem was. The patient remained unconscious, with no detectible blood pressure, but none of the tests were coming back positive as to the cause. Human beings that get run over by cars tend be bleeding within their chest, abdomen or thighs and none of the tests suggested that. At that point, about 7 minutes after the Patient had arrived, when I am realizing that I have no clear diagnosis or plan, the patient up and dies on me – his heart stops beating. In our world that means that he has moved from the actively dying category, the category that everyone who enters trauma is in, to the dead category. We now have minutes to resuscitate him and get him back. Given the strange test results, I assume one of the tests must be wrong, so I make the decision to put all my chips on one*

*number and open the chest. I immediately let the team know that we are going to proceed with a thoracotomy, which means the senior surgical resident will cut the chest open with me standing right next to him. I then in instruct another senior resident to put a chest tube in the other side of the chest. I then ask the Emergency Medicine Attending Physician to take over running the overall show so I can focus on the procedure, in this way they can maintain overall situational awareness while I focus in on supporting the resident with the chest surgery. If anesthesia has a problem with air flow or the resident has a problem with the chest tube that is now the ED Doc's problem to solve.*

*Because I work in a teaching hospital there remains this incredible competing interest, first and foremost we are a hospital, not an experimental laboratory, and the goal is to help patients. At the same time, there is a critical societal need for us to train physicians. What this means is that in this profoundly high stress environment the scalpel is not in my hand, but the resident's hand. Intellectually, I know that if I never allow the resident to do this, they won't be prepared when they are thrust into leadership. At the same time, gut instinct is yelling at me to push the resident aside and take over. As a result, these moments tend to provoke two dominant feelings. The first is of utter terror, because I am about to direct another person to open a human chest in the trauma bay, something we may do only 4 or 5 times a year and my hand is not on the scalpel. The second feeling is one of tremendous power because I am*

*about to slice open a human chest. The ability to do this procedure accurately requires the balancing those two emotions. My mouth is always dry when I give the order to begin, but as soon as the knife hits the skin, and I begin giving the resident guidance in real time, the tissues start showing themselves. Once that happens, I begin to fall into a sense of complete comfort, knowing from experience exactly what is going to happen. Given that that procedure lasts much less than 2 minutes, all of those emotions will cycle within me in seconds. Then, having exposed the chest cavity we look to see the source of the trauma and find… nothing. No bleeding, no trauma, just normal organs.*

*At that point I am out of surgical options and realize the source of cardiac arrest must be medical in nature, meaning that the patient had either had a heart attack or the trauma of being run over had bruised the heart. In each case the solution was drugs. Sure enough in about 7 minutes after being given a series of cardiac therapy drugs the patient's heart was revived. Right now we did something that appears right, but we won't really know for hours or days.*

Appreciative Inquiry

The principle of Understanding: One of the core challenges facing operators within immersion events is the struggle to determine when they should move from reaction to response, or vice versa. Individuals with high standards of excellence will often be managing inner monologues screaming at them to lock onto the "obvious" solution in the hope of getting clear or being right. Operators

within Mission Critical Teams have to be able to thrive in ambiguity. They need to remain focused on maintaining momentum, engaging their team, and maximizing their options. To do this they are often fighting their own inner monologue as much as they are fighting the "opponent."

The Principle of Potential: If the candidate is recognizing and reacting to the problem set, but then generating either no response or an inappropriate response, that is an education problem. To influence a candidates ability to respond it first needs to be established that they have the aptitude, cognitive capacity, to absorb new data and apply appropriate responses. At that point the Cadre needs to provide experiences that allow the candidate to fill their cognitive tool kit with a more diverse set of responses.

The Generative Principle: In interacting with candidates during a training evolution Instructor Cadres need to be asking: What are the behaviors that help you understand when a candidate moves from reaction to response? What are the variables or stimuli that trigger the transition? How often in a training evolution is a candidate being asked to make that transition? How does the cadre create exercise ton increase the candidate's ability to respond effectively?

SURFACE HORIZON

> "But the all-clear sounds--then it's okay, you take a deep breath, the stress has passed by. But real fear is a stone deep down in your chest." Ilya Selvinskiy (Clancy, 2002)

Teams that cross out of an immersion event often talk about being able to take a deep breath. Like the first breath after emerging from a deep dive to break the surface of the water into the air. It is where the immediate danger has past and the context has stabilized. Is the moment that the individual, and the team, take control of the temporal environment or come to "own the clock".

Location: 2012, Conference room, Northwest U.S.

Narrator: Anonymous Federal Intelligence Officer

Narrative:

*Kidnapping cases are complicated. In some cases we are able to negotiate quickly, or physically take down the kidnapper, but in some cases the negotiations can last for a long time. In 2012, I was leading a team seeking the release of a 70 year old man who had been kidnapped in Asia. The kidnappers had located his family, who were living in the U.S., and were demanding an enormous ransom. Because of the location of the kidnapping, and the identity of the kidnappers, my organization was tapped to handle the response. So, every day for 42 days in a row, I drove the two hours from my house to a generic conference room where I, three other members of my team, a linguist, and a member of the victim's family would sit and wait anywhere from one to four hours for a 30 minute phone call that might, or might not come. Every one of those 42 days was intense, both emotionally and physically as we tried to*

*figure out if the victim would live or die. The conference room was like any conference room you have ever been in with florescent lighting and standard office furniture. The shades were always drawn and the table always had drinks and snacks to help keep the family member comfortable. Our first request to the kidnappers was proof of life. We wanted to know if the man was still alive. In reply, the first video the kidnappers sent was a torture video. It showed them beating the victim, who was screaming in pain and covered in blood. A family member had to view the video to get positive identification on the victim, and as you might imagine, the experience physically and emotionally drained everyone involved. Afterwards the family stated they would pay any amount to get their family member back, even without assurances that he would stay alive. It was our job to help them understand that the kidnappers made the video with that outcome in mind. In order to exert some control over the negotiations the Negotiation team made the decision to accept no more videos, something that had never been done in prior kidnapping negotiations.*

*Around the conference room, I sat next to the family member and on my other side was the linguist. The negotiations were being conducted through the family member in a language of which I only knew a few words. It was up to my linguist to help me understand meaning, but tone, tempo, anger and frustration were all really clear regardless of the language. The problem with the negotiations was that the family was not wealthy and the kidnappers*

*wanted 5 times the amount of money they had access too. The negotiations dragged on for 20 days without progress and on day 21, they called to tell us they were getting ready to send us another video. We replied that we would not even talk about the videos and if they brought it up again we would hang up. They got frustrated and told us that they just wanted an answer as to where to send the video, we repeated our statement and they asked again. We hung up. At that moment, it was like the air got taken out of the room as both the room temperature and our collective pulse rates went up. It is one thing to make a decision about hanging up on kidnappers, and another to actually do it, and none of us knew if we have just killed the victim or not. Then the phone rings. We answer, and the kidnapper is outraged, they tell us not to hang up on them as they are just trying to tell us the location of the next video. We explain again that if they bring up the video again we will hang up. Once again he starts talking about the video, and so we hang up again. They called back 12 times. 12 times they asked where to send the video and 12 times we hung up. Each time the family member would anxiously ask if we were making the right decision as this could go really bad, really quick. Each time, we knew we were making the kidnappers more frustrated and the outcome could be catastrophic, but we had to change the direction of the negotiations and we knew the kidnappers wanted the money. On the 13th call, the kidnapper stated that they would no longer talk about the video. Suddenly, the air came back in the room and everyone looked*

*around at each other wondering what had just happened. At the same time, we all suddenly knew that the victim was going to survive, he was going to be ok, we just need to get to a ransom number that was possible. It took us two more weeks to get the kidnappers to understand that we were only going to pay 1/5th of what they have asked. Then finally, realizing we were not going to change our counteroffer, they suddenly say no. The amount is not enough and they are going to kill the victim, there will be no more calls. The entire team is deflated at this point, but I made it clear that they were just using it as a negotiation tactic and reminded everyone that the kidnappers still wanted the money. There are no more calls that day, and as I make the two hour drive back home I am on the phone with the family who are asking if we did the right thing. Twelve hours later, the kidnappers call to let us know they will accept the money. Two days later the victim was released unharmed. Not long after the man returned home the team was invited to the family's home to eat dinner with the victim and his family. A few weeks later the kidnappers were identified and arrested.*

Appreciative Inquiry

The principle of Understanding: The challenge that teams can encounter with the Surface Horizon is that it can often be what Mountaineers refer to as a "false summit." After great effort and sacrifice to reach what they believe to be the Mountain summit, come to see that it is only a ridge with the actual summit

much higher. For some teams, this discovery can have significant impacts on moral and momentum. In other ways, teams can begin to act like a herd of horses that can smell the barn(Priest & Gass, 2005), where they lose focus on the mission and just want to get out of the immersion event.

The Principle of Potential: When navigating a liminal space you are also navigating ambiguity in search of some certainty. It can be physically, emotionally, and psychologically draining even among experienced experts as opportunities for closure come close only to disappear. Teams that are successful in these environments are made up of individuals who can thrive in ambiguity, who can retain their sense of humor even in the darkest of times.

The Generative Principle: Some of the organizations in this study already engage in methods to help candidates become accustomed to staying in the immersion event for long periods. In some cases they might habituate the students to run as fast as they can a certain distance each day, and then on the 6$^{th}$ day, without warning, just as they are about to reach the end, they keep running. Some candidates are unable to adapt and drop out. The Cadre's need to find ways to help candidates understand how long they can metaphorically, hold their breath.

## MOMENT OF RECOVERY

> "And once the storm is over you won't remember how you made it through, how you managed to survive. You won't even be sure, in fact, whether the storm is really over. But one thing is certain. When you come out of the storm you won't be the same person who walked in." - Haruki Murakami (Murakami & Gabriel, 2006)

Shaun Huls, who is currently the Director of Sports Science and Reconditioning at the Philadelphia Eagles, spent 7 years as the head Strength and Conditioning Coach for Naval Special Warfare. When asked about the concept of recovery he answered:

> "During the first decade of war a lot of operators were damaged. It's hard for a community, like Special Operations, who prioritize hardship and adversity during their selection and training to see beyond those traditions as they transitioned to long-term sustained combat. The cultural disregard for wellbeing carried a heavy price tag, physically, mentally, emotionally, and intellectually, when they began engaging in so many back to back missions. Everyone just figured the solution was to work harder and longer. What we have actually learned is that we have to put the same thought and intention in our recovery, as we do in our training, or guys will never reach their potential as a warfighter or their longevity as an operator"(Huls, 2016).

While this may seem obvious, the challenge with this solution is that it is often counter intuitive to highly motivated individuals who maintain very high personal standards. It requires a fundamentally new way of thinking about things like fatigue, error and loss. It also requires that each individual has inherent blind spots to their own performance which require someone else to identify and help resolve (Luft & Ingham, 1961). With many operators, fatigue is a sign of weakness and the solution is to work harder, which in the long term can be really

damaging. To make it even more complicated, it takes a certain amount of maturity and experience to understand the difference between lethargy, which requires motivation and fatigue which requires recovery. When it comes to error and loss, it is not uncommon for some operators to have their focus broken when they make an error due to deficiencies in robustness, resilience or mindfulness. Robustness is a term used to describe an operators ability to continue performing even when subjected to external and unpredictable stressors (Anderies, Janssen, & Ostrom, 2004, p. 1), or put another way, it is the ability to take a hit and not fall down. Resilience, on the other hand, references the operators "positive adaptation in response to adversity" (Waller, 2001, p. 292; K.E. Weick & Sutcliffe, 2007), or said another way is the ability to rapidly get back up after getting knocked down. Lastly, Mindfulness is the ability of the operator to go beyond just focusing on 'what' they want to achieve and instead remain "constantly engaged in updating 'how' to achieve it, given the evolving operational situation" (Darwin & Melling, 2011). In other words, instead of taking the hit and not falling down (robustness), or recovering from falling down after a hit (Resiliency), Mindfulness is a way to avoid the hit all together.

There is a moment in every Mission Critical Lifecycle where they have crossed the surface horizon and the event is beginning to stabilize. It is here they team must enter a moment of recovery, where they can begin to process the event and move toward the new normal. Each immersion event is different, with each operator

sharing a different but similar experience, meaning that they have changed both as individuals and as a team. The greatest change a team can go through is the death of a member of the team. No matter what, everything will be different in some way after that event, while the demand for the team to adapt to the new normal does not diminish. Below, Coleman Ruiz, a former officer in the Navy SEALs, talks about the moment of stabilization, followed by the onset of the new normal after the loss of a team mate.

Location: October 2007 – Baqubah, Iraq

Narrator: Coleman Ruiz, Naval Special Warfare. Thirteen years as an officer in the U.S. Navy SEALs and completed six operational combat deployments to both Afghanistan and Iraq.

Narrative:

*In October 2007, under a clear and cold, pitch-black night, our 70 person assault force, part of a 120 person joint task force, landed in Baqubah (BQ), a small region in northeastern Iraq. Over the previous five years, many of us – most of us – had cut our teeth in a never ending cycle of rotating deployments that was some version of training, leave/vacation, and then deployment and combat. About two months after arriving in the combat theatre, we had already conducted approximately 30 combat operations with only a couple of guys on the team wounded. After 60 days of constant operations, the entire team had acquired a razor-sharp rhythm to our daily lives. Late one afternoon,*

*only weeks before Christmas I sat on a folding chair in the Tactical Operations Center, drinking black coffee and watching the live video surveillance footage of our upcoming target, and it was becoming clear this one would be different. We had spotted watchman on the roof of the target compound who was moving in an unusually disciplined manner, which we didn't typically see in the relatively undisciplined and untrained band of insurgent fighters of this region.*

*As the sun set, and we transitioned from planning to execution, the urgency and intensity of the activity is palpable and thick. I was excited, focused, planning on the fly, rehearsing and visualizing my prepared and potential contingent actions, including my language. In spite of the intensity, it is critical that my voice balances the urgency of the situation, with calm detachment, so as to not over excite our support assets. In truth, however, while I could feel in my core how important it was to be dialed-in and spot on with my reactions, focus, and correctness, critical decision making is so consuming that emotion simply isn't there. Any single night we go out into the field for a raid is a culmination of training, effort, planning, sacrifice, risk, elation, euphoria, reputation, and a potential for tremendous loss and disappointment. There is no joking, laughing, or minimizing these events as foregone conclusions. Everything we know as normal can change in a split second.*

*When we exited the helicopter and began walking the few miles toward the target everything was going according to plan but the surveillance aircraft*

*overhead was still showing the watchman on the roof. This remained unusual and I remember talking with my radio operator about this and thinking that while we had become very good at this exact scenario, and understood the potential consequences, this could get both dangerous and interesting. As we passed through a palm grove on the edge of town we began to set a series of security positions to contain the enemy reaction to our assault. As our security positions are moving into place the primary assault force takes a pause. We sit, wait, look, and listen. The palm grove was as cool as usual in December. Not quite cold but just a nip like on an east coast morning in autumn in the United States. It was very dark and away from the fuel and rubber smells common to an outpost, the air carried the familiar scent of dirt, pine, fruit and nature. It was very quiet with an occasional dog barking in town. Time is important but I tended to lose track of how quickly or sometimes how slowly time would actually pass when we were about to initiate the violence of a deliberate assault.*

*Once set, I cleared the primary assault team to breach the first door. As soon as this happened a number of things occurred near simultaneously. Word came that 16 or so armed enemy men were moving from the building down the street into a secondary fighting position. At almost the same time I heard an abnormally loud blast, at an abnormal timing in our assault. Loud blasts were expected during an assault, but this one did not fit our typical pattern. Something was clearly wrong. I remember wondering if something weird had*

*happened. There wasn't much chatter on the radio which would have been normal. I was worried. It turned out that one of our teammates stepped on an intentionally placed improvised explosive device (IED) in the courtyard of the target building. The IED was a 155mm [Howitzer] round placed underground. He was killed instantly. I can still remember the feelings I had at that moment of finding out one of our teammates was killed. All at once, while still in the middle of an active firefight, I knew that things would forever change for us. The troop would approach the rest of this deployment differently and we as a troop would forever be changed in some way. I wasn't sure how but this would undoubtedly affect us all. We finished prosecuting the target building, gathering intelligence, and using air support to strike fighters in the nearby tree-line. I remember actively thinking, "How do I report this scenario correctly and respectively back to our headquarters over the radio?" Put simply, we had to call in a CASEVAC just as we would in any other scenario but our teammate wasn't just wounded. He was dead. For whatever reason, I still maintained some sort of detached, observational-like separation from the actual event in order to command and coordinate all the tasks at hand. We had to move three miles to a safe landing zone just to get picked up. During the rest of the fire fight and the evacuation I had the sense that my responsibility was growing by a factor of one-hundred or one-thousand, or whatever. I knew that I was responsible for this event, for the safe return of the troop on this night and every*

*other night of the deployment. I'm responsible for ensuring his family gets the real story about his effort and sacrifice. I'm responsible for the ensuring the after action back at our home unit is correct and complete. I could make a list a mile long of all the things for which I suddenly felt responsible.*

*We eventually extracted the entire troop back to our outpost. The helicopters landed and we all jumped off at the airfield. The difference this time was our teammate was on a stretcher, draped in a bloody American flag, and he stayed on the helicopters when they took off to fly back to our headquarters at a different airbase. As the helos powered up and flew off and the din of their engines faded in the dawn of the upcoming sun, our troop just stood there in the silence watching. I realized again, with ever more gravity, that everything was different now, and that somehow we would all need to adapt to the new normal. No one had anything to say. No one knew what to say. No one wanted to say anything at all. It wasn't that no one wanted to cry. I don't think anyone could cry. I couldn't have cried or screamed if I wanted to. I was stunned. The reality of our profession was crushing my chest. Having since lost many other friends since that year and having gone through this process more times than I would have liked saying there is a mix of emotions is a gross oversimplification. For me, the reality of a losing a teammate so up close was more of a mind numbing clarity of the glory, beauty, and fragility of humanity that you see in an instant.*

*We were only halfway through deployment when this operation happened so we still had many more missions ahead of us. Now I was scared. I was scared of how our leadership back home would judge us for the loss. I was scared that we might make a strategic or tactical error in the field and lose another teammate, or more teammates. I was scared that we might have guys in the troop (including me) unprepared to continue operating since the loss. I simply didn't know what to think or feel, or what was normal. Not fully knowing what the new normal would feel like we simply got right back into the game the very next night. Less than twenty four hours later we went right back into the field and got into another massive firefight, presumably with the same enemy group from the previous night.*

*Losing our teammate really focused us. We continued to be extremely aggressive over the next two months. We planned better and operated better than we ever had in the past. Like many guys in our business we felt it was what our duty to do what we believed our teammate would want us to do – keep going! We did a memorial ceremony there at our outpost, put our teammates gear to the side, raised a flag for him and enshrined his badge. However, there wasn't much discussion within the troop about him over the next few months. It was as if we knew we had to stay focused in this world (overseas) to get back to our regular world back home in the United States. Thinking back on it now,*

*there is an eerie sense that he was still with us and we didn't have to fully acknowledge the loss until we returned home.*

*Coming home from deployment is always an exciting time, but this one was significantly different. All the excitement of seeing my family was the same as it ever was but I also knew that we actually had to face the domestic pain of losing our teammate. We knew there would be multiple memorials, burials, family visits, photos posted on the walls of our unit, speeches, after action reports to debrief, cleaning out his cage, and meetings with most of his immediate family. In short, we would relive the moment and the deployment over and over again. We had to face the grief, celebrate the man, memorialize him, comfort his family (if we could at all), enshrine his gear, and begin to move on without him – forever. We would need to "replace" his slot in our troop with a new operator. And today, most of us are still asking ourselves if there is anything else we could have done to prevent him from being killed. And the most humbling and disappointing part of that question is that the answer is "yes." We all could have done more but we didn't know it at the time. Sometimes it is the event itself – the immersion event - that is the teacher and forces us to adapt.*

Appreciative Inquiry

The Principle of Understanding: While Mission Critical Teams operate around iterative immersion events, these events are not isolated or singular as one event might come right on the heels of the last one. Due to the nature of what they do,

whether it is on battlefield, in surgery, in a fire, in a hostage rescue, or an Ebola ward, these teams will experience loss. As these teams are often tribal in nature with many bonds transcending beyond just friends into a form of family, the loss of a team mate represents the most extreme change that a team can go through. It is in these moments that the mission becomes sacred. In the absence of something that is greater than the individual, greater than the team, the center often cannot hold. Eyes must be turned from the pain and the loss toward something worthy of their strength and courage. Individuals and teams that are unable to find time to recover, cannot continue to adapt (Taleb, 2012, p. 58).

The Principle of Potential: To prepare MCT's for those moments, we have to provide them with certain "Protective Factors" (Scales & Leffert, 1999; Waller, 2001). In addition, to such factors as Mindfulness, Robustness and Resilience, these factors also include structures, habits, skills and beliefs that allow teams to sustain themselves even in the face of catastrophic loss. Too often however, operators will allow their embarrassment, shame, sorrow, or pride to distract them from remaining in service to the team. They will turn inwards and decline. At the same time, these individuals are rarely selfish, and if we are able to help them see that their inward focus is fundamentally selfish, we can sometimes help them to see that remaining in service to the team and the mission is a way forward.

The Generative Principle: After each training evolution, and each week, the Cadre must determine if the candidates are recovering. If not, they need to determine the source of the fatigue, is it physical, mental, emotional, social? From there the Cadre needs to be identifying sustainable coping mechanisms to teach to the candidates to help them not just in training, but throughout their career.

CLOSURE THRESHOLD:

> "The trick is what one Emphasizes. We either make ourselves miserable or we make ourselves strong. The amount of work is the same." Carlos Castaneda (Carlos, 1968)

Mission Critical Teams are unique in the sense that they are constantly recovering from one immersion event while at the same time preparing for the next emergence. In some cases, the impact of an immersion event can leave a lasting impact and as a result can take time to put the event behind them. By having the team formally, or ritually(Bell, 1997), close and event provides permission for the operators to put it behind them and at the same time acts to highlight the operators who continue to try to make meaning of the event or trauma. The point of a formal closure is to help identify those people who are lack the skills to cope with the aftermath of the event. To then get them the resources to strengthen their coping mechanisms.

Date: September, 2014

Location: Ebola Treatment Unit, Bong Liberia

Narrator: Dr. Colin Bucks (MD), clinical assistant professor of surgery in the division of emergency medicine at Stanford University and member of the International Medical Corps

Narrative:

*In December of 2013, a two-year-old boy, named as Emile Ouamouno from the village of Meliandou in Guinea west Africa died of an unknown illness. Later his mother, sister, and grandmother also died presenting with similar symptoms. Healthcare in West Africa is limited to remote villages and no cases of Ebola had ever been reported, so locals assumed it was the result of one of the dozen local diseases. At some point in mid-July, 2014 a sick patient arrived at Phebe Hospital in Bong, Liberia. The patient, not wanting to be denied treatment, lied about where she was from and her initial symptoms were considered common in the region. On July 21, 2014 four nurses who had been treating her became ill and tested positive for the Ebola Virus and the hospital was immediately shut down. Six days after that, in another part of the country, Dr. Samuel Brisbane, one of Liberia's preeminent doctors, died of Ebola. By July 28th, most border crossings in and out of Liberia were closed and by July 30th all schools were closed in an attempt to prevent the virus from spreading (Fink, 2014; Sack, Fink, Belluck, Nossiter, & Berehulak, 2014).*

*The problem with shutting a hospital down, is that it not only those who might have Ebola, but everyone. If you had baby, if you have diabetes, high blood pressure, appendicitis, where were you going to get those issues addressed, it's gone. At the same time, if Ebola is not contained, everyone dies. It is a disease without a cure and without a vaccine so the only way that we are going to stop this is to break the chain of transmission, to get people from touching the disease and touching each other. Infectious outbreaks are similar to wild fires in the sense that each virus has its own characteristics, its own transit times, its own attack rates, its own mobility, its own mortality. These are the things that we have to figure out in the beginning of every outbreak. Except the fuel for an outbreak isn't wood, it is human. You and I are the fuel. The problem with people, unlike trees, is that they move around and like to co-mingle. They don't behave well but in some cases you can educate them and that sometimes really helps. We can't do any of those things, however, if we cannot keep the medical personnel secure, and medical personnel were currently dying.*

*In Response to the outbreak, governments like the U.S. and Britain start ramping up to respond to the outbreak, and Non-Government Organizations like Doctors without Borders (Médecins Sans Frontières -MSF) and the World Health Organization (WHO) and Save the Children start dispatching teams. I was contacted by Save the Children who were building an Ebola Treatment Unit (EBU) at an old leper colony in Bong Liberia, about 4 kilometers from*

*Phebe Hospital to help run Incident Response. At that time the mathematical modelling showed was predicting an exponential increase in infection. Medical personnel were dying and there were not nearly enough Ebola treatment units. In addition, the location of the ETU I would be helping to run was at an old leper colony, down the road from the home to Charles Taylor the convicted war criminal. This, however, is the life I chose, so between September 23rd and October 23rd, 2014, I am one of the doctors at the Bong Ebola Treatment Unit and I sleep and eat at the abandoned university next to Phebe hospital. By the time I arrive, the team that worked impossibly hard to stand the ETU up is getting ready to cycle home. I got about three hours with him, got trained for a day, and got handed the night shift. After about a week, the Doc who ran the day shift rotates home and lets me know that I have the day shift too, including the meetings, and by the way you need to train the two new up to speed. This lasts for a couple of weeks and we are starting to get test results back and we are getting more patients and things are starting to move along. During my month, I saw about 130 suspect cases of those about half were positive, meaning that they had Ebola, half had something else and I don't get to know what. And of the half that had Ebola, slightly more than half of those died in spite of our best interventions.*

*When doctors tell stories, we start by saying, "This is a 56 year old male or female with a past medical history of this and they present it with a complaint*

*of this." That doesn't tell you anything about what we sense. The Bong Ebola Treatment Unit is designed in Sections. As patients arrive, they enter the triage area. On the left side is the staff area; on the right is the patient area. The patient area is then broken into two sections, on one side is the suspect ward for people waiting for their test results to come back. This is because Ebola can initially present like other diseases like malaria. If you just have malaria and we put you in contact with someone with Ebola, then you might have Malaria and Ebola at the same time and we have not done you any favors at all. The other section is the confirmed, or treatment, ward is where everybody has Ebola and we can cohabitate people and families in that area. We need to care for our patients, there was not much we could do, a lot of this is maintain their dignity treating their symptoms and try and keep them comfortable while their immune system ramped up and hopefully caught up in time to beat the disease but more often than not it didn't.*

*The first thing that hits you when you arrive there is the heat. It's seldom under 90 degrees, it is only under 90 degrees or so when the huge rains, when the sky opens up and it just goes boom, like that. The heat also matters, because in the patient side you always have to be in the personal protective equipment (PPE), some patients are vomiting and having so much diarrhea that protecting against contact with fluids is critical. You are completely covered and wearing rubber boots with a heavy leather or rubber apron over you. Your work period*

*is about 45 minutes, maybe as long as an hour and 10 minutes and in that time you fill your boots with a liter and half of sweat and sometimes you have to come out early because you soaked your mask so thoroughly with your own sweat and condensation. For a while you can tilt you head like this and still breath but then in a certain point the mask is so wet that that every time you breathe it just fills against your face, sort of like being water boarded. And then you only really have a couple of minutes before you are going to pass out, so we have to have a procedure in place in case someone does go down to both keep them alive while also preventing them from getting contaminated. The fastest we can get you out of PPE and disinfected is four minutes, so it is a challenging timeline. Everything at our treatment unit had this blue tint because it's concrete structures, framed in blue covered in blue plastics. When you walk it is mostly on gravel and when you don't have your mask on everything smells like bleach, bloody diarrhea, vomit or burnt plastic from the incinerator that never stops. Every time you are going to step in or out of the building, you wash your hands in bleach, you walk through a bucket of bleach, before you could enter in. It's dilute bleach, but the smell of chlorine permeates everything and so this is a wholly different environment than I think most of us ever experience. It was certainly a new experience for me.*

*Besides diagnosing and treating patients we have to plan for things like patient transport, biological testing, burial, releasing non Ebola patients, and survival*

*support. The last one, unfortunately, was our lowest priority because at the time I first arrived we didn't have any survivors. In terms of patient transport, we go lucky, because we had Elvis. Elvis, and that's his real name, Akengwa, is a SWAT paramedic from Nairobi who designed and then implemented the patient transport system. Every day, Elvis would call me and he'd say something like, "Dr. Collins, seven patients, three flat tires, tree on the road, but I've got my cutlass (Machete). Echo Tango Alpha (ETA Estimated Time of Arrival) 1900, would you save me dinner." I would just smile, and tell Elvis to keep doing his thing, and I would save him dinner. He always got through.*

*Our bigger challenge was with Biological Testing and the release of patients who did not have Ebola. It was critical that we have a local lab we could do testing and a local hospital to send patients who were ill with other diseases, but the lab was in Phebe Hospital and it had been shut down. It was for this reason that the team before us was racing to set up the ETU. By the time I arrived the Ministry of Health was stepping in to help get Phebe hospital back on its feet after dealing with emotional crisis of having Ebola patients and losing nurses. At the time the very well respected hospital made it clear that it was there community and they needed to get back up and running and start treating Ebola. Just before the hospital opened up, however, the Ministry of Health made the decision to have this outside international group run this Ebola Treatment Centre and they should just focus on normal services for their*

*communities. Given that people with Ebola would still show up to their hospital, this was both disrespectful and somewhat dangerous. To make matters worse, any nurse who came to work at the ETU got higher pay and access to better PPE. So right off the bat, they lost 30 to 40 percent of their surviving nurses. Needless to say, when their lab did open up, we had a slow time getting our test results back. The problem was that initially we were two different organizations fighting the same problem with no coordination and a bad start.*

*When we do get our tests back, some of them come back negative. The problem with that is that there are dozens of really bad diseases in West Africa, that you do not want, that are not Ebola. The question is where do we send them? We currently don't have a relationship with Phebe hospital and I cannot discharge sick people not knowing if they are going to survive. At the same time, I cannot keep them next to people who may have Ebola and I might then infect them with this. At this point, I know that I need to meet with Phebe hospital, and even though I did not create the conflict, I need to eat some humble pie. So, I drove the 4 kilometers to the hospital and requested an appointment with the Medical Director, Dr. Sibley. I was told he would be available the next day. The next day I drove to Dr. Sibley's office and shared with him my understanding the situation, that I am a temporary outsider and at any time he should cut me off to educate me on what I was getting wrong.*

*I told him that I know that not long before his nurses got sick his hospital was shot up during the second civil war. I know that he has had to overcome a great deal just to do his work. With that said, I told him that I currently had patients who were negative to Ebola, but still very sick. If I try to ship them back to you I am going to terrify your staff. A terror that I think is justified, given what you all have just gone through. At the same time you've got a problem because your community knows you better than they know us and they are very likely to show up with Ebola symptoms at your door first. So here is my proposal. We will come to you and at the drop of a hat. We are less than 10 minutes away and if anybody in your hospital thinks someone has arrived who might have Ebola we will come immediately and take them no questions asked. We will take them to our ETU, we will treat them and we will work them up. At the same time, we are asking that you take our patients if I can show you that they are negative to Ebola. We can go through the WHO guidelines and show that they have met the criteria for a negative test. As we talked, he made it clear that we were trying to solve a medical problem and a cultural problem. There's a small degree of false negatives in all testing, and the hospital staff are afraid. Even though I had a lot of faith in the testing, and it would take longer to double the tests, I really couldn't re-inflict that emotional trauma to the hospital staff. So we decided to take the established guidelines and double the testing. With that agreement, he agreed to take our cleared patients.*

*I have a picture of one of the nurses at Phebe Hospital, she was one of the nurses to catch Ebola and one of the very first survivors. The picture I have of her is her working at Phebe hospital after she recovered. It always blows me away. As I was leaving, I told my replacements how critical it was to maintain the relationship Phebe hospital. We know that we are temporary and at some point we need to hand the problem back to them better than how we found it. After I was home, I would continue to check in with returning medical personnel and ask about Phebe. It was like, "Oh, yeah Phebe Hospital? They'll take anything we send them, yeah, really great we love them." It is one of my proudest accomplishments when I think back to that exhausting marathon of an experience. Many of the people I was surrounded by were former child soldiers. I was actually scared to go into that environment, yet, the place was filled with warmth, love and compassion.*

Appreciative Inquiry

The principle of Understanding: At the end of the day, MCT's remain sustainable only as long as their hope and their purpose remain sustainable. The reality is that we look at rates of addiction, divorce and suicide, the long term cost of joining a Mission Critical Team can be devastating, but, it doesn't need to be. Little by little the teams are beginning to understand that in order to have a full career as an operator, they will need to learn how to process the abnormal events they are continuously situated within.

The Principle of Potential: We know enough now, to know that individuals can have long, sustainable, and healthy careers within Mission Critical Teams. What we don't know enough about is how to create programs to help young operators become old operators.

The Generative Principle: The Cadre must focus both on developing the person and the team for the mission, as well as for the career, and even the life after that career.

## THE NEW NORMAL

> "Through learning we grow, becoming more than we were before, and in that sense learning is unselfish, because it results in the transformation of what we were before, a setting aside of the old self in favor of a more complex one." Mihaly Csikszentmihalyi (Csikszentmihalyi, 1990)

Most of the change that we experience in our lives, are small course corrections that we experience over time. For example, imagine that you and your team are navigating through the wilderness using a map a compass. Your destination is 60 miles away, at compass heading of 93 degrees, but some of your team decides to head off at a bearing of 94 degrees. Given it is only one degree off, it doesn't seem like much, but at the end those teammates who took the other bearing will be a mile away and on a very different path. Radical Change events, however, are different. Instead of a long walk of 60 miles, the event lifecycle for a Mission Critical Team is over in five minutes. Instead of disappearing onto a new path, your teammates may be gone entirely, or near but appearing completely different

in some way. Teams that fail to stay on the same bearing, or recognize the changes that have occurred to each other over time, risk losing their cohesion (MacCoun, 1993). It is only after the team has experienced closure that they can truly enter a **Period of Reconstitution**: Where the team is restored to effectiveness, commensurate with new knowledge, personnel, technology, threats and opportunities(Staff, 2013).

Location: Hudson River, New York City, Jan 15, 2009

Narrator: Chief Joe Pfeifer, Chief of Counterterrorism and Emergency Preparedness for the New York Fire Department (FDNY).

Narrative:

*On Jan. 15, 2009, Capt. Chesley "Sully" Sullenberger makes an emergency landing in New York's Hudson River after US Airways Flight 1549 strikes a flock of geese. Miraculously, all of the 155 passengers and crew survive the harrowing ordeal, and Sullenberger becomes a national hero in the eyes of the public and the media.*

*What most people don't know is that water rescues require greater coordination of limited resources than similar events on land. The FDNY is tasked with fighting fires and rescuing people on both land and water. As people gathered on the wings of the plane, FDNY along with New York Waterways, USCG and NYPD rescued everyone from the ice waters of the Hudson River. Enhancing*

*our fleet of fireboats and training our people to work in partnership with other agencies contributed to this success.*

*As the world changes and presents new challengers, FDNY must adapt, as we can no longer think just in terms of fighting fires. In the wake of 9/11 there are new terrorist threats as well treats of natural disasters. To meet these new threats, FDNY created a Center for Terrorism and Disaster Preparedness. As founding director, I challenge others to think about the unthinkable so we can prepare FDNY for such events. This requires moving from agency centric thinking to a networked approach that requires building partners across city, State and Federal agencies, as well as with our international partners.*

*After the November 13, 2015 terrorist attacks in Paris, France, FDNY travels across the ocean and met with official to prepare for similar events in the U.S. French fire and police official also traveled to NYC to compare protocols for active shooter attacks. Together we learn from each other to enhance preparedness.*

Appreciative Inquiry

The Principle of Understanding: In the aftermath of a radical change event the individual, teams and the socio-technical-cultural ecosystem in which they are nested will have changed. In order for teams to be prepared for the next RECAPS they need to have a clear eyed approach to those changes. Teams that cling too

tightly to their history, or dwell too deeply in the nostalgia of "the old way" are actively becoming obsolete. The teams need to be constantly asking: What is different now because of what we just experienced? What is the same, but should be different?

The Principle of Potential: Change is hard. It requires intention and perseverance, and too make matters even more complicated, not all change is healthy. Instructor cadre's need to constantly be asking whether current traditions, behaviors, language and rituals support the mission or support the legacy. If they do both, great, but if they only support the legacy they are restricting the teams potential.

The Generative Principle: Think about your team right now. Are they innovating as fast as they need to remain relevant? Are the people on the team active and motivated learners or are they stagnant? Is the team culture open to change or are they resistant? Do they have access to trusted outsiders that can help them see their blind spots? What is the motivation of those outsiders? Mission Critical Teams are either evolving or adapting or they are becoming irrelevant.

## A University Assisted Mission Critical Team Instructor Cadre Development Program

Not one of the teams that were part of this research existed, in a permanent form, prior to 1950. That fact alone is suggestive that MCT's are fundamentally

different from the Crisis Response Organizations that preceded them. To better illustrate this concept, consider the evolutionary pattern that began during in World War II. It wasn't long after the Japanese attacked Pearl Harbor in 1941 that it became clear that the war in the pacific could not be won at sea and that an invasion of Japan was necessary to win the war. Due to the limits on how far the supply chain could be stretched, it was necessary to capture a series of islands in the south pacific. By 1943, after fierce battle in Guadalcanal, it was decided to capture the island of Tarawa, and Atoll located in the Gilbert Islands about 2,500 miles south west of Hawaii. The Atoll is about 3 miles in length, a half a mile wide and held by about 4,700 Japanese Soldiers (History, 2003). The plan was to bombard the island from a distance and then send an initial 5,000 U.S. Marines ashore to deal with any lingering resistance.

The Navy only had access to obsolete depth charts and pictures taken from Aerial reconnaissance, and the concern was how to navigate the reef around the Atoll as the majority of their landing craft drafted about 4 feet of water (History, 2003). What they did not know was that the Japanese had learned a great deal from the Battle of Guadalcanal and had set up both underwater obstacles and weaponized defensive positions within range of the beach with the intention of creating a new problem set for the Marines (Brown, 1992). As the landing craft got bogged down trying to reach the beach the Japanese began opening fire, killing or wounding over 1,500 Marines. "The Majority of the Marines who died on Tarawa did so as

they struggled to reach shore"(Brown, 1992). In the aftermath of the battle, it was clear that other islands must be captured, but that neither the Navy nor the U.S. Marine Corps had a solution to the beach reconnaissance and clearing problem. As a result a number of amphibious unconventional warfare units, such as the Navy Scouts and Raiders, Naval Underwater Demolition Teams (UDT), and OSS Operational Swimmers, were piloted to resolve the emergent problem set (Williams, 1949; Cunningham, 2007). At the end of the war, all of the unconventional units were disbanded with the exception of UDT, which remained successful through Korea, but encountered a new problem set in Vietnam. The type of warfare required a type of team that could leave the water, continue past the beach, and engage in unconventional warfare. Unable to adapt rapidly enough, the U.S. Navy created their Sea, Air and Land Unit, the Navy SEAL's (Marcinko & Weisman, 1992). By 1980, however, a new problem set had emerged in the form of state sponsored terrorism, and in the aftermath of the failed Iran hostage rescue mission in 1980, the Navy saw the need for a full-time joint special operations counter terrorism unit, and thus SEAL Team 6 was created (Marcinko & Weisman, 1992).

The paradox of a successful human based CRO is that in its pursuit of sustainably adapting to emergent problem sets it requires a sustainable bureaucracy to function, and a cultural legacy to attract the best possible personnel. The paradox lies in the fact that both a bureaucracy, and a legacy, act to standardize

solutions and behavior, which conversely reducing the amount of times that teams have to navigate truly ambiguous and uncertain situations. If not attended to, the need to manage and sustain the new organizations will act as a form of resistance to change and adaptation which will slowly and quietly sabotage a CRO's ability to remain relevant. There are many that believe that the reason Lord Nelson won the Naval battle at Trafalgar in 1805, was not because he was a better tactician, but because he belonged to a more adaptive culture (G. S. McChrystal, 2015). The enemy could not overcome their own traditions, even to save their own lives. In some cases, this resistance will slow them down so much that they can end up taking on the same structure as the CRO they were meant to replace.

When we take a look at what was happening in 1950, however, it appears that MCT's were not just created because of a new Rapidly Emergent Complex Adaptive Problem Set (RECAPS), but also the rate in which these new problem sets were emerging. It might be easy to dismiss this characterization, until we consider the impact in other domains such as Wall Street. "The rate at which large American companies left the Fortune 500 increased four times between 1970 and 1990" (Micklethwait & Wooldridge, 2005). If we assume that large corporations are run by intelligent motivated people, than what we are left with is the fact that organization could not adapt quickly enough to survive. By the 1980's this phenomenon was also being noted in business schools such as

Harvard and Wharton where renowned researchers such as Eric Trist, the founder of the Tavistock Institute (Trahair, 2015), was recognizing that we had entered an “era of fundamental discontinuity” that would require Universities to adopt methodologies around “co-learning enterprises promote among students the joint discovery of the way to go ahead” (Trahair, 2015, p. 278)

For the modern MCT another significant problem has emerged: information. To illustrate the current information challenge, consider the metaphor of my fourth grade paper on horses. I am of a generation of people who attended primary school before computers or the internet, so the way we did reports in middle school was to go to our school library and check out the 4 books that the school had on horses. Those four books represented the cumulative, and agreed upon knowledge, that a fourth grader needed to know to be considered knowledgeable on the subject of horses. It is now 2016, a query to Google Scholar, a search engine for scholarly articles, on the subject of “Horses” returns “About 1,750,000 results” in “0.05 seconds” (Google, 2016). That number represents the current number of scholarly articles on horses that Google has immediate access. The point is that our conceptions of “valid” sources of information are being overwhelmed by the sheer volume of information that is available. Furthermore, if we consider that researchers at IBM estimated that by 2010 the worlds information was doubling every 11 hours (Coles, Cox, Mackey, & Richardson,

2006) the above number of google results might radically increase before I can even finish the report.

High Reliability Organizations, and Mission Critical Team Communities of Practice, are designed as learning organizations (Senge, 1994; Wenger, 2000; K.E. Weick & Sutcliffe, 2007). Their primary system of learning, however, is the exploitation of existing knowledge for the purpose of reacting to the next emergent problem set. Because of the need to fully commit to resolving the next problem set, they retain very few resources aimed at the rigorous exploration of new knowledge (March, 1991) in areas such as learning and teaching. This often leaves the organizations exposed to consultants who are also exploiting existing knowledge, and arguing for potentially misinformed solution (Kuriloff, Reichert, Stoudt, & Ravitch, 2009).

Paradoxically, if MCT's were to invest more internal resources into research on learning and teaching, they would only end up distracting themselves from their primary mission while at the same time increasing the size of their bureaucracy and reducing their overall agility. Furthermore, because of the way in which personnel continuously turnover, there would be an ongoing struggle to maintain the institutional memory of any real innovation. Even if all of this did happen, and the MCT's were able to create and maintain innovations in learning and teaching their efforts would still never hope to match, or keep pace, with what already exists within tier one universities.

A Framework for Innovation

In 2013, a group of researchers and practitioners based at the University of Pennsylvania published a paper aimed at showing how a University could be effectively leveraged to transform a community of learning (Harkavy et al., 2013). Based on two decades of proven practice, they have updated John Dewey's argument that:

> "working to solve complex, real world problems is the best way to advance knowledge and learning, as well as the capacity of individuals and institutions to do that work" (Benson, Harkavy, & Puckett, 2007; Harkavy et al., 2013).

This framework has enabled universities around the country to develop interdisciplinary partnerships with local schools and educational organizations to better support educational communities of practice (Wenger, 2000). By adapting this same framework, and their lessons learned, it is possible to create a ***University Assisted, Mission Critical Team Instructor Cadre Development Program.***

To be clear, participants in a University Assisted program would not just travel to the University to take on the role of a student. The intent behind such a program would be fundamentally collaborative. While members of the Cadre would be reinventing themselves by finding ways to "make the tacit, explicit" (Ravitch, 2015), the University would be reinvented (Bartholomae, 2005) as a partner in collaborate inquiry community. Because the program would be intended to be

aimed at applied research, however, certain structural elements would need to be in place.

Operational Elements

1. Integrated Logistical Support by the University

The University would need to commit to supporting a central program, center, or institute that coordinates University resources. For this work to sustain, it must become integrated into the mission of the higher educational institution, and not remain the effort of a few faculty members. In the case of the University of Pennsylvania, for example, it would act as an extension of the Penn Compact which:

> "...outlines next steps to increase access to Penn's exceptional intellectual resources; integrate knowledge across academic disciplines with emphasis on innovative understanding and discovery; and engage locally, nationally, and globally to bring the benefits of Penn's research, teaching, and service to individuals and communities at home and around the world."(Gutmann, 2017)

2. Interdisciplinary engagement by University Faculty

Engagement across the University that involves and leverages multiple perspectives, schools, and departments. This includes developing interdisciplinary approaches to research as well as new ways to interact and present information through data visualization ((Tufte & Graves-Morris, 1983; Tufte, 1991).

3. Committed engagement by the Mission Critical Team Instructor Cadre

The leader of the instructor cadre who welcomes and encourages the partnership, and conveys this philosophy to the instructor cadre.

4. Integrated Logistical Support by the Mission Critical Team Instructor Cadre

A coordinator at MCT Training site who acts is the link and continuity between the Cadre, the Parent Organization, and the University.

5. Integration of Mission Critical Team Staff and Enablers

Staff and enablers are integrated into the Training Cadres operation, so that planning for and provision of supports for students, instructors, leadership and other stakeholders are as seamless as possible.

6. Long Term commitment by Mission Critical Team Leadership

An ongoing commitment by the Mission Critical Team leadership to have a permanent representative connected to the University to maintain relationships, pass on institutional knowledge, exchange ideas, and advise on emergent needs of their specific instructor cadre.

Programmatic Elements

1. Selection: University Supported Cadre Selection

Teaching is a different kind of hard. If being a great instructor was just about improving your methods or your public speaking, it would be easy, but being a great instructor is about more than just tactical expertise or being a subject matter expert. The University can partner with Mission Critical Teams to evaluate instructor candidates along criteria that is both co-created and scientifically validated so they can better support their selection, training and education efforts.

2. Practice: Access to Collection of Professional Educators

Even if we are able to get the "gray beards" to walk back from the tip of the spear to work in the school house (knowing that some in the community will accuse them of taking a holiday from the real work), they still need to have the skills of a motivating instructor (Wlodkowski, 2011):

- Expertise: The power and knowledge of instructional preparation
- Empathy: The power of understanding and consideration (respect)
- Enthusiasm: The power of commitment and animation
- Clarity: The power of language and organization

Working with professional university educators, the instructor cadres can identify specific effective practices and then collaboratively create ways to develop those capabilities within the selected instructors.

3. Research: Access to Emerging Research on Training and Education

Research on training and education continues to evolve. With that said, Mission Critical Teams need to stay focused on the mission upon which they were built. By partnering with a tier one University, Mission Critical Teams will have access to the knowledge creation pipeline and those that can synthesize and interpret emergent theories regarding teaching and learning. At the same time, the instructor cadres can inform the Academy about emerging best practices for both the screening, training and educating Mission Critical Teams and the resolution of Rapidly Emergent Complex Adaptive Problem Sets (RECAPS).

4. Crosstalk: A Forum for Mission Critical Team Instructor Cadres

In order for MCT's to remain sustainable they need to constantly be "reinvented." In the process they have created their own cadres of theorists, operators and instructors. It is time to bring them all together in a legitimate Collaborative Community of Practice to begin reinventing the Mission Critical Team selection, training and education pipeline.

5. Design: Collaborative curriculum design that balances theory and pragmatism

By creating a curricular design forum that includes scholars and instructors we will be better able to balance innovating exploration of new knowledge, with the pragmatic exploitation of existing knowledge, in creating learning curriculum.

## CONCLUSION

The transition from Collective Action (CA) to a Crisis Response Bureaucracy (CRB) took thousands of years. The transition from CRB to a High Reliability Organization (HRO) took over a hundred of years. The transition from HRO's to Special Purpose Teams (SPT) took less than a hundred years and the transition from SPT's to Mission Critical Teams (MCT) took just a few decades. The rate of change is increasing and new ways must be found to accelerate our ability to adapt. All around us, out of our day to day viewing, various Crisis Response Organizations (CRO) and Crisis Response Networks (CRN) maintain the thin wall between civilization and chaos. For example, in 1801, after an outbreak of yellow fever that killed thousands of people in Philadelphia, the city created the Philadelphia Water Department. For over 200 years, that organization has pumped and purified the water for almost two million people. What most people don't know is that during the early hours of each morning, the city turns off all of the pumps except one, because the demand is low and it is cost effective. Each morning, before the city wakes up the water department crosses their fingers and turns the pumps back on. If a day comes where the pumps do not turn on, the

difference between the people in Bong, Liberia and the people of Philadelphia will determined in a period that can be measured in hours and days, by a Crisis Response network made up in part by Mission Critical Teams. As those teams are actually just human based systems, they will only be as good as the Instructor Cadre's that trained them.

In order for MCT's to remain both relevant and sustainable, these organizations must maintain internal mechanisms to simultaneously support the ongoing learning of their personnel, the development of their technology, and the continuous transformation of the organization itself (Pedler, Burgoyne, & Boydell, 1991). This requires that current Instructor Cadre's go beyond selecting for cultural fit, as it eventually leads to stagnation, and begin selecting for cultural contribution (Grant & Sandberg, 2016). Once in the training and education pipeline, the selection for existing attributes may be less important than whether the candidate's adaptive capacity, or neuroplasticity, enables the required rate of learning, and/or reversal learning, without diminishing their focus and confidence. It may be that we are moving from a skills evaluation paradigm to one that measures and develops protective factors (Waller, 2001), which means that instead of evaluators we are going to require master coaches (Coyle, 2010).

Lastly, the Mission Critical Team Instructor Cadres will need to begin to recognize their role as a Community of Practice within the research and a community of elders within their CRO. This means, that they will have to

recognize their own inherent intelligence and continue to learn the language required to advocate their way of knowing in a way that other researchers can access and understand (Argyris, 1991). It also means, that when their teams legacy comes in conflict with their underlying mission they must be the ones to innovate, and continues to "shed" (Simons, 2012) those tasks, technologies, and traditions that no longer require adaptive or generative thinking (Kohn, 1999). They also need to understand that the rate of change is such, that they can no longer solve all of those problems alone.

# APPENDICES

## APPENDIX A: ATTRIBUTE CODING

| 10 | Adaptability | 6 | Resolve | 4 | Trust | 1 | Assuredness |
|---|---|---|---|---|---|---|---|
| **10** | Integrity | 5 | Compatible | 3 | Accountability | 1 | Candor |
| **9** | Discerning | 5 | Discretion | 3 | Awareness | 1 | Character |
| **9** | Unpretentious | 5 | Leadership | 3 | Bias for Action | 1 | Cooperative |
| **8** | Fortitude | 5 | Mindfulness | 3 | Endurance | 1 | Creative |
| **7** | Agency | 5 | Peer Acceptance | 3 | Motivation | 1 | Emotional Stability |
| **7** | Aptitude | 5 | Principled | 3 | Positive | 1 | Entrepreneurial |
| **7** | Autonomous | 5 | Proactive | 3 | Robustness | 1 | Grit |
| **7** | Communicate | 5 | Proficiency | 3 | Stable | 1 | Patriot |
| **7** | Discipline | 5 | Service | 2 | Curious | 1 | Receptivity |
| **7** | Fitness | 5 | Trainability | 2 | Decisiveness | 1 | Resourceful |
| **7** | Initiative | 4 | Aggression | 2 | Dependable | 1 | patient |
| **7** | Innovate | 4 | Bearing | 2 | Determined | 1 | Reliability |
| **7** | Intellect | 4 | Courage | 2 | Feedbackology | | |
| **7** | Mature | 4 | Diplomacy | 2 | Followership | | |
| **7** | Perseverance | 4 | Humor | 2 | Judgment | | |
| **7** | Teamwork | 4 | Loyal | 2 | Rational | | |
| **6** | Assiduous | 4 | Professional | 2 | Resilience | | |
| **6** | Confidence | 4 | Restraint | 2 | Toughness | | |
| **6** | Drive | 4 | Solver | 1 | Assertive | | |

## APPENDIX B: LIST OF COLLABORATIVE INQUIRY PARTNERS

- Australian Special Operations Command (AUSSOF)
- Canadian Special Operations (CANSOF)
- U.S. Federal Bureau of Investigation (FBI)
- U.S. Secret Service (USSS)
- Fire Department of NYC (FDNY)
- New Zealand Special Operations Command (NZSOC)
- U.K. Special Forces (UKSF)
- UPENN Trauma Surgery (PENNMED)
- U.S. Air Force Special Operations (AFSOC)
- U.S. Army Special Operations (USASOC)
- U.S. Army Special Operations Aviation Command (SOAR)
- U.S. Naval Special Warfare (NSW)
- U.S. Marine Corps Special Operations Command (MARSOC)
- San Diego Fire and Rescue Department (SDFRD)
- Wildland Firefighters (Hotshots & Smokejumpers)

## APPENDIX C: CRITERIA FOR INCLUSION INTO THE COLLABORATIVE INQUIRY COMMUNITY.

1. They needed to meet the criteria of a Mission Critical Team: MCT's are designed as small (4-12 agents) integrated groups of indigenously trained and educated experts, that leverage tools and technology to resolve complex adaptive problems (Quesada et al., 2005) in an immersive, but constrained (5 minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss (Cline, 2014, p. 1).
2. Their operational tempo was rapid enough that they were constantly being force to learn and adapt.
3. There needed to be a key agent within their community to engage with the research.
4. Due to political and security concerns, members of Military Special Operations Teams were limited to the countries recognized by the multilateral UKUSA Agreement, sometimes called the "five eyes" comprising Australia, Canada, New Zealand, the United Kingdom and the United States (NSA, 2010).
5. Their contribution to the research needed to be unique.
6. The other existing members of the community did not object to a team's participation.

## APPENDIX D: PARTICIPANT OF 2008 MEETING

- Vikram Bakhru: Surgeon and Founder of Foundation for International Medical Relief of Children

- William Hodge: Navy Special Warfare
- Todd Mortensen: NFL quarterback – New England Patriots
- George Sax: U.S. Secret Service - Philadelphia Field Office
- Raj Shah: Air Force F-16 pilot
- Brenda Taylor: Hurdler in the 2004 Olympic Games in Athens, Greece
- Chris Warner: Mountaineer and President of Earth Treks

APPENDIX E: LIST OF COLLABORATIVE INQUIRY PARTNERSHIP OBSERVATIONS

- Australian Special Operations Command (AUSSOF) Multiple Observations and Group Discussions
- Canadian Special Operations (CANSOF) Multiple Observations and Group Discussions
- Fire Department of New York City (FDNY): a 24hr observation of FDNY Chief Pfeifer acting as the NYC city watch and multiple collaborations with instructor at the Fire Academy
- New Zealand Special Operations Command (NZSOC): Interviews and Group Discussions
- Philadelphia Eagles: Multiple observations and group discussions
- San Diego Fire and Rescue Department (SDFRD), Joint Training with Wharton MBA's and multiple group discussions.
- U.S. Airforce: flown in the rear seat of an Air Force T-6 trying to understand "crew resource management" with Raj Shah
- U.S. Air Force Special Operations (AFSOC) Multiple Observations and Group Discussions
- U.S. Army Special Operations (USASOC) Multiple Observations and Group Discussions
- U.S. Army Special Operations Aviation Command (SOAR) Multiple Observations and Group Discussions
- U.S. Federal Bureau of Investigation (FBI) Multiple Observations and Group Discussions
- U.S. Naval Special Warfare (NSW) Multiple Observations and Group Discussions
- U.S. Navy Flight Operations U.S.S. Harry S. Truman: 24 hour rotation observing flight operations in the Atlantic.
- U.S. Secret Service (USSS): Multiple Interviews and Group Discussions
- U.S.M.C. Officer Candidate School (USMC OCS): Multiple Observations and Group Discussions
- UPENN Trauma Surgery (PENNMED),12 hour observation of the Penn Trauma and Multiple discussions with Dr. Bill Schwab, director of traumatology.

- Wildland Firefighters (Hotshots & Smokejumpers): Staff Ride of the South Canyon Fire as well as numerous interviews and group discussions

APPENDIX F: 2012 MEETING TO DISCUSS POTENTIAL SUMMIT

- Army Special Operations Command: Jon Braga
- Army Special Operations Command: Michelle Schmidt
- FBI SF SWAT: Greg Walton
- FBI SF SWAT: Michael Velasco
- Freemont Fire Department: Bruce Martin
- Freemont Fire Department: Chief Geoff Latendresse
- Freemont Fire Department: Deputy Chief of Training Ron Maize
- IDEO: David Haygood
- Mountaineer/Explorer: Dr. Rodrigo Jordan
- Naval Special Warfare: Jeff Campbell
- Naval Special Warfare: Tom Maher
- Naval Special Warfare: Stephen Wisotzki
- New York City Fire Department (FDNY) Incident Management Team: Chief Bob Maynes
- New York City Fire Department (FDNY): Captain John Regan
- San Diego Fire-Rescue Department: Assistant Fire Chief: Brian Fennessy
- Stanford University, Foresight and Innovation: Tamara Carleton
- The Wharton School Leadership Program: Mike Useem
- The Wharton School Leadership Program: Preston B. Cline

APPENDIX G: LIST OF PARTICIPATING ORGANIZATIONS IN THE MISSION CRITICAL TEAM SUMMITS

- Australian Special Operations Command (AUSSOC)
- Border Patrol Tactical Unit (BORTAC)
- Canadian Special Operations Command (CANSOFCOM)
- Federal Bureau of Investigation (FBI)
- Federal Bureau of Investigation Hostage Rescue Team (FBI-HRT)
- Federal Bureau of Investigation Special Weapons and Tactics Teams (FBI-SWAT)
- Fire Department of New York (FDNY)
- Google
- Guardian Group
- IDEO
- New Zealand Special Operations Command
- Philadelphia Eagles
- Pittsburgh Pirates

- RMIT University (Australia)
- San Diego Fire-Rescue Department (SDFD)
- Stanford University School of Medicine
- U.K. Special Operations (UKSOF)
- U.S Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS)
- U.S. Airforce Special Operations Command (AFSOC)
- U.S. Army Special Operations Command (Multiple Commands)
- U.S. Forrest Service – Wildland Fire
- U.S. Marine Corps Forces Special Operations Command (MARSOC)
- U.S. Naval Special Warfare Command (Multiple Commands)
- Wildland Firefighters

## APPENDIX H: INFORMED CONSENT FORM

MISSION CRITICAL TEAMS: Towards the creation of a University Assisted, Mission Critical Team Instructor Cadre Development Program

### Introduction and Purpose of Interview

My name is Preston Cline and I am in the process of collecting data to be used in my doctoral dissertation in Educational Leadership at the University of Pennsylvania School of Graduate School of Education. The dissertation is titled: Mission Critical Teams: Towards the creation of a University Assisted, Mission Critical Team Instructor Cadre Development Program and is focused on how the screening, training and education of small (4-12 agents) integrated groups of indigenously trained and educated experts, that leverage tools and technology to resolve complex adaptive problems in an immersive, but constrained (5 minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss. This research utilizes a Collaborative Inquiry Framework which means that you will be will help inform and edit the final published version of your interview.

### Research Questions and Purpose of Study

Given that the problem sets that Mission Critical Teams continue to face, this thesis is aimed at supporting future Mission Critical Team Instructor Cadres in their ability to increase mission success, survivability, and sustainability through answering the following research questions:

### Primary Research Question

Would a University Assisted, Mission Critical Team Instructor Cadre Development Program increase the ability of the Mission Critical Teams to achieve Mission Success, Survivability and Sustainability?

Subsidiary Research Questions

- Is there evidence that Mission Critical Teams represent a unique type of team?
- Do Mission Critical Teams share a common event lifecycle?
- Do Mission Critical Teams Instructor Cadre's represent a legitimate Communities of Practice?

Protocol Number: 826499

**Principal Investigator:** Sharon M. Ravitch, Ph.D. Senior Lecturer, Research Director www.gse.upenn.edu/faculty/ravitch University of Pennsylvania, Graduate School of Education 3700 Walnut Street, Philadelphia, PA 19104-6216

**Other Investigator & Emergency Contact:** Preston B. Cline Senior Associate Director, Wharton Graduate Leadership Program; The Wharton School |University of Pennsylvania | Suite G47 | Jon M Huntsman Hall 3730 Walnut Street | Philadelphia, PA 19104 | 215.898.0721 (phone) | 215.573.2291 (fax) 215-514 -8193 (Cell) prcline@wharton.upenn.edu

Purpose of this Letter:

The purpose of this letter is to ask for your assistance as current of former member of a Mission Critical team to agree to be interviewed as part of the study and have that interview attributed to you within a doctoral dissertation. Please ask any questions that you have about participating in this project at any time. I want you to have the information you need to make a decision that is best for you.

You're Rights

The proposed interview is neither a form of therapy, nor is it supposed to detect a disease or find something wrong. Your participation is voluntary which means you can choose whether or not to participate. If you decide to participate or not to participate there will be no loss of benefits to which you are otherwise entitled. Before you make a decision you will need to know the purpose of the study, the possible risks and benefits of being in the study and what you will have to do if decide to participate. The research team is going to talk with you about the study and give you this consent document to read. You do not have to make a decision now; you can take the consent document home and share it with friends and family.

If you do not understand what you are reading, do not sign it. Please ask the researcher to explain anything you do not understand, including any language contained in this form. If you decide to participate, you will be asked to sign this form and a copy will be given to you. Keep this form, in it you will find contact information and answers to questions about the study. You may ask to have this form read to you.

Why was I asked to participate in the study?

You are being asked to join this study because you are a recognized leader within the Mission Critical Team Context.

How long will I be in the study? Where will the study take place?

The study will take place over a period of four months. This means for the next four months you will be asked to complete one interview, in person or by phone. It is anticipated that they interview will last 1 hour and will be audio recorded. The interview will then be transcribed and reformatted to fit the format of the thesis.

How many other people will be in the study?

You will be one of 20 people in the study.

What will I be asked to do?

1. Study participants will be asked to return signed consent form to Preston Cline prior to the start of interview. On the bottom of the form, you will also be asked whether we can use your name in the study, or if you require Anonymity.

2. Study participants will be asked to confirm his/her willingness for this interview to be recorded.

3. Prior to commencing interview participants will be asked to verbally reaffirm consent for audio recording. Participant will retain the right to withdraw consent to record interview at any time at which point the interview will be immediately ceased.

4. Study Participants will then receive a copy of the interview in story form, and be asked to edit it for accuracy and content.

What are the risks?

There are no known risks for participating in this study. If answering some of the questions makes you uncomfortable, please let me know. We can stop the

interview for a few moments, you can skip a question or you can decide to stop participating.

How will I benefit from the study?

There is no benefit to you. However, your participation could help us to better understand how Mission Critical Teams can more efficiently adapt their training programs in response to rapidly changing complex problems.

What other choices do I have?

Your alternative to being in the study is to not be in the study.

What happens if I do not choose to join the research study?

You may choose to join the study or you may choose not to join the study. Your participation is voluntary.

When is the study over? Can I leave the study before it ends?

The study is expected to end after all participants have completed the interviews and all of the information has been collected. The study may be stopped without your consent for the following reasons:

- The PI feels it is best for your safety and/or health – you will be informed of the reasons why.
- You have not followed study instructions.
- The PI, the sponsor or the Office of Regulatory Affairs at the University of Pennsylvania can stop the study at any time.

You have the right to drop out of the research study at any time during your participation. There is no penalty or loss of benefits to which you are otherwise entitled if you decide to do so. Withdrawal will not interfere with your future care.

If you no longer wish to be in the research study, please contact Preston Cline at 215-514-8193. There will be no consequences what so ever if you withdraw from this study.

How will confidentiality be maintained and my privacy be protected?

In the event you choose to engage in the research, but remain anonymous, the research team will make every effort to keep all the information you tell us during the study strictly confidential, as required by law. The Institutional Review Board (IRB) at the University of Pennsylvania is responsible for protecting the rights

and welfare of research volunteers like you. The IRB has access to study information. Any documents you sign, where you can be identified by name will be kept in a locked drawer in Preston Cline's home office. These documents will be kept confidential. All the documents will be destroyed when the study is over.

Will I have to pay for anything?

There are no costs associated with participating in this study.

Will I be paid for being in this study?

Only with deep lasting gratitude.

Who can I call with questions, complaints or if I'm concerned about my rights as a research subject?

If you have questions, concerns or complaints regarding your participation in this research study or if you have any questions about your rights as a research subject, you should speak with the Principal Investigator listed on page one of this form. If a member of the research team cannot be reached or you want to talk to someone other than those working on the study, you may contact the Office of Regulatory Affairs with any question, concerns or complaints at the University of Pennsylvania by calling (215) 898-2614.

When you sign this document, you are agreeing to take part in this research study. If you have any questions or there is something you do not understand, please ask.

You will receive a copy of this consent document.

Signature of Subject:
_____

Print Name of
Subject:_____

I, _____, hereby grant Preston Cline the right to use my name in attributing the source of my interview.

OR

I,_____, require that my interview be attributed as "Anonymous".

Date:_____

# APPENDIX I: EVOLUTION OF THE TEAMS

**Mission Critical Teams - Evolution - prcline@wharton.upenn.edu**

| Category | Obvious Problem Set (OPS) | Complicated Problem Sets (CPS) | Complex Problem Sets (XPS) | Complex Adaptive Problem Sets (CAPS) | Emergent Complex Adaptive Problem Sets (ECAPS) | Rapidly Emergent Complex Adaptive Problem Sets (RECAPS) |
|---|---|---|---|---|---|---|
| **Problem Recognition** | Relationship between Cause and effect is | Relationship between cause and effect requires analysis and | Relationship between cause and effect requires system | Relationship between cause and effect is both unclear and | Both cause and effect are emergent | Both cause and effect are rapidly emergent |
| **Event Lifecycle** | Recognize - Categorize - | Recognize - Analyze - Respond | React- Analyze-Respond | Probe-Recognize-Act | Probe - Recognize - React | Recognize - React-Respond - Recover |
| **Problem Set Example** | One ill person | Multiple Ill people | Multiple Injured People | Patient with Multiple Injuries/Illnesses | Multiple Patients each with multiple injuries/Illnesses | Hospital is under assault |
| **Response Example** | Grandmother | Single Doctor | Nurses | Doctor/Nurse Team | Joint Team | Networked Team |

| Organizational Emergence | Collective Action | Crisis Response Bureaucracy | High Reliability Organization | Special Purpose Teams | Joint Teams | Networked Nodes |
|---|---|---|---|---|---|---|
| **Locus of Authority** | Individual | Authority Driven Organization | Expert Driven System | Directive Team (Unilateral) | Empowered Team (Joint) | Distributed Team (Networked) |
| **Control Paradigm** | Kinship | Command and Control | System Redundancy | Contingency Planning | Capacity Building | Adaptive Capacity |
| **Information Mgmt.** | Informal | Vertical and Controlled | Vertical and | Compartmentalized | Shared Information | Networked |
| **Optimal Practice** | Best Practice | Expert Practice | Standard Practice | Novel Practice | Emergent Practice | Adaptive Practice |

| Organizational Exemplars | | | | | | |
|---|---|---|---|---|---|---|
| **Military** | Collective Action | Standing Army (U.K. 1707) | Royal Mil. Col. (U.K. 1799) | 22 SAS (U.K. 1950) | Delta (U.S. 1977) | TF 714 (2003) |
| **Medical** | Religious | U.K Westminster (1719), UPENN 1751 | UPENN Teaching Hospital (U.S. 1874) | EMS/Trauma (U.S. 1967) | Flat Trauma Team (1983) | |
| **Fire** | Collective Action | Paris Fire Brigade (FR. 1716) | FDNY "Fire College" (U.S. 1869) | Hotshot Crew (U.S. 1961) | Incident Command System (1972) | All Hazards |
| **Law Enforcement** | Collective Action | Paris Police Force (Fr. 1791) | Scotland Yard Training (U.K. 1829) | SWAT (U.S. 1964) | HRT (1983) | |

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## GLOSSARY AND LEXICON

The terms within this Glossary are a representative of a number of sources, including the Oxford English Dictionary, the original screening attributes of numerous teams, theoretical constructs, and terms unique to the teams themselves.

A

**Accountability:** The quality of being accountable; liability to account for and answer for one's conduct, performance of duties, etc.; responsibility (Simpson et al., 1989).

**Adaptability**: Able to adjust to new conditions or situations, or to changes in one's environment (Simpson et al., 1989).

**Adaptive Capacity:** is the capacity of a system to adapt if the environment where the system exists is changing.

**Adaptive System:** A system that is able to adapt its behavior according to changes in its environment or in parts of the system itself.

**After Action Review (AAR)** is a structured review or de-brief process for analyzing what happened, why it happened, and how it can be done better, by the participants and those responsible for the project or event. (See debrief)

**Agency:** Ability or capacity to act or exert power (Simpson et al., 1989). In Social Science Dictionaries: the capacity of individuals to act independently and to make their own free choices AKA (Internal Locus of Control and Self Efficacy).

**Agent:** Agency is the capacity for human beings to make choices and to impose those choices on the world. I am referring to individuals on a team as agents to make clear our assumption that all of the individuals within a high performance team have agency (or internal locus of control).

**Aggressive:** Feeling or energy displayed in asserting oneself, or in showing drive or initiative; aggressiveness, assertiveness, forcefulness (Simpson et al., 1989).

**Anachronism:** Anything done or existing out of date; hence, anything which was proper to a former age, but is, or, if it existed, would be, out of harmony with the present (Simpson et al., 1989).

**Anagnorisis**: (Ancient Greek: ἀναγνώρισις) describes a transformative moment within an ancient Greek play. It is a moment when an actor makes a critical

discovery that allows them to understand things as they really are, along with the willingness and motivation to act (Baracchi, 2014).

**Andragogy:** Latin for “Leading of Men” It is used to represent the art and science involved in educating adults.

**Aptitude:** Natural capacity to learn or understand; intelligence, quick-wittedness, readiness (Simpson et al., 1989).

**Aspiration:** The action of aspiring; steadfast desire or longing for something above one (Simpson et al., 1989).

**Assertive:** Of the nature of, or characterized by, assertion; declaratory, affirmative; positive, dogmatic (Simpson et al., 1989).

**Assessment:** the evaluation or estimation of the nature, quality, or ability of someone or something.

**Assessment Center:** An assessment center is a means of gathering relevant information, under standardized conditions, about an individual’s capabilities to perform a managerial position

**Assiduous:** Constant in application to the business in hand, persevering, sedulous, unwearyingly diligent (Simpson et al., 1989).

**Assuredness:** Self-confidence, firmness of mind, intrepidity; hardihood, audacity (Simpson et al., 1989).

**Attribute:** a quality or feature regarded as a characteristic or inherent part of someone or something.

**Authority Gradient:** Refers to the balance of decision-making power or the steepness of command hierarchy in a given situation. Most teams require some degree of authority gradient; otherwise roles are blurred and decisions cannot be made in a timely fashion. However, effective team leaders consciously establish a command hierarchy appropriate to the training and experience of team members.

**Autonomy:** Liberty to follow one's will; control over one's own affairs; freedom from external influence, personal independence (Simpson et al., 1989).

B

**Bearing** (USMC-OCS): Creating a favorable impression in carriage, appearance, and personal conduct at all times(Corps, 1998).

**Bias for Action:** Active decision making - 'getting on with it'. Facilitate quick decision making & problem solving tends to avoid bureaucratic control (Peters & Waterman, 1982).

**Big 5**: a description of five broad dimensions openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, used by some psychologists to describe the human personality. Sometimes known under the acronyms OCEAN or CANOE.

**Briefing:** an act or instance of giving precise instructions or essential information.

**Bureaucracy:** Hierarchical organization, extensive use of rule, impersonality of procedure, and the employment of specialists on a career basis(Weber, 1946).

C

**Candidate:** One who seeks or aspires to be selected for an office, privilege, or position of honor.

**Candor:** Freedom from reserve in one's statements; openness, frankness, ingenuousness, outspokenness (Simpson et al., 1989).

**Capacity Building:** This is a term often used in contrast to contingency planning. For those variables that an agent or team cannot predict, they instead work to build the capacity of the Agents or team to effectively respond to novel variables.

**Catastrophic Incident:** Any incident that results in permanent injury or death.

**Certainty:** Absolute truth. Etymologically, it once meant: “what was decided by the gods.(Hacking, 2001)”

**Character**: Reputation, general estimation of qualities; The sum of the moral and mental qualities which distinguish an individual or a people, viewed as a homogeneous whole; a person's or group's individuality deriving from environment, culture, experience, etc.; mental or moral constitution, personality (Simpson et al., 1989).

**Checklist**: Algorithmic listing of actions to be performed in a given activity to ensure that, no matter how often performed by a given practitioner, no step will be forgotten. A checklist is used as a visual or oral aid that enables the user to enhance short-term human memory, reducing the risk of slips.

**Choreographing:** to compose the sequence of steps and moves in anticipation of action.

**Chunking:** to group together items, or words, so that they can be stored or processed as single concepts.

**Closure**: A feeling of resolution, or conclusion, at the end of an event.

**Cognitive Dissonance:** is an uncomfortable feeling caused by holding two contradictory ideas simultaneously. Ideas may include attitudes and beliefs, and also the awareness of one's behavior. The theory of cognitive dissonance proposes that people have a motivational drive to reduce dissonance by changing their attitudes, beliefs, and behaviors or by justifying or rationalizing their attitudes, beliefs, and behaviors. Cognitive dissonance theory is one of the most influential and extensively studied theories in social psychology

**Collaborative Inquiry:** In this context, it refers to a process where researchers partner with communities of practice to collaboratively resolve an emergent question (Miles et al., 2013, p. 56)**.**

**Collective Action:** The ad hoc, or improvisational response of a community to a threat or opportunity.

**Commandos:** a small raiding force operating outside of conventional warfare.

**Communicative:** The following is the definition of just Communicate: To impart (information, knowledge, or the like) (to a person; also formerly †with); to impart the knowledge or idea of (something), to inform a person of; to convey, express; to give an impression of, put across (Simpson et al., 1989).

**Community of Practice:** Is a group of people who share a distinct profession, language, culture and mythology. (Turner, 1995; Wenger, 2000; Van Gennep, 2011).

**Compatible:** Mutually tolerant; capable of being admitted together, or of existing together in the same subject; accordant, consistent, congruous, agreeable (Simpson et al., 1989).

**Competency:** Having the necessary knowledge or technical skill to perform a given procedure within the bounds of success and failure rates deemed compatible with acceptable care.

**Complex Adaptive Problems:** Comes from Complexity Science (or Complexity Theory): These are problems that exhibit non-linear dynamics and

unpredictable behaviors. These behaviors emerge as a result of interactions between multiple dynamic variables, the system and its environment.

**Complexity Science (or Complexity Theory)**: Provides an approach to understanding the behavior of systems that exhibit non-linear dynamics, or the ways in which some adaptive systems produce novel behavior not expected from the properties of their individual components. Such behaviors emerge as a result of interactions between agents at a local level in the complex system and between the system and its environment.

**Confident:** Full of assurance, self-reliant, bold; sure of oneself, one's cause, etc.; having no fear of failure (Simpson et al., 1989).

**Conventional:** body of traditional, orthodox, or widely held standards of conduct, taste, theory or belief. Not original or spontaneous.

**Convergent Thinking:** the ability to give the "correct" answer to standard questions that do not require significant creativity by exploiting previous knowledge.

**Consequence:** The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.

**Contingency planning:** Is the active creation of alternative solutions to current challenges. It includes coordinated strategies that involve plans, procedures and technical measures to enable the recovery of systems, operations and data in the event of a disruption.

**Cooperative:** Having the quality or function of co-operating; working together or with others to the same end; of or pertaining to co-operation (Simpson et al., 1989).

**Cortical Authority:** A phrase to illustrate whether an whether a person is cognitively System 1 or System 2 dominant within an event lifecycle.

**Counterterrorism.** Activities and operations taken to neutralize terrorists and their organizations and networks in order to render them incapable of using violence to instill fear and coerce governments or societies to achieve their goals. Also called CT (C. o. t. J. C. o. Staff, 2014).

**Courage**: That quality of mind which shows itself in facing danger without fear or shrinking; bravery, boldness, valor (Simpson et al., 1989). (USMC-OCS): Courage is a mental quality that recognizes fear of danger or criticism, but

enables a Marine to proceed in the face of it with calmness and firmness(Corps, 1998).

**Creative:** Inventive, imaginative; of, relating to, displaying, using, or involving imagination or original ideas as well as routine skill or intellect, esp. in literature or art (Simpson et al., 1989).

**Crew Resource Management** (**cockpit resource management) (CRM):** is a set of training procedures, used primarily in aviation, where human error can have devastating effects. CRM focuses on interpersonal communication, leadership, and decision making in the cockpit.

**Crisis:** A vitally important or decisive stage in the progress of anything; a turning-point; also, a state of affairs in which a decisive change for better or worse is imminent; now applied esp. to times of difficulty, insecurity, and suspense (Simpson et al., 1989). Also, defined as "unknown outcome."

**Crisis Response Bureaucracies (CRB):** Organizations of experts that are employed full time to resolve technical or obvious problem sets.

**Crisis Response Organization (CRO):** A general label to describe any organization whose primary task is to respond to and resolve crisis.

**Critical Incidents**: From Root Cause Analysis this is a term that describes occurrences that are significant or pivotal and this can mean for good or bad. These incidents can provide key insight into the existing flaws in the Agent, Team or Organization.

**Crucible:** Any severe test or trial. Originally described the vessel used to melt metal.

**Curiosity:** Desire to know or learn (Simpson et al., 1989).

D

**Danger:** Liability or exposure to harm or injury

**Debriefing:** To interrogate (a soldier, astronaut, diplomat, etc.) on return from a mission in order to assess the conduct and results of the mission. (See After Action Review)

**Decisive:** Having the quality of deciding or determining (a question, contest, etc.); conclusive, determinative (Simpson et al., 1989).

**Decisiveness** (USMC-OCS): Ability to make decisions promptly and to announce them in a clear, forceful manner(Corps, 1998).

**Dependability** (USMC-OCS): The certainty of proper performance of duty(Corps, 1998).

**Dependable:** That may be depended on; trustworthy, reliable(Simpson et al., 1989)

**Destination Team:** A team within an organization that represents the highest difficulty to join.

**Determined:** Characterized by determination or final and fixed resolve; resolute; not to be moved from one's purpose(Simpson et al., 1989).

**Diplomacy:** Skill or address in the management of relations of any kind; artful management in dealing with others(Simpson et al., 1989).

**Discerning:** The faculty or power of discerning; intellectual perception, discrimination; good judgment(Simpson et al., 1989).

**Discipline:** Orderly conduct and action resulting from instruction or training; the quality or fact of behaving in a controlled and orderly manner; self-control, self-discipline(Simpson et al., 1989).

**Discretion:** The quality of being discreet; the possession or demonstration of sound judgment in speech or action; prudence; tactfulness, trustworthiness (Simpson et al., 1989).

**Distributed Cognition:** a collection of individuals and artefacts and their relations to each other in a particular work practice (See Shared Situational Awareness).

**Distributed Leadership:** a shared, distributed, phenomenon in which there can be several formally appointed, and/or emergent, leaders within a group.

**Divergent Thinking:** a thought process or method used to generate creative ideas by exploring many possible solutions.

**Diversity:** In this context it refers to cognitive or conceptual difference. Literally, will your team mates approach a problem set from a different perspective.

**Drive:** Energy, intensity, persistence, initiative, determination to achieve one's purpose (Simpson et al., 1989).

E

**Ecosystem:** a biological community of interacting organisms and their physical environment.

**Education:** The development of skill sets to lead in environments we are uncertain. In this context, it is the way in which we develop learner's ability to resolve adaptive, non-linear or uncertain problem sets. The development of skill sets to lead in environments we are uncertain.

**Effective Intelligence (OSS):** Ability to select strategic goals and the most efficient means of attaining them; quick practical thought-resourceful-ness, originality, good judgment-in dealing with things, people, or ideas(OSS, 1948). (see Adaptability, Mindfulness)

**Emergence:** describes "the arising of novel and coherent structures, patterns, and properties during the process of self-organization in complex systems (Goldstein, 1999, p. 49)."

**Emic:** In this context it is the language of the Instructor Cadre.

**Emotional Stability (OSS):** Ability to govern disturbing emotions, steadiness and endurance under pressure, snafu tolerance, freedom from neurotic tendencies (OSS, 1948).

**Endurance** (USMC-OCS): The mental and physical stamina measured by the ability to withstand pain, fatigue, stress, and hardship(Corps, 1998).

**Endurance:** The fact of enduring (pain, hardship, annoyance); the habit or the power of enduring; as denoting a quality, longsuffering, patience(Simpson et al., 1989).

**Energy and Initiative (OSS):** Activity level, zest, effort, initiative(OSS, 1948).

**Engagement Profile:** Often dictated by the onset profile. Does the team have the initiative or are they reacting?

**Enthusiasm** (USMC-OCS): The display of sincere interest and exuberance in the performance of duty(Corps, 1998).

**Entrepreneurial**: The pursuit of opportunity without regard to resources currently controlled (Stevenson, HBS).

**Equilibrium:** The state of equal balance between powers of any kind; equality of importance or effect among the various parts of any complex unity.

**Error:** An act of commission (doing something wrong) or omission (failing to do the right thing) that leads to an undesirable outcome or significant potential for

such an outcome. In addition to commission vs. omission, three other dichotomies commonly appear in the literature on errors: active failures vs. latent conditions, errors at the "sharp end" vs. errors at the "blunt end," and slips vs. mistakes.

**Etic:** In this context, it is the language of the researcher.

**Event Horizon:** Is a boundary in space and time that marks the transition between normalcy and action or response. Crossing the Event Horizon describes the moment where the agent or teams commits themselves to action (First Shot fired, first incision, etc.).

**Event:** An incident or situation, which occurs in a particular place during a particular interval of time.

**Expert Judgment Strategy:** That one can always make a legitimate distinction between 'actual risk' calculated by experts and so-called 'perceived risk' postulated by laypersons (Shrader-Frechette, 1990).

**Expert:** Trained by experience or practice, skilled, skillful (Simpson et al., 1989).

F

**False Summit:** In mountaineering, is a peak that appears to be the pinnacle of the mountain but upon reaching, it turns out the summit is higher.

**Feedbackology:** This is a Neologism (new word) to describe the ability of someone to give and receive feedback (Daniel Kaufman, 2014).

**Fitness:** The quality or state of being fit or suitable; the quality of being fitted, qualified, or competent. spec. the quality or state of being physically fit (Simpson et al., 1989).

**Flow:** A term coined by Mihaly Csikszentmihalyi to denote a type of focused motivation and optimal state of execution where time and space seem to slow (Csikszentmihalyi, 1990).

**Fluidity:** The ability of a substance, a process, or a team, to flow.

**Folkway:** the traditional behavior of a people or group.

**Followership:** The act of following or supporting (Simpson et al., 1989).

**Fortitude**: Moral strength or courage. Unyielding courage in the endurance of pain or adversity (Simpson et al., 1989)

**Friction:** surface resistance to relative motion. Often used in the context of training and education of injecting verbal, informational or experiential obstacles for trainees to overcome.

**Funds of Knowledge:** "historically accumulated and culturally developed bodies of knowledge and skills" (Moll et al., 1992, p. 133)

G

**Gap Analysis**: The analysis of what we need vs. what we actually have.

**Generative Learning:** Is the active integration of new ideas and behaviors within the learner's existing mental models.

**Generative Learning Theory:** That learning must combine existing knowledge with new ideas through experimentation and open-mindedness.

**Genesis Story**: The story of the team's origin.

**Goal Oriented Chunking**: refers to the chunking that occurs under strategic control and is goal-oriented.

**Graduation:** an official rite that transitions someone from liminality into incorporation.

**Greybeards/Grey hairs:** a person of years and experience who is recognized by the community as having counsel that is sought and valued.

**Grit:** The tendency to sustain interest in and effort toward very long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007)

**Grounded Theory**: is a research methodology in the social sciences involving the systematic generation of theory through the systematic analysis of data.

H

**Hazard:** A source of potential harm or a situation with a potential to cause loss.

**Heuristic**: Loosely defined or informal rule often arrived at through experience or trial and error, they provide cognitive shortcuts in the face of complex situations.

**Heuristic Behavior:** Are behaviors based on using open ended prompts, or rules of thumb, to think or act in a particular way. "Look in the rearview mirror before passing" It does not guarantee an outcome, only opens up possibilities.

**High Reliability Organizations (HROs):** High reliability organizations refer to organizations or systems that operate in hazardous conditions but have fewer than their fair share of adverse events. Commonly discussed examples include air traffic control systems, nuclear power plants, and naval aircraft carriers.

**High Workload Environment:** Any environment in which multiple demands on the flight crew necessitate the prioritizing of work functions. For example, IFR operations below 10,000 feet during arrival or departure from a terminal area (including taxiing) are considered to be high workload environments.

**Hindsight Bias:** In a very general sense, hindsight bias relates to the common expression "hindsight is 20/20." This expression captures the tendency for people to regard past events as expected or obvious, even when, in real time, the events perplexed those involved. More formally, one might say that after learning the outcome of a series of events—whether the outcome of the World Series or the steps leading to a war—people tend to exaggerate the extent to which they had foreseen the likelihood of its occurrence.

**Homeostasis:** The tendency toward a relatively stable equilibrium between interdependent elements.

**Human Factors (or Human Factors Engineering):** Refers to the study of human abilities and characteristics as they affect the design and smooth operation of equipment, systems, and jobs.

**Humble**: Having a low estimate of one's importance, worthiness, or merits; marked by the absence of self-assertion or self-exaltation; lowly: the opposite of proud(Simpson et al., 1989).

**Humility**: The quality of being humble or having a lowly opinion of oneself; meekness, lowliness, humbleness: the opposite of pride or haughtiness(Simpson et al., 1989).

**Humor**: The ability of a person to appreciate or express what is funny or comical; a sense of what is amusing or ludicrous(Simpson et al., 1989).

I

**Immediate Action:** An action that must be taken in response to a non-routine event so quickly that reference to a checklist is not practical because of a potential loss of aircraft control, incapacitation of a crewmember, damage to or loss of an aircraft component or system, which would make continued safe flight improbable.

**Immersion Event:** A discreet liminal event, where the individual or the team must pass through a crisis. They cannot volunteer out of the event, they must see it through (Fighting a fire, combat, surgery, rocket launch, etc.).

**Incorporation:** The final phase of a rite of passage where the candidate exits liminality to assume their new membership in the community.

**Indigenous:** originating in a particular place, a native to an organization. In the context of MCT's it refers to the fact that the organizations train and develop their people internally.

**Indoctrination:** To imbue with a doctrine, idea, or opinion.

**Induction:** The action of introducing to, or initiating in, the knowledge of something; the process of being initiated; introduction, initiation

**Initiation:** Formal introduction by preliminary instruction or initial ceremony into some position, office, or society, or to knowledge of or participation in some principles. Admission to the knowledge, or instruction in the elements, of any subject or practice.

**Intake:** an initial process to screen a group of recruits into a training pipeline.

**Initiative** (USMC-OCS): Taking action in the absence of orders (Corps, 1998).

**Initiative:** That which initiates, begins, or originates; the first step in some process or enterprise; hence the act, or action, of initiating or taking the first step or lead; beginning, commencement, origination(Simpson et al., 1989).

**Innovator**: One who innovates; an introducer of novelties or new methods; a revolutionist. A changer or alterer of (a thing) by innovation(Simpson et al., 1989).

**Instructor Cadre:** The team of MCT operators who have been brought together to run the team's training and selection program.

**Integrity** (USMC-OCS): Uprightness of character and soundness of moral principles. The quality of truthfulness and honesty(Corps, 1998).

**Integrity:** Soundness of moral principle; the character of uncorrupted virtue, esp. in relation to truth and fair dealing; uprightness, honesty, sincerity(Simpson et al., 1989).

**Intellect:** That faculty, or sum of faculties, of the mind or soul by which a person knows and reasons; power of thought; understanding; analytic intelligence, comprehension; understanding (Simpson et al., 1989).

**Intrapersonal:** Existing or occurring within the individual self or mind.

J

**Joint Cognitive Systems (Joint Cognition):** The combination of human problem solver and automation/technologies which must act as co-agents to achieve goals and objectives in a complex work domain. (i.e., you, your team, your computer, your enablers all looking at the same problem).

**Judgment** (USMC-OCS): The ability to weigh facts and possible courses of action in order to make sound decisions (Corps, 1998).

**Judgment:** The ability to make considered decisions or to arrive at reasonable conclusions or opinions on the basis of the available information; the critical faculty; discernment, discrimination (Simpson et al., 1989).

**Justice** (USMC-OCS): Giving reward and punishment according to the merits of the case in question. The ability to administer a system of rewards and punishments impartially and consistently(Corps, 1998).

K

**Key Informant:** These are individuals with whom the research begins in data collection because they are well informed, are accessible, and can provide leads about other information (Creswell, 2007, p. 243).

**Kinship:** The recognized ties of relationship, by descent, marriage, or ritual, that form the basis of social organization

**Knowledge** (USMC-OCS): Understanding of a science or an art. The range of one's information, including professional knowledge and an understanding of your Marines(Corps, 1998).

L

**Latent Error (or Latent Condition):** The terms "active" and "latent" as applied to errors were coined by James Reason. Latent errors (or latent conditions) refer to less apparent failures of organization or design that contributed to the occurrence of errors or allowed them to cause harm to Participants. Latent errors are quite literally "accidents waiting to happen."

**Leadership (OSS):** Social initiative, ability to evoke cooperation, organizing and administering ability, acceptance of responsibility(OSS, 1948).

**Leadership:** The dignity, office, or position of a leader, esp. of a political party; ability to lead; the position of a group of people leading or influencing others

within a given context; the group itself; the action or influence necessary for the direction or organization of effort in a group undertaking (Simpson et al., 1989).

**Learning Curve**: The acquisition of any new skill is associated with the potential for lower-than-expected success rates or higher-than-expected complication rates. This phenomenon is often known as a "learning curve." In some cases, this learning curve can be quantified in terms of the number of procedures that must be performed before an operator can replicate the outcomes of more experienced operators or centers.

**Limbic System:** is a set of brain structures located on both sides of the thalamus, immediately beneath the cerebrum. It supports a variety of functions including emotion, behavior, motivation, long-term memory, and smell.

**Liminality** (from the Latin word līmen, meaning "a threshold") is a state of being where the individual, or group, is on the "threshold" between two realities. A rite of Passage, Initiation, or Transition is often used to recognize a change of status. The liminal state is characterized internal and external uncertainty, where new ways of being are possible. The liminal state is characterized by ambiguity, openness, and indeterminacy. One's sense of identity dissolves to some extent, bringing about disorientation. Liminality is a period of transition where normal limits to thought, self-understanding, and behavior are relaxed - a situation which can lead to new perspectives. Those who remain in a state between two other states may become permanently liminal. (Turner, 1995; Van Gennep, 2011).

**Loss:** Any negative consequences, financial or otherwise.

**Loyalty** (USMC-OCS): The quality of faithfulness to country, the Corps, and unit, and to one's seniors, subordinates, and peers (Corps, 1998).

**Loyalty:** Faithful adherence to one's promise, oath, word of honor, etc.(Simpson et al., 1989)

M

**Magic Eye:** the belief by some members of the instructor cadre that they know a quality candidate when they saw one.

**Maturity:** Deliberateness of action; mature consideration, due deliberation (Simpson et al., 1989).

**Mechanistic Solution:** solutions that depend on purely physical or deterministic variables.

**Member Check:** A member check is a tool that researchers use to insure that they are maintaining fidelity to the original data, my regularly having their work evaluated by their research partners (Saldaña, 2012).

**Mental Models:** Mental models are psychological representations of real, hypothetical, or imaginary situations and are the basis for anticipating events and explaining events. Mental models create differing expectations, which suggest different courses of action. For instance, when you walk into a fast-food restaurant, you are invoking a different mental model than when in a fancy restaurant. Based on this model, you automatically go to place your order at the counter, rather than sitting at a booth and expecting a waiter to take your order.

**Mindfulness:** The meditative state of being both fully aware of the moment and of being self-conscious of and attentive to this awareness; a state of intense concentration on one's own thought processes; self-awareness.(Simpson et al., 1989)

**Mission Critical Team:** Defined as a small (4-12 agents) integrated group of indigenously trained and educated experts that leverage tools and technology to resolve complex adaptive problems in an immersive temporal environment of five minutes or less, where the consequence of failure is death or catastrophic injury.

**Mistakes:** Mistakes reflect failures during attentional behaviors, or incorrect choices. Rather than lapses in concentration (as with slips), mistakes typically involve insufficient knowledge, failure to correctly interpret available information, or application of the wrong cognitive “heuristic” or rule. Mistakes more often reflect lack of experience or insufficient training.

**Modest:** Having a moderate or humble estimate of one's own abilities or achievements; disinclined to bring oneself into notice; becomingly diffident and unassuming; not bold or forward. Of an action, trait, etc.: proceeding from, indicative of, or accordant with such qualities.(Simpson et al., 1989)

**Moment of Reaction:** Following Recognition the Amygdala will trigger a fight, flight, freeze response.

**Moment of Recognition**: Is a term used in high consequence working environments. It refers to the moment that the leaders realize that the situation they are in is starting to deteriorate. Recognition starts and ends in the brain. The conscious and subconscious minds are constantly working together utilizing as much data as they can effectively process. During the beginnings of any incident there will come a moment where one of the observers will realize something is wrong, this is the moment of recognition. Maintaining situational

awareness speeds your ability to recognize impending harm. Is a term used to describe a threshold of sensory cues that triggers a person's awareness of an emergent problem set.

**Moment of Response:** Once the forebrain is able to exert cortical authority, heuristics and Mental Models from prior training will take over to implement a measured response

**Moment of Recovery:** Control of the "clock", cleanup, water, etc. The team is able to "catch their breath." Regain control of the clock as the problem set has transitioned from complex adaptive down to technical.

**Moral Courage:** The kind of courage which enables a person to remain firm in the face of odium or contempt, rather than depart from what he or she deems the right course.(Simpson et al., 1989)

**Morbidity and Mortality conferences (M&M)** – Are meetings in hospitals that happen once a week as peer reviews of mistakes occurring during the care of patients. The objectives of a well-run M&M conference are to learn from complications and errors, to modify behavior and judgment based on previous experiences, and to prevent repetition of errors leading to complications. Conferences are no punitive and focus on the goal of improved patient care.

**Mores:** The shared habits, manners, and customs of a community or social group.

**Motivation for Assignment (OSS):** war morale, interest in proposed job.(OSS, 1948)

**Motivation:** The general desire or willingness of someone to do something; drive, enthusiasm.(Simpson et al., 1989)

**Mythology:** the received wisdom concerning a particular subject; the collective or personal ideology or set of beliefs which underpins or informs a particular point of view

N

**Narrative:** An account of a series of events, facts, etc., given in order and with the establishing of connections between them; a narration, a story, an account.

**Naturalistic Decision Making:** framework for studying how people make decisions and perform cognitively complex functions in demanding, real-world situations.

**Near Miss**: An event or situation that did not produce Participant injury, but only because of chance. This good fortune might reflect robustness of the Participant or a fortuitous, timely intervention

**Neuroplasticity:** The brain's ability to reorganize itself by forming new neural connections throughout life.

**New Normal:** describes how something which was previously abnormal has become commonplace.

**Normalization of Deviance**: A gradual shift in what is regarded as normal after repeated exposures to "deviant behavior" especially in the context of risk management. Weak signals get ignored and danger signs are reinterpreted as normal (Vaughan, 1996).

O

**Observing and Reporting (OSS):** Ability to observe and to remember accurately significant facts and their relations, to evaluate information, to report succinctly (OSS, 1948).

**Onset Profile:** The speed in which the event comes on line. It is a continuum from: Rapid (explosion, ambush, and trauma) to Glacial (climate change). Issues such as new technology, pandemics, etc. fall in the middle of the continuum.

**Operational Risk Management:** The management of risk relating to people, processes, and systems or from external events.

**Operator:** A term that a MCT community uses to describe someone who has achieved mastery. It is not an official term, but one given by the community.

**Operant Conditioning:** is a type of learning in which behavior is modified by through the use of reward or punishment. The behavior is controlled discriminative stimuli which signal the consequences.

P

**Paradigm:** A conceptual or methodological model underlying the theories and practices of a science or discipline at a particular time. A generally accepted world view.

**Participatory Action Research:** A broad category of research that includes collaborative inquiry. The term refers to the fact that the individuals, or groups, within the study are also participating in the actual research process with the goal of implementing the outcomes (Herr & Anderson, 2005, p. 2).

**Patriot:** A person who loves his or her country, esp. one who is ready to support its freedoms and rights and to defend it against enemies or detractors(Simpson et al., 1989).

**Pedagogy:** The art, occupation or practice of teaching. Latin for the "leading of children" it has come to mean the art and science of teaching, but in this context is specific to the art and science of teaching children.

**Peer Acceptance:** (AKA socio-metric status) Is the degree to which an individual is socially accepted by peers. It includes the level of peer popularity and the ease with which an individual can initiate and maintain satisfactory peer relationships(Gifford-Smith & Brownell, 2003).

**Perceptual Chunking:** is automatic chunking and occurs during perception.

**Performance (IQ):** Performance IQ is a SCORE derived from the administration of selected subtests from the Wechsler Intelligence Scales, designed to provide a measure of an individual's overall visuospatial intellectual abilities. The Performance IQ is a measure of fluid reasoning, spatial processing, attentiveness to details, and visual-motor integration.

**Period of Condensation:** A period where series of variables are self-organizing into a common affect or group so as to form an emergence.

**Period of Reconstitution:** Where the team is restored to effectiveness, commensurate with new knowledge, personnel, technology, threats and opportunities (Staff, 2013).

**Perseverance:** The fact, process, condition, or quality of persevering; constant persistence in a course of action or purpose; steadfast pursuit of an aim, esp. in the face of difficulty or obstacles; assiduity(Simpson et al., 1989).

**Perspective Taking:** is the act of viewing a situation or understanding of a concept from an alternate point-of-view.

**Phase Transition:** is when a substance changes from a solid, liquid, or gas state to a different state.

**Physical Ability (OSS):** agility, daring, ruggedness, stamina (OSS, 1948).

**Positive:** Consisting in or characterized by constructive action or attitudes; inclined to hope for the best or to 'look on the bright side', optimistic; good, beneficial, advantageous (Simpson et al., 1989).

**Practice:** the actual application or use of an idea, belief, or method, as opposed to the theory or principles of it; performance, execution, achievement; working, operation

**Pragmatic Theory:** "a statement is true if it works" (Seale, 2004, p. 20; Miles et al., 2013, p. 7; Patton, 2015, p. 152).

**Praxis:** Action entailed, required, or produced by a theory, or by particular circumstances (Simpson et al., 1989).

**Pre—mortem:** an engineering term to describe the process of taking a newly designed system and trying to figure out the parts that will eventually fail.

**Primary Response:** The initial stage of a crisis when it is only the group that is aware of, and responding to, an incident.

**Principled:** Acting in accordance with morality, showing recognition of right and wrong; upright, honorable (Simpson et al., 1989).

**Principle of Initiation:** The concern about initiation is defined as how the research process begins, and specifically whose concerns, interests and methods of approach determine/define the outcomes(Bishop, 1995).

**Principle of Benefits:** The question of benefits concerns who will directly gain from the research, and will anyone actually be disadvantaged(Bishop, 1995).

**Principle of Representation:** is focused on the questions regarding whose voice is heard, who does the work, whose interests are represented, and who can edit the data(Bishop, 1995).

**Principle of Legitimacy:** is focused on the questions of who defines what is accurate, and true and complete in a text and who constructs theories to explain the findings(Bishop, 1995).

**Principle of Accountability:** This questions who the researchers are answerable to, and who has control over the initiation, procedures, evaluations, text constructions and distribution of newly defined knowledge (Bishop, 1995).

**Proactive:** Of a person, action, policy, etc.: creating or controlling a situation by taking the initiative and anticipating events or problems, rather than just reacting to them after they have occurred; (hence, more generally) innovative, tending to make things happen(Simpson et al., 1989).

**Problem Sets:** Refers to a taxonomy of problems based on complexity and urgency. There are many problem sets; this paper specifically refers to Snowden and Heifetz models.

**Professional Development (ProDev):** In this context it refers to the formal and informal learning that occurs throughout the lifecycle of a Mission Critical Team Agent.

**Professional:** Person who does something with a high level of competence, commitment, or expertise: That has or displays the skill, knowledge, experience, standards, or expertise of a professional; competent, efficient(Simpson et al., 1989).

**Proficient**: Skilled, adept, competent; expert in a particular field (Simpson et al., 1989).

**Propaganda Skills (OSS): A**bility to apperceive the psychological vulnerabilities of the enemy; to devise subversive techniques of one sort or another; to speak, write, or draw persuasively (OSS, 1948).

**Protective Factors (Pre-Event):** A protective factor refers to anything that prevents or reduces vulnerability for the development of a disorder or error.

**Punctuated Equilibrium:** A theory that describes how history is characterized by having extended periods of normalcy (stasis) occasionally punctuated by the emergence of a radical change event that acts to introduce a new type of problem set(s) (Gersick, 1991).

Q

**Qualitative Research:** This is an inquiry process of understanding based on a distinct methodological tradition of inquiry that explores a social or human problem. The research builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting (Creswell, 2007, p. 249)**.**

**Quiet Professional:** This is a term used by almost all of the teams, while it is related to, work ethic, expertise, etc., it is most often associated with discretion. More commonly spoken of as Discreet Professional

R

**Radical Change Event:** Is an event that is characterized by revolutionary, rather than evolutionary change. A radical change is a shift from one archetypal configuration of values, actions, and beliefs to another.(Amis et al., 2004)

**Rate of Change Problem:** the rate of change in a wide variety of evolutionary systems (including but not limited to the growth of technologies) tends to increase exponentially over time.(Kurzweil, 2004)

**Recruitment:** The action or process of identifying and enlisting new personnel.

**Rational:** The rational part of the human mind; the power or faculty of reason(Simpson et al., 1989)

**Receptivity:** The quality of being receptive; ability or readiness to receive or take in(Simpson et al., 1989).

**Red Rules:** Rules that must be followed to the letter. In other words, any deviation from a red rule will bring work to a halt until compliance is achieved. Red rules, in addition to relating to important and risky processes, must also be simple and easy to remember.

**Reinvention:** The degree to which an innovation is changed or modified by a user in the process of its adoption and implementation.

**Resilient:** The quality or fact of being able to recover quickly or easily from, or resist being affected by, a misfortune, shock, illness, etc.; robustness; adaptability(Simpson et al., 1989). The ability to rapidly recover from an adverse event.

**Resolve:** Firmness or steadfastness of purpose; determination; an instance of this(Simpson et al., 1989).

**Resourceful:** Skilled in devising expedients or in meeting difficulties; full of practical ingenuity(Simpson et al., 1989).

**Restraint:** Control of oneself, one's desires, moderation(Simpson et al., 1989)

**Reversal Learning:** Reversal learning is term used to describe the process of overwriting old habits (what are sometimes called “training scars”) with the new habits.

**Risk acceptance:** An informed decision to accept the consequences and the likelihood of a particular risk.

**Risk avoidance:** An informed decision not to become involved in a risk situation.

**Risk retention:** Intentionally or unintentionally retaining the responsibility for loss, or financial burden of loss within the organization.

**Risk transfer:** Shifting the responsibility or burden for loss to another party through legislation, contract, insurance or other means. Risk transfer can also refer to shifting a physical risk or part thereof elsewhere.

**Risk:** The effect of uncertainty on objectives ISO 31000:2009.

**Rite of Passage:** In the anthropological theories a rite of passage is a ritual that involves some change to the participants, especially their social status. Is a process that transitions a person through a liminal space from one status to another(Turner, 1995; Van Gennep, 2011).

**Robustness:** Relating to, requiring, or promoting physical strength or hardiness; energetic, vigorous.; not easily damaged or broken, resilient; Of an immaterial thing, esp. a thought or emotion: powerful; not showing undue sensitivity, firm, unyielding; resilient (Simpson et al., 1989). A property that allows a system to maintain its momentum in the face of internal and external stressors and obstacles or the persistence of an Agent or Teams characteristic behavior under threat, trauma or conditions of uncertainty.

S

**Safe:** From the Latin "salvus": entire, uninjured healthy. In modern times it has come to mean: Free and Secure from danger, harm, injury and risk.

**Schemas:** A mental structure that helps us perceive and organize new information using a set of pre-conceived ideas. Children who see a zebra for the first time will often call them a horse, because it fits the schema.

**Schematic Behavior:** refers to the many activities we perform reflexively or as if acting on "autopilot." Slips refer to failures of schematic behaviors, or lapses in concentration (e.g., overlooking a step in a routine task due to a lapse in memory)

**Screening:** Systematic examination of a large number of subjects, esp. for the detection of unwanted attributes or objects prior to being admitted to the training pipeline.

**Secondary Response:** The secondary stage of a Critical or Catastrophic Incident that may involve the administration responding internally and/or externally.

**Secure:** From the Latin "securus": free from doubt or apprehension

**Security (OSS):** Ability to keep secrets; caution, discretion, ability to bluff and to mislead. Such were the general qualifications for all OSS men and women (leader-ship excepted in some cases). Distinguished from these were the special

qualifications applicable for the most part to the undertakings of one or two branches only. Of these, three were added to the list of general qualifications printed on the formal report sheet(OSS, 1948).

**Selection:** The process of determining who in the professional development training and education pipeline will move on to join a Mission Critical Team

**Self-Confidence:** Confidence in oneself; often in an unfavorable sense, arrogant or impudent reliance on one's own powers (Simpson et al., 1989).

**Self-Discipline:** Orderly conduct and action resulting from instruction or training; the quality or fact of behaving in a controlled and orderly manner; self-control, self-discipline (Simpson et al., 1989).

**Self-Organization:** is a process where some form of order emerges from interactions between previously unrelated parts of a disordered system. The process is spontaneous, not needing control by any external agent.

**Sense making**: The processes by which individuals and teams consume information to make meaning of their situation. (Karl E Weick, 1988; Karl E. Weick, 1995).

**Sentinel Event**: The initial adverse event which then cascades into catastrophic failure..

**Separation:** The first stage of a Rite of Passage where an individual withdraws from their current status and community to enter into liminality with the hope and intention of being incorporated into a new community with a new status.

**Service**: The action of serving, helping, or benefiting; conduct tending to the welfare or advantage of another(Simpson et al., 1989)

**Shared Situational Awareness:** The process of integrating the mission-essential overlapping portions of the situational awareness of individual team members—thus, developing a group dynamic mental model.

**Sharp End**: The “sharp end” refers to the personnel or parts of the organization in direct contact with Participants.

**Shift Detection:** In statistics and signal processing, it is the process of finding abrupt changes in a signal.

**Shibboleth:** a term from the bible describing a word used as a test for detecting foreigners, or persons from another district, by their pronunciation. It has come

to mean a catchword or formula adopted by a group, by which their members, or those not their followers may be excluded.

**Situational Awareness:** Situational awareness refers to the degree to which one's perception of a situation matches reality. "The perception of elements in the environment within a volume of time and space, the comprehension of their meanings, and the projection of their status in the near future." (M. R. Endsley, 1995)"

**Slips (or Lapses):** In some contexts, errors are dichotomized as "slips" or "mistakes," based on the cognitive psychology of task-oriented behavior. Attentional behavior is characterized by conscious thought, analysis, and planning, as occurs in active problem solving.

**Social Relations (OSS):** Ability to get along well with other people, good will, team play, tact, freedom from disturbing prejudices, freedom from annoying traits(OSS, 1948).

**Solver:** One who solves (Simpson et al., 1989).

**Span of Control:** the area of activity or number of functions, people, or things for which an individual or organization is responsible.

**Special Operation Forces (SOF) Truths:**

1. Humans are more important than hardware.
2. Quality is better than quantity.
3. Special Operations Forces cannot be mass produced.
4. Competent Special Operations Forces cannot be created after emergencies occur.
5. Most special operations require non-SOF assistance.

**Special Operations:** Operations requiring unique modes of employment, tactical techniques, equipment and training often conducted in hostile, denied, or politically sensitive environments and characterized by one or more of the following: time sensitive, clandestine, low visibility, conducted with and/or through indigenous forces, requiring regional expertise, and/or a high degree of risk (J. C. o. Staff, 2014).

**Special Purpose Team:** A general term to describe unilaterally and individually deployed teams that are designed off of the original military Special Forces model.

**Stable:** Of faith, resolve, love, friendship, etc.: Not changing, constant: Of counsel, judgment, intellect: Trustworthy, sound.(Simpson et al., 1989)

**Stakeholders:** Those people and organizations who may affect, by affected by, or perceive themselves to be affected by, a decision or activity.

**States:** are considered personality characteristics that are temporary, like moods or activities; these include things like being afraid or moments of joy. (John & Srivastava, 1999, p. 26)

**Surface Event Threshold:** Marked by the moment an individual or team leaves an immersion event and once again "owns the clock". Often described as being the first time the team could take a breath, much like after surfacing from a deep dive.

**Systems Approach**: An HRO view that most errors reflect predictable human failings in the context of poorly designed systems (e.g., expected lapses in human vigilance in the face of long work hours or predictable mistakes on the part of relatively inexperienced personnel faced with cognitively complex situations). Rather than focusing corrective efforts on reprimanding individuals or pursuing remedial education, the systems approach seeks to identify situations or factors likely to give rise to human error and implement "systems changes" that will reduce their occurrence or minimize their impact on Participants.

T

**Tacit Knowledge:** is the kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it, such as bike riding or swimming.

**Tact** (USMC-OCS): The ability to deal with others without creating hostility (Corps, 1998).

**Target:** This is term that refers to what a MCT is focused on. In Trauma, the target would be the patient. In Urban Fire, if you are on a ladder the target is people, if you are on an engine, the target is the fire.

**Task Saturation**: When one is faced with a large volume of tasks, and not enough capacity to accomplish them, humans can shut down. Some, in an effort to deal with the tasks, begin to compartmentalize and channel, meaning that they begin to concentrate on one task to the exclusion of all other communication and input that is still coming their way.

**Teamwork**: The combined action of a team of players, etc.; work done by a team of operatives; work done by persons working as a team, i.e. with concerted effort(Simpson et al., 1989).

**Temporal:** Of, pertaining, or relating to time, the present time, or a particular time.

**Threat Detection:** An unconscious process that uses sensory cues to trigger a physiological fear response when a stimulus is considered potentially threatening. Untrained responses are focused on metabolically taxing defensive behaviors such as Attack, immobility, or escape (fight, flight, freeze). The process is located within the limbic system and may act independently of higher cognitive processes (Öhman, 2005).

**Time to Contact:** The amount of time before we actively interact with a problem set.

**Toughness:** The following is the definition of just Tough: Capable of great physical endurance; strongly resisting force, injury fatigue, etc.; not easily overcome, tired, or impaired; hardy, stout, sturdy(Simpson et al., 1989).

**Trainability:** The quality or fact of being trainable, esp. by instruction and practice (Simpson et al., 1989)

**Training:** The development of skill sets to manage variables we are certain (equipment, communication, etc.) In this context, it is the way in which we develop learner's ability to resolve technical, linear or certain problem sets.

**Trait Theory** In psychology, trait theory relates to the study of human personality and is interested in the measurement habitual patterns of behavior, thought, and emotion.

**Traits:** are believed to personality characteristics that remain stable after a person achieves adulthood (John & Srivastava, 1999, p. 26), such as extraversion, perfectionism, impulsivity, etc. (John & Srivastava, 1999, p. 26).

**Transfer of Learning:** The use of principles or concepts learned in one context to another context in which they remain applicable.

**Transition:** A period in a Rite of Passage, that an individual has entered the liminal phase, the period between states, where they have left one place or state but have not yet entered or joined the next.

**Tribe:** Is an English word used by anthropologists to describe a group of distinct people, who are largely self-sufficient, and not integrated into the national society(Fried, 1975).

**Trust:** The quality of being trustworthy; fidelity, reliability; loyalty, trustiness(Simpson et al., 1989)

U

**Uncertainty:** That which only the gods can know(Hacking, 2001).

**Unconventional:** Not limited or bound down by convention.

**Unpretentious:** Without pretension; unassumingly. Pretention: Attempting to impress by affecting greater importance or merit than is actually possessed; making an exaggerated outward display; ostentatious, showy(Simpson et al., 1989).

**Unselfishness** (USMC-OCS): Avoidance of providing for one's own comfort and personal advancement at the expense of others(Corps, 1998).

Index