Selecting for the Operator:
Examining the Selection Criteria of Mission Critical Teams

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Abstract

Eleven domestic and international military and law enforcement Special Operations Counter Terrorism teams from the Australia, Canada, New Zealand, the United Kingdom and the United States engaged in a process of collaborative inquiry to determine whether they shared a common set of candidate screening attributes and whether trait theory was still a reliable predictor of operator success. In this paper we affirm that the teams do share a set of common attributes and demonstrate that modern Mission Critical Teams are selecting for both aptitude and fit within their existing community of practice. As a result, I offer trait theory alone will not suffice.

Introduction

Between 2008 and 2015, I set out to observe the training and education programs of a number of what I term Mission Critical Teams (MCT): 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 (ten minutes or less), temporal environments, where the consequence of failure is death or catastrophic loss (Cline, 2014, p. 1). During each observation my questions were the same, first, what is the optimal learning environment for helping individuals and teams improve their ability to successfully and sustainably navigate uncertainty. Secondly, how do trainers and educators positively influence both mission success and mission survivability? As I am an outsider to these organizations my strategy was to immerse myself within their training and education environments. This has meant that I have followed Fire Department of New York (FDNY) firefighters into burning buildings, listened in on the headset while the crew of a Chinook Helicopter conducted a mock up landing under various conditions, watched Trauma Surgical Teams triage bullet ridden patients, wore body armor while observing Special Operations teams practiced live fire room clearance exercise, and stood by while a Wild Land firefighter spoke to a young Hot Shot crew about surviving the fire that killed his crew while standing in the exact place they fell. The deeper I investigated the question of training and education, however, the clearer it became that before I could answer the question of "How," I must first answer the question of "Whom?" Before I am able to investigate training and education, I first need to investigate how MCT's screen and select candidates to enter the training pipeline. To this end, 11 International Military and Tactical Law Enforcement Special Operations Teams have agreed to partner in a cooperative inquiry (P. Reason, 1996) research project to compare and contrast their current screening attributes.

The first thing one needs to understand regarding the teams within this study, is that none of them existed, or existed permanently, prior to 1950 (Cline, 2014). In each case they emerged after their parent organization, a High Reliability Organizations (HRO) (Perrow, 1984) encountered a problem set that exceeded their capacity to respond. HRO's are defined as "learning organizations" (Senge, 1994) that "operate in hazardous conditions, but have fewer than their fair share of adverse events" (K. M. Sutcliffe, 2011). The HRO's associated with this

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study are the Defense and Law Enforcement agencies of; Australia, Canada, New Zealand, United Kingdom and the United States (NSA, 2010). Historically, these organizations have been designed to reliably solve technical problems. In the years immediately following World War Two (Cline, 2013) each of these agencies encountered a series complex adaptive problem sets (Heifetz, 1994; Lansing, 2003) they were unable to resolve. Then, after several failed attempts utilizing technical solutions (Kuhn, 1996), the HRO's made the decision to form an MCT.

The first question the new teams needed to resolve was what qualified an individual to be a member of an MCT, or to paraphrase Jim Collins, the author of *Good to Great*, how do we get the right people on the bus (Collins, 2001). Historically, this question of candidate selection had been the domain of the Assessment Center (MacKinnon, 1980). Assessment Centers emerged during World War II when the a sudden and critical need for huge numbers of officers (Murray, 1990), and later espionage agents (O. o. S. Services, 1948), forced the military to rethink their historical selection processes. Starting with the German Army (Ansbacher, 1941; Burt, 1942; Fitts, 1946), and then later adopted by the British (Ahrenfeldt, 1958; Crang, 2000; Murray, 1990) and finally the Americans (Banks, 2006; Handler, 2001; O. o. S. Services, 1948), these early Assessment Centers were created by psychologists, for psychologists, who utilized "trait theory" (John & Srivastava, 1999) to focus on evaluating the whole candidate by assessing certain traits such as leadership, intelligence, initiative, etc.

This "whole man" approach was theorized to identify the key core traits that would lead to the identification of the right person for a specific role within the organization, what we now call screening attributes. Over the last 70 years, however, the assumptions woven into the current screening attributes become increasingly flawed. These flaws become clearly apparent when examined through the lens of the September 10th problem. On September 10th, 2001, MCTs around the world believed they understood the problem set, the profile of the candidate, the profile of the selection cadre, the science behind assessment, the optimal professional lifecycle of the candidate, and the profile of the jobs themselves. On September 11th, almost all those assumptions changed significantly. In order to investigate these changes 11 MCT's have volunteered to submit their current screening attributes as part of a cooperative inquiry (P. Reason, 1996) research study to examine what shared attributes may exist as well as to investigate the integrity of the selection process itself.

Research Questions

1. Do current Mission Critical Teams share a common set of core screening attributes?
2. Should Mission Critical Teams still rely on trait theory as the foundation of their screening & selection process?

Description of Modern Mission Critical Teams

Whenever I am observing these teams it always seems to be 2am in the middle of some swamp. While that might sound odd to someone outside the teams, it needs to be understood that the selection and training processes that these teams provide must have a close fidelity to

real life experience. Issues of sleep deprivation, discomfort, experiential education, etc., are all required to measure and prepare a person for life in an MCT. After the third or fourth swamp, I began to recognize that while the teams are all very different culturally, there are a number of core characteristics they all share. To help organize and frame the shared characteristics within the context of an ecological system (Capra, 2005), I have adapted Nadler and Tushman's model of congruence (Nadler, Tushman, & Hatvany, 1982). According to the theory of congruence, an HRO's or MCT's performance is reliant upon how well each of its major components aligns, or fit together. For Nadler and Tushman, those components are; work, people, structure, and culture. For the purposes of this paper they have been modified into; history, problem set, mission, culture and human factors:

- **History**
  - o **Genesis Story:** None of the teams in my study had a permanent presence prior to 1950. Many of them had forefathers who were raised during times of war and then promptly disbanded at the end of the war. Additionally, all of the teams were created after the parent attempted other technical or conventional solutions (Cline, 2013).
  - o **Tension with Parent Organization:** In almost every case, the unconventional nature of these teams creates some sort of ongoing tension with their more conventional parent organization.
- **Problem Set:**
  - o **Emergent:** As Admiral McRaven framed it in his book "Spec Ops" "The X-axis is time" (McRaven, 1996). All of the teams that are part of this study operating in emergent temporal decision making environments of 10 minutes or less, often much less (Cline, 2014).
  - o **Complex Adaptive Systems:** Represent a type of problem set that often emerges without warning and begins adapting and evolving immediately. These type of problem sets are often nested within a larger system, so solutions require a team that is agile, rapid and tolerant of innovation (Heifetz, 1994; Snowden, 2007).
- **Mission:**
  - o **Adaptive:** The change in the problem set has transitioned the teams from being just problem solvers to becoming adaptive problem solvers that are focused on adapting (learning) as fast as the problem set adapts if properly supported.
  - o **Immersive:** MCT's operate in constrained spatial and temporal environments that require the individual and the team to be fully immersed in the experience until its conclusion. This means that traditional theories of both decision making and contingency planning are degraded. Teams in this environment must rely more on the capacity of the team to navigate ambiguous environments, than attempts to develop contingency plans and/or predict the future.

- - **Consequential:** Failure can have fatal or catastrophic consequences. Given the two failure is "Often a greater motivator that death, as most of us would prefer death to failure" (Anonymous, 2014).
- **Structure**
  - **Team Profile:** Built around the idea of true teams, rather than collections of individuals (Hackman, 2002), as teams are able to innovate against complex adaptive problems faster than individuals (Johnson, 2010). Due to issues related to span of control, small group communication, and agility in performance teams are typically built 4-12 members consistent with the small group theory (Hackman, 2002, pp. 116-117).
  - **Leadership Profile (Operational):** While these teams do have a hierarchy, in order to be effective, they often operate using distributed and empowered leadership model (Yun, Faraj, & Sims Jr, 2005).
- **Human Factor**
  - **Candidate Profile:** The average MCT candidate is a current expert, over 25 years of age, who is able to maintain a high rate of learning. Each candidate team must be able to submit part of their own personal goals in support of achieving the goals, or mission, of the team.
  - **Selection Authority:** The authority to screen and select new candidates into the team, resides in the indigenous operators of that team. Outside experts can advise, but it is the community of practice that determines eligibility of membership.
  - **Development Profile:** While there is currently no college degree or trade school certificate to become and operator on a MCT, their ongoing learning environment is an intense and sophisticated mix of training, education and iterative experience. What some teams call E3: Education, Experience and Exposure.

Conspicuous by its absence is any reference to culture as culture emerges from a congruence of the above variables. My experience is that because MCT's are selected and trained by an elder member of the team, each MCT culture is both unique from all others while at the same time sharing some commonalities.

Significance of Study

Starting around 2005 a phenomenon was emerging in the training cadres of Mission Critical Teams around the world to include not just special operations, but also Urban Fire Academies and Urban Trauma Rooms. Prior to 9/11, combat operations for Special Operations units, both domestically and internationally, were fairly uncommon. What this meant is that, up until 2001, Special Operations training cadres were using a training curriculum that was a combination of "lessons learned" from a limited set of past incidents as well as estimates of future missions. It is important to note the cultural role that lessons learned play in the creation of training doctrine, as

many Instructors will tell you that their training manuals are written in the blood of their fallen friends and as such they take it very seriously (Anonymous, 2014). By the 1990's much of the doctrine on things like clearing a room with a bad guy in it was settled. The priority had always been on speed as the belief was, and in some cases still is, that "speed creates security" (Ruiz, 2014). We have all seen the movie where the 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 reexamine 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 the 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 to some operators seemed cowardly. Reading this now, it may seem like a ridiculous response. Why would anyone inhibit the implementation of this obvious response? To come to that conclusion, however, would be anachronistic.

When someone joins a Special Operations team, they are doing more than taking on a new job. They are taking on a new way of thinking, a new way of navigating uncertainty, a new personal and professional mythology. Every one of them had trained for years to overcome their fears and learn how to act precisely, and in concert with the rest of the team in hostile, unstable, complex and rapidly evolving environments. They had come to depend on the fact that with speed, surprise, and aggression, there is security; slowing down seemed somehow …wrong. Then the realities of war started to collide with those long held beliefs, those shared mythologies, as they began to lose their friends to predictable ambushes. Little by little, the various teams representing different countries and military branches started to change their procedure to mimic those of the Israelis. Suddenly, mission success was going up and so was mission survivability. Then, just as the new procedures were coming on line and normalized within the teams, it was time for some of the operators to rotate back to the training center to select and develop the next generation.

By 2005, the senior instructors who were still at the training centers were fighting hard to get out of the school house and into combat as many of them had yet to be overseas. At the same time, they were still diligently executing on the doctrine that had been created in prior to 9/11. This created a situation where you had a group of lower ranked, but much more combat experienced, operators entering into an environment led by people with higher rank but less combat experience. Then add to this the fact that the suggestions the new instructors were making created the same questions of cowardice that had already been addressed overseas.

Lastly, to add even one more level of complexity to this already complex situation is the context in which Military Training and Education had been operating in since WW2.

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)"

Table 1 - U.S. Army Battle and Non-battle Casualties (FM 100-14, 1998)

	World War II	Korea	Vietnam	Desert Shield/Storm[1]
	1942–1945	1950–1953	1965–1972	1990–1991
Accidents	56%	44%	54%	75%
Friendly Fire	1%	1%	1%	5%
Enemy Action	43%	55%	45%	20%

1. These numbers include the relatively long build-up time and short period of combat action

While this data is specific to the conventional army, there is an entire body of research aimed at demonstrating that the greatest threat to success and survivability of human based systems, are neither technical nor tactical factors, but human factors (Army, 2006; Ault, 1968; Cline, 2013; Endsley, 2000; Helmreich, 2000; J. T. Reason, 1990; Vaughan, 1996). As the number of 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 (Helmreich, Merritt, & Wilhelm, 1999; A. C. Services, 2005; A. Sutcliffe & Rugg, 1998).

For the modern MCT these two variables, the need to adapt against emergent threats and then 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, most efforts at organizational change face some sort of resistance. The centrality of the Human Factor in 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. Therefore, given the sheer volume of Human Factor research we have decided to start the research process where the training pipeline begins, the place where we decide which applicants become candidates.

At the most basic level if this research is able to demonstrate that teams participating in this study share some common screening traits, then conceivably they could pool their limited research resources to better understand how to measure, screen and influence those specific characteristics. This alone, would add tremendous value to their current practice. Additionally, by critically examining the historically informed theoretical framework that underlies their screening, training and education practices it may be discovered that alternative strategies may

be more effective. The bottom line is that any research that is able to improve ways to influence the human factor stands a good chance of increasing what I am calling MS^3: Mission Success, Mission Survivability, and Mission Sustainability.

Conceptual Framework

A conceptual framework is a tool that researchers use to construct and maintain a rigorous and appropriate academic argument (Ravitch & Riggan, 2012). For those not familiar with academic research it generally falls into one of two general categories, qualitative and quantitative. Quantitative research is focused primarily on the statistical analysis of the data it is investigating. For example, in this research I could have chosen to examine how many times the word "courage" showed up within the screening attributes of all of the teams in the study. The challenge with this approach is that it is hard to imagine that all of the teams define courage the same way, that they hold the same qualities. Instead, by selecting a qualitative research approach the goal is to investigate the quality of the terms within the context of the themes (Saldaña, 2012) that they represent, tenacity, perseverance, etc. This approach, however, creates the obvious question as to how I, the researcher, choose those themes. As I look back now, from the vantage point of a 47 year old married man who is pursuing a part-time doctorate from an Ivy League institution while still working as an educator, it is reasonable to assume that my perception of "obvious" themes might not be universal, that I am likely biased in a number of specific ways. It is these collection of past experiences, woven together with my cultural and socioeconomic history, which defines what researchers call my positionality. By trying to inform you, the reader, about my positionality, I am attempting to better inform you regarding ways in which my identity and history shape how I interpret the data and some of the other research choices I have made. A more detailed explanation of the pertinent theories will be made in the literature review section.

Positionality

On August 6, 2011, a Chinook helicopter was shot down near Kabul, Afghanistan killing all 30 personnel inside (Wikipedia, 2015a). Among the many Navy SEALs who were killed were Rob Reeves and Heath Robinson (DOD, 2011). About two weeks earlier, after spending some time observing their team's training, I had sat down with Rob and Heath to answer some questions they had about continuing their formal education through the University of Pennsylvania.

I was actually in the process of returning one of their emails when the call came letting me know they had been killed. As I have spent a good part of my life working with 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

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different. Up until that moment, I had been going about my research trying to remain a detached professional academic and that suddenly seemed 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, standing around in the dress uniforms they rarely wore, wondering if someday I might have to go to their funerals. After a short time I took a seat high in the bleachers just as the bagpiper began to play and watched as the many young families entered the hall. Even though I have been to many funerals, they had always been for one person. 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. That 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. That I needed to burn the image of that long line of children into my memories to remind myself that in the end my research must add some measure of value to the lives of the future operators.

Clearly, the death of Rob and Heath has changed my positionality, but to fully understand that change, it is important to understand how I, as an educational researcher, and a former wilderness guide and EMT who had never been in the military and did not really even know how to use a gun, found himself as the invited guest at a Navy SEAL Memorial Service. The answer is mostly timing and coincidence. I began pursuing my research informally around 2008. The Training Cadre revolution was in full swing and I just happened to be asking the same questions, mostly around how to help people learn to more sustainably interact with uncertainty. Given my position at Wharton, and the number of veterans to come through our program, it did not take long for me to be introduced to the key members of Mission Critical Teams. From there it was really uncomplicated. I was invited to come observe and comment and if I added some value I would be either invited back, passed on to some new contact, or both. Over time, my position within the teams became that of a trusted outsider (Herr & Anderson, 2005, p. 31) who was willing to partner with the Instructor Cadre's to find ways to improve practice.

Due to the ongoing relationship that I already had with many of the instructor cadres the first decision I made was to conduct my research with the cadre, rather than on the cadre (Heron & Reason, 2006, p. 1). To do this I chose to use a cooperative inquiry model to partner with the teams in the context of my normally occurring practice as a trainer and educator using a Participatory Action Research methodology (Herr & Anderson, 2005) in order to both have the cadre participate in the research and take action that would allow us all to improve our practice. Historically, traditional assessment research (Highhouse & Kostek, 2013) is done by psychologists (Burt, 1942) focused on selecting future leaders (Earles & Winn, 1977) using

Trait Theory (John & Srivastava, 1999). This research, on the other hand, is being conducted by a trainer and educator, for and with other trainers and educators, who represent a legitimate communities of practice (Wenger, 2000) using a generative (Miles, Huberman, & Saldaña, 2013, p. 56) cooperative inquiry process (P. Reason, 1996).

Two significant criticisms of participatory action research (PAR) 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 six years I have spent a great deal of time with many of the operators, stayed at their houses, met their families, and in the case of Rob and Heath attended their memorial service. It was through these experiences many of the operators have become good friends. With that said, it is also important to note that when it comes to their communities, I will always remain a stranger in a strange land, as is true for all who have not successfully passed through their training pipeline. 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. It must be understood that the individuals who make up the Mission Critical Team community have "an almost mystical devotion to mission accomplishment"(S. C. F. McChrystal, Tantum Collins, David Silverman, 2015, p. 3). It is for this reason they are suspicious of too much praise and demanding of 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 need for 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. As it impacts the Instructor Cadre's this type of secrecy is both a strength and weakness as they cannot talk about much of what they do to outsiders and are therefore limited in their ability to receive new research or ideas that allow them to innovate in the face to a constantly adapting problem set. By engaging in a process of cooperative inquiry (P. Reason, 1996) the Instructor Cadre is both able to gain access to research and ideas that might be helpful and help make sure that no inaccurate or sensitive information is being disclosed.

One of the key challenges that this type of partnership creates, however, is how to properly articulate the Instructor Cadres unique way of knowing in such a manner that it also maintains the rigorous academic standards needed to insure reliability. This is a challenge is because the cadre's way of knowing is typically described as tacit knowledge. Most people best understand tacit knowledge as the knowledge associated with riding a bike. It is one thing to know how to do it, it is another thing to try to explain it to someone else, given that we all "know more than we can tell" (Polanyi, 1968, p. 30). In order to navigate this razor's edge between nothingness and eternity (Maugham, 1944), this paper will attempt to "make the tacit, explicit" (Ravitch,

2015) by navigating 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. With that said, the "operator" on each team that provided me with their attribute data, 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.

Historical Context

At its very core the concept of screening attributes for MCTs, is about identifying an individual who will be able to help the teams improve their ability to sustainably interact with uncertainty (Cline, 2013). With that said, in order for us to understand the mechanics of the current MCT screening processes, we need to understand how both the screening attributes, and the assessment centers that created them, came to exist. As we explore the historical documents used in this study, however, it is worth taking a moment to caution against what are called historical anachronisms. Anytime we delve back in history to understand the root of a current situation, we must remain mindful that context is everything. The challenge is that when we look back on our collective history we tend to assume that the people making decisions back then were just like us, except they are not. Historical researchers use the term anachronism (Skinner, 1969, p. 7) to describe this problem. The word anachronism means: 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, Weiner, & Oxford University Press., 1989). The individuals who first created the concept of screening attributes lived in a very different world than ours, facing very different risks and problem sets accesses very different types of solutions and resources.

"To judge the extent to which today's methods of dealing with risk are either a benefit or a threat, we must know the whole story, from its very beginnings. We must know why people of past times did-or did not-try to tame risk, how they approached the task, what modes of thinking and language emerged from the experience, and how their activities interacted with other events, large and small, to change the course and culture. Such a perceptive will bring us to a deeper understanding of where we stand, and where we may be heading." (Bernstein, 1996, p. 157)

One clear example of an anachronism, within the research associated with assessment centers, can be seen in one of the fields foundational texts, "The Assessment of Men" (O. o. S. Services, 1948). Written in 1948 by the Office of Strategic Services (the WWII precursor to the Central Intelligence Agency) it described the assessment methods and screening attributes used to select American spies during World War Two. The challenge is that despite what the title and much of the text would have you believe "about 15% to 20% of the candidates assessed were

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women" (Handler, 2001, p. 1). While this omission was considered normal at the time, it should also be noted that some of those women endured unimaginable suffering and death after being captured behind enemy lines in service to our country (Alcorn, 1962; Banks, 1995, p. 11). The point of bringing up the concept of anachronism is to remind us that while "there are some truths that remain fairly stable over time" (Skinner, 1969, p. 5), we cannot simply cut and paste historical solutions to current problems without considering that they were initially designed to solve a different problem, at a different time, with different tools and a different perspective.

While all MCT's share certain traits, they each remain unique and must be understood through the historical, cultural, temporal and systemic context in which both they, and their original mission, emerged. In their original form, most of the teams represented in this study were labelled "unconventional commando units" (Thomas, 1983). Traditionally, these units were formed during war time and then disbanded at the end of the conflict (Asher, 2008). The reason for this had been that unconventional commando units often created unnecessary friction within a conventional garrison force (Beckwith & Knox, 1983; Dobbie, 1944). By 1950, however, a series of radical change events had triggered a shift in the traditional military paradigm (Kuhn, 1996). The recent introduction of the jet airplane, the computer and the nuclear bomb, had created new problem sets that emerged faster, with more complexity, and with greater impact (Cline, 2014). Theorists had believed that this type of change was best articulated in the theory of punctuated equilibrium (Gersick, 1991) which states that emergent radical change events disrupt social equilibrium and create periods of disequilibrium. The theory was that once we learned to harness the disruptive element (inoculate against a pandemic or standardize the automobile) everything would settle back down into the new equilibrium, or "new normal."

By 1950, the British Military was recognizing that the core problem they were facing was not just that things were changing, but it was also the *rate* at which things were changing. It was the emergence of this "rate of change problem" that provoked some theorists to wonder if punctuated equilibrium, or "the historical pattern- disruption followed by stabilization – has itself been disrupted?" (Center for the Study of Intelligence (U.S.), 2010). In response to this new rate of change problem, the British Military decided that the solution to the rate of change problem was the creation of a permanent unconventional warfare unit. So, on May 31, 1950, for the first time in recorded history, the British Army reformed the British SAS and created the first permanent Mission Critical team.

In the years that would follow, other HRO's would encounter other emergent complex adaptive problem sets and set out to create their own MCT's. Examples of this pattern can be seen in Table 2.

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Table 2: MCT origin date

Type	Organization	Org. Est.	MCT. Est.	Sample Set
Military	British Army	1707	1950	British SAS
Military	U.S. Army	1775	1952	U.S. Army Special Forces
Military	NZ Army	1845	1955	New Zealand SAS
Military	Australian Army	1901	1957	Australian SAS
Fire	National Park Service	1946	1961	Wildland Hotshots
Aerospace	NASA	1963	1963	NASA Mission Control
Medical	EMS	1865	1973	Paramedic Team
Legal	Los Angeles Police	1869	1974	Special Weapons and Tactics (SWAT)
Military	U.S. Army	1775	1977	U.S. Army SFOD-D
Legal	Secret Service	1865	1979	Counter Assault Team (CAT)
Military	Navy	1775	1962	Naval Special Warfare (Navy SEAL)
Legal	FBI	1908	1983	Hostage Rescue Team (HRT)
Medical	U.M. Shock Trauma	1823	1966	Trauma Surgical Unit
Military	Canadian Army	1867	1993	Canadian Joint Task Force 2
Disaster	FDNY	1865	2001	Incident Management Team

(Wikipedia, 2015c)

As each of these teams was created the first challenge they would need to overcome is deciding how to select people to be on the new team.

History Assessment Centers

The story of Assessment Centers really began in Germany in 1926 (Ahrenfeldt, 1958, p. 54). Following their defeat in World War I Germany was set on rebuilding their military but the restrictions put in place by the Treaty of Versailles restricted how many officers that could be employed at any given time. As a result they were in search of a process that would provide them the best possible candidates for the few positions that were available. Unlike Britain and the U.S., where psychology was still viewed somewhat suspiciously (Ahrenfeldt, 1958, p. 26), experimental psychology had been legitimized some 60 years prior when Wilhelm Maximilian Wundt had founded the institute for experimental psychology at Leipzig University (Mandler, 2007). This series of events created an opportunity for a team of German psychologists to create a process for selecting future leaders (Earles & Winn, 1977). All of this might have been lost to history, except for the fact that German military psychologists, operating during peace time, were also scientists who believed in publishing their work.

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By 1938, the British army was facing the prospect that over the next 5 years they were going to need to grow military from approximately 400,000 to almost 5,000,000 (Rogers, 2012). At the time, there were significant social barriers within the British Military that inhibited the recruitment of officers, so having read the articles published by the German Psychologists an effort was made to reproduce the "German army methods of officer selection (Ahrenfeldt, 1958, p. 55)." It was out of this that came the British "War Officer Selection Board"(Crang, 2000) that would supersede the traditional Regular Commissions Board (Crang, 2000, p. 36) for the duration of the war. Like the German model, it was designed and primarily run by a group of Psychologists.

By 1943, a new assessment challenge had emerged as the Office of Strategic Services (OSS) had been tasked with creating a selection process to choose a new group of American espionage agents. After some early failures, the OSS decided to organize a group of Scientists to follow the German and British Model. The team would be led by Dr. Henry Murray (Lenzenweger, 2014), a noted Harvard Psychologist who had been a pioneer in personality assessment (Weiner & Greene, 2011) using what would come to be called trait theory (John & Srivastava, 1999, p. 26). In general terms, trait theory espouses that we can understand a person by measuring certain personality characteristics or "traits," such as extraversion, perfectionism, impulsivity, etc. (John & Srivastava, 1999, p. 26). Traits are personality characteristics that are considered by researchers to be fairly stable over time and do not change much after we reach adulthood, unlike "States" and "Judgments" (John & Srivastava, 1999, p. 26). States are considered temporary, like moods or activities; these include things like being afraid or moments of joy. Judgments are considered "highly evaluative judgments of personal conduct and reputation, such as excellent, worthy, average, and irritating" (John & Srivastava, 1999, p. 26). The historical question has then been whether to evaluate these traits, states and judgments in isolation or whether to look at the person as a "whole man."

Once the team of psychologists was gathered their first act was to benchmark their emerging process off the British War Officer Selection Boards (Services, 1948, p. 3). After the war, this same group of scientists would publish their findings in a book entitled "The Assessment of Men"(O. o. S. Services, 1948). It was this book that would chart the course for the next several generations of Assessment Centers, including many of the modern MCT's within this study (Banks, 1995, 2006; Handler, 2001; Highhouse & Kostek, 2013; Howard, 1974; Lenzenweger, 2014; MacKinnon, 1980). Why this history is so important, is because over the last almost 100 years, the validity of Assessment Centers is still being debated (Arthur, Day, & Woehr, 2008; Lance, 2008; Monahan, Hoffman, Lance, Jackson, & Foster, 2013).

If we evaluate these early Assessment Center models against the MCT framework, they could be summarized in the following way.

1. **The History:** In each case the assessment model being used was brand new. In the case of the Germans and the British, it was nested within an existing military system, in the case of the OSS, it was all new.

2. **The Problem Set:** Was predictable, stable, and technical in nature and existed within a temporal environment which allowed for days or weeks of planning and execution.
3. **The Mission:** Was reliant on an individual expert who could efficiently solve technical problems.
4. **The Structure:** Was a traditional hierarchical and directive leadership environment where membership in the selection cadre was mostly a team of psychologists whose goal was to test candidates for the optimal traits associated with specific technical roles.
5. **The Human Factor:** The optimal solution to technical problems was the assignment of an individual expert (human asset) capable of leveraging basic technology (technical asset), who could be further developed through further technical skill development and iterative contingency planning.

Modern Context

At the writing of this paper, almost 90 years have passed since the German Military first designed their psychological selection program and in that time the science, technology, and culture associated with that initial design have continued to evolve.

- **The History:** By 2001 the teams culture, norms and mythology, had been long established.
- **The Problem Set:** Had transitioned from a technical to complex adaptive.
- **The Mission:** Had transitioned toward an integrated team of experts that leveraged technology (technical asset) and information (information asset) in an iterative decision making environment of 10 minutes or less.
- **The Optimal Structure:** Had transitioned into an operationally distributive leadership model where authority to select new candidates had transitioned from a cadre of psychologists selecting candidates for specific expertise to a cadre of operators selecting for membership into a community of practice.
- **The Optimal Human Factor:** Had transition from an individual technical skill development using iterative contingency planning to a team based training and education program that developed both contingencies and capacities.

The History

One of the main challenges in studying MCT's is the sheer complexity that comes with trying to describe a team that is a multilayered complex adaptive system which is also nested within (Patton, 2015, p. 141; Quesada et al., 2005), and positioned against, other multilayered adaptive complex systems. One way to simplify this problem is to break the components down into their component parts while still referencing the larger system in which they are nested. To this end the components will be presented in the sequence they emerge. We will start with the emergence of the HRO (K. M. Sutcliffe, 2011). The HRO's represented in this study are human based complex adaptive systems (Svyantek & Brown, 2000) created to manage a known chronic problem (fire, disease, war, crime, etc.), which at some point encounters a novel complex

adaptive problem set (Heifetz, 1994; Holland, 2006). In terms of the HRO's associated with this study, the novel complex adaptive problem set was unconventional warfare, which like war itself "is a process of continuous mutual adaptation" (Corps, 1997). Once the adversary creates a new adaptive problem set the HRO's will often first try, and then fail, to implement an established technical solution (Kuhn, 1996). When these fail to work, they will then be forced to create a small, agile, semi-autonomous team (the MCT), which is in itself a complex adaptive system (Arrow, McGrath, & Berdahl, 2000), designed specifically to both counter the emergent threat and exploit emergent opportunities.

Dominant military theories are a response to current problem sets. For example, if you consider Boyd's military decision making theory (Richards, 2001), the OODA Loop (OODA representing Observe, Orient, Decide, Act), it emerged from the need to better prepare a single seat fighter pilot to face another single seat fighter pilot during the Vietnam War. The reason that MCT's became dominant after the 1950's is because of the emergence of complex adaptive problems and networked systems. MCT's are the natural response to these threats both because they are themselves networks, nested within larger networks, and they are what Steven Johnson would call "liquid networks"(Johnson, 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.

Problem Set:

To explain the notion of Emergent Complex Adaptive Problem sets we also need to break it down into its component parts. The term "emergent" describes "the arising of novel and coherent structures, patterns, and properties during the process of self-organization in complex systems (Goldstein, 1999, p. 49)." The term complex references the fact that unlike complicated or technical problems, which are isolated problems, complex problems are part of a network that requires experts to navigate. In his book "Leadership without easy answers" Ronald Heifetz describes how adaptive problem sets (or situations) can be conceptualized (Heifetz, 1994, pp. 74-75):

- **Type I:** Are technical problem sets that are mechanical in nature. We can look at the broken machine, see where it is broken, obtain the part, and fix the machine. These types of problems will always exist and can be seductive to organizations looking for ways to measure success.
- **Type II:** Are technical/adaptive problem sets where the actual problem is clear and obvious, but there is no clear and obvious solution. For example, the well has run dry and we are not sure if just digging deeper will lead to more water. This kind of problem requires an expert to help resolve.
- **Type III:** Are adaptive problem sets where the problem set is neither clear nor obvious and a technical solution will not suffice. Terrorism is an example of this type of problem set.

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Table 3 shows how we have adapted Heifetz work for the purposes of this paper:

Table 3: Technical vs. Adaptive Problem Sets

Problem Set	Problem Definition	Solution & Implementation	Optimal Solution	Kind of Work
Type I	Clear	Clear	Individual	Technical
Type II	Clear	Requires Learning	Individual with support	Technical and Adaptive
Type III	Requires Learning	Requires Learning	Team	Adaptive

Adapted from: (Heifetz, 1994, p. 76)

The Mission

Because Complex Adaptive Systems are living systems "open to flows of energy, matter and information" (A. Ryan, 2009, p. 71), we will never be able to prevent unpredictable threats and opportunities from suddenly emerging. What we can do, however, is strengthen the Individual, team, and institutions Protective Factors (Scales & Leffert, 1999; Waller, 2001). For the purpose of this paper, Protective Factors are those structures, skills and beliefs that strengthen "Mindfulness" (K.E. Weick & Sutcliffe, 2007), "Robustness" (Anderies, Janssen, & Ostrom, 2004), and "Resilience" (K.E. Weick & Sutcliffe, 2007). Mindfulness is the ability of the operator to develop their situational awareness (M. R. Endsley, 1995); 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). Robustness is a term used to describe a complex adaptive systems ability to continue performing even when subjected to external and unpredictable stressors (Anderies et al., 2004, p. 1), sometimes also referenced as anti-fragile (Taleb, 2007). Resilience on the other hand is "positive adaptation in response to adversity" (Waller, 2001, p. 292). While these characteristics apply to individuals, teams and organizations a more accessible metaphor is that of the fighter. Mindfulness speaks to how well a fighter can rapidly adapt to an opponent, robustness speaks to how hard a fighter can take a hit and continue fighting, while resilience speaks to how quickly a fighter can recover if they are knocked down. To strengthen the protective factors associated with MCT's we need to start by recognizing that MCT's themselves are complex, or ecological, systems. Why this is helpful is because ecological systems are governed by certain principles designed to maintain system equilibrium. These principles include; networks, nested systems, cycles, flows, development, and dynamic balance (Capra, 2005). When new threats and opportunities emerge, they disrupt the systems equilibrium forcing it to adapt. It is the systems rate of adaptation that determines its sustainability. By developing an MCT's protective factors in congruence with the larger ecological principles we can influence our chances of mission success and mission survivability.

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The Structure

Over the last 65 years as the missions have become increasingly complex and constrained, both temporally and spatially, leaders have become much more likely to dispatch a team over an individual. The reason for this transition is simply because teams are more effective than individuals in solving time constrained complex adaptive problem sets (Hackman, 2011, p. 26). This transition from the individual to the team has also brought about an evolution in team leadership as every single one of the teams in this study has become operationally less hierarchical and more distributed in its leadership. Distributed Leadership is a term used to describe teams 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). Obviously, given that these are military or paramilitary organizations there is still a military hierarchy. Distributed Leadership refers to the fact that while on mission the person who has the most relevant knowledge and skills, in the moment, is influencing team momentum during that moment.

The Human Factor

Both HRO's, and the MCT's nested within them, are very sophisticated learning communities (K.E. Weick & Sutcliffe, 2007), where the type of learning employed is not theoretical, but experientially based and situated in the same context in which it is applied (Dewey, 1938; Kolb, 1984; Lave & Wenger, 1991). Furthermore, the often ambiguous nature of their missions requires them to focus more on building the capacity of the team to navigate uncertainty, than the ability of the planners to create contingency plans. Which means that unlike traditional tests of intelligence, or physical fitness, they have to consider whether candidates are capable of adaptive and generative learning (Chiva, Grandío, & Alegre, 2010) in multiple domains (Gardner, 2006). By generative learning, we are specifically referencing the type of learning that can lead to additional learning (Wittrock, 1992). To do this, they start by restricting the applicant pool to candidates who have already achieved expertise in their profession. This has the secondary effect of increasing the average age of a candidate to above 25 years of age. By focusing on the older candidate it allows teams to rely more on principles than rules which allows for more rapid and sophisticated problem solving. At the same time the rapid development of technology also requires individuals to function on teams capable of tight thought and action cycles that are mediated by joint cognitive systems (David D. Woods & Hollnagel, 2006). A Joint Cognitive System is an integrated human, computational and communication system 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), using both data, concepts and relationships(David D Woods, 1985).

Working with older operators, however, comes with its own challenges, due to the fact that in order to be successful in an MCT selection program a candidate must have the ability to engage in a process labelled "reversal learning" (Kalyuga, Rikers, & Paas, 2012). Reversal learning is a cognitive process which allows for overwriting old habits (what are sometimes called "training

scars" by the operators) with the new habits. If the older operators do not have a certain level of neuroplasticity, their ability to engage in reversal learning is slower and as a result their rate or learning will not be high enough to keep up with the rest of the team during selection.

Even if the candidate is able to keep the pace and complete the tasks in selection, however, does not mean they will be selected. Over the last 70 years the focus has shifted from choosing someone for a role, to choosing someone to join a community. Along with that shift in focus, the profile of the Instructor Cadre has also transitioned from just evaluating the candidate skills and attributes using trait theory, to a evaluating their fit to join an established Community of Practice in a manner akin to the anthropological theories related to "Rites of Passage" (Turner, 1995; Van Gennep, 2011). Rites of Passage represent an anthropological interpretation of how indigenous communities formally transition their members through status changes. As the teams have come to develop their own cultures, norms and mythologies, the attributes they have identified represent more than just ideal physical and personality traits; they also represent the team's history, culture, norms and taboos.

In summary, the historical evolution of MCT's can be seen in Table 4:

Table 4: Historical Evolution of MCT's

Domain	Common Characteristics	Pre-1950 (Type I)	1950-2001 (Type II)	Post 2001 (Type III)
History	MCT Evolution	No Team	Evolving Team	Established Team
Problem Set	Problem Classification	Technical	Technical/Adaptive	Complex Adaptive
	Problem Identification	Clear/Obvious	Clear/Obvious	Requires learning
Mission	Solution Identification	Clear/Obvious	Requires learning	Requires learning
	Temporal Environment (Ops)	Weeks/Days	Hours/Minutes	Minutes/Seconds
Structure	Selection Authority	Psychologists	Psychologists/Cadre	Cadre/Psychologists
	Operational Leadership	Directive	Directive/Distributed	Distributed
Human Factor	Optimal Size	Individual	Individual/Team	Team
	Development	Training	Training/Education	Education/Training

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Literature Review

The study of Mission Critical Teams is interdisciplinary by necessity. Research related to organizational behavior, anthropology, education, neuroscience, and physiology. are all required to understand the way that each component of an MCT is nested within a larger physical and social ecosystem in which it belongs. As a result, an effort was made to find theories that would be the most useful for the operators who will read this study.

Historical Context

In order to critically examine the traits that the teams submitted, we need to understand both the historical context in which they emerged (Earles & Winn, 1977), as well as the how and why they are used in modern times. The historical assessment programs instituted by the Germans, British and Americans represented new processes and ways of thinking utilizing a relatively new science within existing paradigms. It is important to find a way to judge their success based on both their explicit goals as well as their ability to overcome internal design challenges. It so happens, that during the summer of 1945 the U.S. Government was interested in the same questions regarding the Wehrmacht Assessment program. So, they sent Lt. Col. Paul Fitts, "as a military representative of the U. S. Army Air Forces Aviation Psychology Program" (Fitts, 1946), to determine the relative success of the Wehrmacht Selection Program. Fitts, states that the reason that the Wehrmacht terminated the screening program in the middle of the war was due to a series of political, professional, practical and scientific factors (Fitts, 1946, p. 160). Given that this review will start with that framework, it makes sense to continue using that same framework when evaluating both the British and OSS models.

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. As the Wehrmacht had a traditionally hierarchical military structure, this put tremendous pressure on the leadership to obtain the highest caliber officer. Given that experimental psychology had, by that time, matured into a distinct scientific branch the decision was made to assign a group of psychologists to design the new assessment system.

"By 1936, 114 psychologists were working for the (Wehrmacht), and by 1941, there were between 450 and 500 psychologists working for the Wehrmacht, to include those in the Army, Navy, and Air Force" (Banks, 1995, p. 33).

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The primary motivation for the Wehrmacht to invest in a new approach to officer selection was that the "…hope for victory is founded on intellectual superiority of the (Wehrmacht) officer" (Ansbacher, 1941, p. 370). More specifically, the explicit goal of the Wehrmacht Officer Selection program was

> "to obtain an evaluation of: general intelligence, loaded on the practical side; use of will power (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; expressive movements (speech, face, gestures, handwriting); total personality (life history, interview)" (Ansbacher, 1941, p. 380).

The Design of the Wehrmacht Selection Program

The new Wehrmacht Psychological Assessment Program was under the leadership of Dr. Max Simoneit (Fitts, 1946) who believed you needed to see the whole person (Banks, 1995, pp. 34-35) to make a proper assessment, unlike some of his contemporaries that believed you could break people down into their component parts. This approach would later be described as the "the whole man" approach. (Banks, 1995, p. 38), which would create a far more qualitative process than a quantitative one (Highhouse & Kostek, 2013).

To that end "Simoneit designed an assessment 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. Because, we have access to Simoneit's original principles for selection which were translated from the original German and published in 1941 (Ansbacher, 1941), I am choosing to publish them as they were printed to provide a further sense of context:

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.

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    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).

Evaluation of the Program

A determination of the success of the Wehrmacht Officer Selection program to select for the highest Caliber Officer would be difficult at best. Given the historical record, it is unclear how anyone could reconcile the success of a program based on selecting for character in light of the atrocities that were committed by some of the Wehrmacht officer corps. With that said, the program was actually discontinued about midway through the war for the below reasons (Fitts, 1946).

Political Challenge: Integration with those in power

While experimental psychology had developed a scientific reputation, it needs to be remembered that these relatively new teams of psychologists were creating an assessment program that was nested within a very traditional military context that was built on generations of social engineering.

"Prussian officers, who exerted a great amount of control over the (Wehrmacht), eventually realized that the widespread use of psychological tests was an application of democratic selection procedures which would make it possible for men who possessed the right character traits and aptitudes to become officers regardless of family background. Many old line officers favored the traditional procedure of selecting most of the young officers from Prussian families with a long military tradition." (Fitts, 1946, p. 160)

Secondly, the Nazi Party, which was a relatively new player in German power struggles

"…came to oppose the democratic selection procedure. In an effort to gain control over the armed forces, the Nazi party insisted that boys who had belonged to one of the Hitler youth groups be given preference when officers or other key military personnel were selected." (Fitts, 1946, p. 160)

This tension between innovation and tradition is something that modern MCT's continue to experience.

Professional Challenge: Collaboration with other Disciplines

Historically, in most militaries, the task of selecting officers fell on both the officer corps and the medical corps. The new Psychology program would have to negotiate with both of those groups for authority and in the end failed to do well with either.

"The testing program was poorly organized. Psychologists were not an integral part of the military organization and lacked authority responsibility for seeing that their recommendations were carried out. Liaison with other military groups, especially with the medical services, was poor and there was duplication of effort and lack of understanding

between psychologists and officers responsible for medical, personnel, and training activities." (Fitts, 1946, p. 160)

It must be remembered that for much of recorded history it was the military medical corps job to determine who was fit for duty. The idea that that the Wehrmacht would turn away an able bodied soldier because of something to do with their personality contradicted core medical corps practices and traditions.

Practical Challenge: Ability to Scale the Program

Prior to the start of the war the emphasis had been on obtaining the candidate with the best qualities, once the war started the emphasis became selecting the greatest quantity of officers. As a result;

"A number of practical considerations contributed to the termination of psychological testing. The testing procedures had been developed during peace time to select men for a small army, and these peace time methods proved to be too cumbersome for use in a total war. Lack of competent personnel resulted in the use of inexperienced men as psychological examiners, and the great increase in testing load made it necessary for each examiner to evaluate a large number of men each day." (Fitts, 1946, p. 160)

This pressure to dilute the process of getting more candidates through both reduced the quality of the program while also providing ammunition to the Political and Scientific opponents who wanted the old ways to return.

Scientific Challenge: Lack of Evidence of Success

There might be any number of reasons one could speculate on why Wehrmacht scientists would not want to collect data evaluating the success of the officer selection, including the fact that they would eventually be working for the officers they graded. Whatever the reason,

"No acceptable evidence was accumulated to show that the program was successful. Had they been able to report positive validation data, Nazi aviation psychologists might have been able to secure much stronger backing for their program. Nor were Nazi psychologists able to refine their procedures on the basis of validation of separate tests or of studies to confirm the hypotheses on which testing procedures were based." (Fitts, 1946, p. 160)

This lack of acceptable evidence regarding the success of the program is a challenge that continues to plague assessment centers up until current times.

1939 Britain War Officer Selection Board (W.O.S.B.)

The British military had recognized that war with Germany was coming and it would be battle for the survival of their nation (Ahrenfeldt, 1958, p. 2; Handler, 2001, p. 558). In order for

them to survive, they would need to raise an army as large or larger than the one they had raised just 25 years prior in the lead up to World War One (Table 5) (Rogers, 2012).

Table 5: British Military Build-up WWI & WWII

Year	Total Strength, UK Service Personnel (Regulars)	Population- UK million	Personnel per 100,000 population
1913	393,300.00	44.868	877
1914	1,478,400.00	44.604	3,315
1918	4,583,300.00	43.564	10,521
	Inter-War Period		
1938	384,800.00	47.563	809
1939	1,068,850.00	47.78	2,237
1945	4,906,400.00	49.035	10,006

Yet the difference in the British Culture between 1913 and 1939 was profound, the type of warfare was more technologically advanced, and the effect of WWI was still being felt in significant ways. While the Wehrmacht was focused on officer selection, the British began designing new systems to improve selection processes for both the officer and enlisted corps (Ahrenfeldt, 1958; Crang, 2000). With that said, the majority of their focus (and the focus of this paper) was on increasing the quality of their officer corps to deal with the running of a " modern technological army" (Crang, 2000, p. 1).

Goal of the Selection Program

The explicit goal of the 1939 War Officer Selection Board was to create an officer selection program that would adequately 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). These criteria were not selected at random, but had arisen from the lessons they had learned from the last World War only 25 years before.

Mental Health

Shell Shock was a phenomenon first talked about seriously in World War One (Ahrenfeldt, 1958, p. 30). "It was estimated that, by December 1914, 7–10% of all officers and 3–4% of other ranks in the British Expeditionary Force were 'nervous and mental shock' casualties" (Macleod, 2004). In some cases, like the Battle of the Somme, some 40% of casualties were shell shocked (Macleod, 2004). Even though leaders were convinced that the British Military needed to do a better job of screening both the officer and enlisted ranks (Ahrenfeldt, 1958, p. 29) the state of psychology in Britain was simply not as advanced or as widely accepted as it was in Germany. As a result, much of the lessons of WWI had been forgotten by the start of WWII (Ahrenfeldt, 1958, p. 252), leaving the field of psychiatry unprepared for the coming challenges (Ahrenfeldt, 1958, p. 253). Had more time passed between wars this issue might have simply been ignored,

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but in 1939 the British Military was starting a conscription process (Murray, 1990) that would call up almost 10% of their entire population at a time when "120,000 pensioners were still collecting pensions due to shell shock from WW1, that represented 15% of all pensioners" (Ahrenfeldt, 1958, p. 10). Because the pain was still being felt, there was an urgency to come up with an innovative solution to military selection.

Social Barriers

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 exclamation by many officers that they knew a quality candidate when they saw one. With the sudden build up to WWII this system was rapidly breaking down, but no one was sure how to fix it.

> "Since the supply of young men from the universities and public schools were drying up, the interviewing officers sometimes found themselves rather at sea, since for the purposes of rapid assessment they understood too little of the background and outlook of many of the candidates whose civil life experience had been so completely different from anything of which they had previous knowledge." (Ahrenfeldt, 1958, p. 52)

The problem was twofold, one was a process problem and the other was a cultural one. From a process perspective the RCB's were historically a "rejection process" (Ahrenfeldt, 1958, p. 54). The rejection rate for officers was "20% to 50%" (Ahrenfeldt, 1958, p. 53). In order for the Army to get the officers they needed, this system would need to change, but the need for procedural changes were running up hard against the long held cultural beliefs of the current leadership.

> "General Sir Walter Kirke (Director-General of the Territorial Army) voiced their concerns when he warned that it was 'important not to take any drastic measures to attract a new class of officer, whose entry in any considerable numbers would probably have the effect of curtailing the existing supply from the superior classes" (Crang, 2000, p. 22).

In order to try and resolve the process and cultural challenges, while also finding ways to reduce the rate of mental illness, the British Military decided to create a new process to select the much needed officers "In June 1941 two psychiatrists Lieutenant Colonel T. F. Rodger, and Major E. Wittkower were given the task of designing a program that would reduce this rejection rate in officer training" (Banks, 1995, p. 43). Ironically, many of the methodologies that they would use to create the new War Officer Selection Boards where based on the techniques that their current advisories, the Wehrmacht, had developed for the same conflict (Ahrenfeldt, 1958; Banks, 1995; Murray, 1990).

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The Design of the War Officer Selection Board

Leveraging the Wehrmacht Model of selection created by Simoneit, the British developed a War Officer Selection Board 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. As this was an experimental program there was not one standard process, but all incorporated the same features as documented by Crang (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)

This inclusion of situated learning and experiential education is something that continues to evolve and influence the type of candidate that is being accepted into MCTs today.

Evaluation of the Program

Much like the Wehrmacht's efforts, the original goals of the program was to select better officers. In the case of Britain, there was the added goal of decreasing the mental health problems that occurred during WWI. Considering that much of the original model for officer selection that was created during this time is still in use, it could be argued that it was very successful. With that said, like the Wehrmacht, we also need to evaluate whether they were able to overcome their Political, Professional, Practical and Scientific obstacles that come with starting a program of this kind.

Political Challenge: Integration with those in power

One of the factors that helped the WOSB's succeed was the alignment around the same problem set. By triangulating officers, psychiatrists and sergeants the new WOSB's were starting to break down old stereotypes (Ahrenfeldt, 1958, p. 63). This happened because as officers got into the job of looking after their people they began to recognize that the "psychologist was dealing with similar problems" (Ahrenfeldt, 1958, p. 11). In the end, the Military Leadership, many who had never accepted that Psychologists could share their decision regarding who could be an officer in the British Military, decided to permanently remove psychologists from the selection boards following the war. With that said, one could argue that their impact on process, culture and mental illness is still being felt.

> "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)

Professional Challenge: Collaboration with other disciplines

Just like the Wehrmacht, the challenge of assessing who was fit enough to serve within the military was the responsibility of the medical corps, who were incidentally under intense pressure to get the maximum number of "fit" soldiers in uniform (Ahrenfeldt, 1958, p. 27). When the new W.O.S.B. were created, the medical personnel were relegated to a position of "advisors" and from the beginning complained that the selection boards were failing too many abled bodied men (Ahrenfeldt, 1958, p. 31). They also felt that psychology, was still a relatively new science that lacked the rigor of medicine (Ahrenfeldt, 1958, p. 72).

Practical Challenge: Ability to scale the Programs

By 1940 the British Army was the greatest single employer of labor in Britain. (Ahrenfeldt, 1958) and over 140,000 candidates would pass through the selection boards during the remainder of the war and roughly 60,000 were recommended for officer training (Crang, 2000, p. 60).

> "By March, 1942, a technique for the selection of officers had been developed to the satisfaction of the war office, and it became possible to establish permanent W.O.S.B.'s in every part of the United Kingdom and, later, with the Forces overseas. Within a year of the formation of the first experiment WSOB every candidate for an emergency commission was appearing before one of these boards." (Ahrenfeldt, 1958, p. 58)

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

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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 Operations Command was formed (Bank, 1986, p. 192; Beckwith & Knox, 1983, p. 121; Marcinko & Weisman, 1992) and in some cases continues to inhibit talent identification for MCT's.

Scientific Challenge: Lack of Evidence of Success

As the program was getting off the ground, there was a period in 1942, where both the old system and the new system were happening at the same time (Table 6). Research was then done to rate the graduates on Job performance (Ahrenfeldt, 1958, p. 73; Crang, 2000, p. 33).

Table 6: Comparison of RCB's to WOSB's

Grading of Candidates	Old Methods (RCB)	W.O.S.B.
Above Average	22.1%	34.5%
Average	41.3%	40.3
Below Average	36.6%	25.2%

It should also be noted that part of the goal of the new selection programs were to reduce the amount of Psychiatric illness of officers. While there was still a considerable number of officers who "developed psychiatric illness requiring hospitalization" (Ahrenfeldt, 1958, p. 75), 58% of those cases came from the "lower ranges of officer intelligence ratings" (Ahrenfeldt, 1958, p. 75), which suggests that if the pressure to fill billets was not as great, the threshold of acceptance could have been raised, which would have reduced those losses.

In the decades that have followed that first War Officer Selection Boards, the notion of selection centers have been used worldwide, and in many cases their roots can be traced back to these boards (Murray, 1990, p. 65).

A Note about Special Operations

It is important to understand that the W.O.S.B.'s, and the Wehrmacht that preceded them, were primarily used to select officers of conventional forces, primarily the Army. Special Operations, given the expectation that they would be disbanded at the end of the war (Cline, 2014), were largely ignored by the Boards. With that said Special Operations teams were experiencing a number of "psychiatric breakdowns occurring among commandos in action" (Ahrenfeldt, 1958, pp. 43-44). At the time the Director of Army Psychiatry felt that "some four-fifths of such breakdowns could be prevented by adequate selection of recruits" (Ahrenfeldt, 1958, p. 44). For reasons that remain unclear "No specific selection procedure was introduced for commandos" (Ahrenfeldt, 1958, p. 44).

For Airborne (volunteer parachutists) however, a completely different story emerged. The Army assigned specific psychiatrists to assist with Airborne selection, and one even went through the training to qualify as a parachutist (Ahrenfeldt, 1958, p. 47). By 1944, the research

showed that those efforts at more scientific selection reduced wastage, which was a term used to denote a candidate who was selected but who failed to make it through training. Using the new WOSB methods about 20% of the volunteers were rejected during the initial screening phase. For those who did make it through screening, 70% completed training. This represented an 84% reduction in wastage from previous screening methods (Ahrenfeldt, 1958, p. 47).

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 of William Donovan and prominent members of society" (Banks, 1995, p. 51). The problem with that method, was that just because you 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). This led to large amount of what the British termed "wastage."

"A significant number of deployed personnel were either incompetent, or in a few cases, had dramatic mental crack-ups" (Banks, 1995, p. 49). According to the records of the Medical Branch of the OSS, (a unit distinct from selection and assessment) 52 agents had emotional difficulties severe enough to require that they be removed from duty. This was a rate of roughly .29 percent (3 out of 1,000) of the total non-assessed population that worked for the OSS (Banks, 1995, p. 49).

So two years later, in 1943 they 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). The lack of research on selection and assessment was one of the primary reasons that they based much of their model on the German and British efforts that preceded them (Services, 1948, p. 3).

Goal of the Program

The OSS Assessment cadre was tasked with "developing a system of procedures which would reveal the personalities of OSS recruits" (O. o. S. Services, 1948, p. 8). The purpose of doing this was to provide "sufficiently reliable predictions of their usefulness to the organization" (O. o. S. Services, 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).

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The process of becoming an OSS Agent involved first being recruited by a specific branch within the OSS. Then, if the candidate passed the background test, they were sent to an interview in Washington, D.C. which acted as a second level of screening. If they passed those two screening processes 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 (O. o. S. Services, 1948, pp. 58-63). It was there 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). Upon completion of the Assessment, an Assessment Board would determine if they were selected for training. From there, successful candidates would go on to 4-10 weeks of training, depending on the Branch they were recruited, before being sent overseas to their job posting (Chambers & John, 2010).

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 7):

Table 7: OSS Candidate Lifecycle

	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. (O. o. S. Services, 1948, p. 60).
- **Screening:** The applicant would then travel to Washington D.C. for an interview with the OSS officer who would supervise the candidate throughout his training in the OSS schools. This acted as a second screening as in some, cases the applicant would fail this interview and be sent home (O. o. S. Services, 1948, p. 61).
- **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).

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

Given that none of the assessors had firsthand knowledge of what a spy actually did 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" (O. o. S. Services, 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 and upon receiving his commission they promptly dispatched him to the OSS. The OSS then promptly sent him to Europe to gather his "list of abilities." What Dr. Lieutenant Gardner came up with was "A list of abilities and qualities which these officers considered necessary for the accomplishment of the projects planned by their section" (O. o. S. Services, 1948, p. 30). They then took Dr. Lieutenant Gardner's list of attributes and then "by resolving differences in terminology and by combining related factors under a single term" (O. o. S. Services, 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-resourceful-ness, 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" (O. o. S. Services, 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.

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It was these attributes, several of which are still in use today, which would guide Assessment Centers for decades to come. Both the British and the Germans were selecting individuals to engage in a primarily technical and stable task within a traditionally hierarchical military system. The OSS on the other hand, while still selecting for individuals also recognized the importance of "social relations" which included the notion of "team play" (O. o. S. Services, 1948, p. 30). However, when you explore their definitions of "social relations" it primarily describes what modern researchers would term "agreeableness" (Graziano & Tobin, 2009) which generally refers to someone's likability. So, while the OSS was dealing with more adaptive problem sets, it was still from the paradigm of the individual actor within a highly political system.

Evaluation of the Program

Political Challenge: Integration with those in power

Even though the program was directly authorized by President Roosevelt "there was no single agency responsible for all U.S. intelligence until the establishment of the Central Intelligence Agency following the dissolution of the OSS after the war" (Banks, 1995, p. 8). What this meant was that the OSS had to constantly negotiate with both Military agencies (Army and Navy) and the Federal Bureau of Investigation.

Professional Challenge: Collaboration with other disciplines

Because the OSS was a new entity, outside the traditional turf fights of the Military, the OSS Assessment team had fewer pre-existing obstacles to overcome. In addition, Dr. Murray was originally trained as a physician before becoming a psychologist and strongly believed in the strength of collaborating with a team of specialists. As a result, he started with a multidisciplinary team that pretty much included all of the professions.

Practical Challenge: Ability to Scale the Program

Compared to both the German's and the British, the OSS had far fewer numbers of agents to screen. With that said, as demand for agents increased the additional assessment centers were created. Overall 2,372 candidates were assessed at the formal Assessment centers and an additional "3,071 candidates were assessed in Washington, D.C, mostly for administrative positions" (Banks, 1995, p. 66).

Scientific Challenge: Lack of Evidence of Success

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). With that said, it should be remembered that the assessors were not able to set up as rigorous a program as they "Had little or no first- hand knowledge of the jobs the selectees would be performing" (Handler, 2001, p. 563) and no time to set up a truly rigorous research program. In terms of producing quality spies,

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"The number of operatives who were recommended by Station S, and who later were rated unsatisfactory by the field, ran from 11 to 16 percent, depending on which of the outcome measures were used. Because of the limitations in the outcome measures themselves, the psychologists suggested that 10 percent is probably the most accurate estimate" (Banks, 1995, p. 75).

In terms of preventing mental health issues,

"…the OSS recorded 52 "neuropsychiatric breakdowns." This is out of a total population of approximately 20,000. …the assessment process reduced the rate of psychiatric casualties from 52 out of 20,000 (1:385) to 2 out of 2,372 (1:1186), or to one-third the previous rate. …This finding is remarkable when compared to the ineffectiveness of U.S. Army World War II psychiatric screening." (Banks, 1995, pp. 76-77)

It is worth noting that in 1952, when the U.S. Army Special Forces (SF) was reformed and made permanent, becoming the first U.S. Mission Critical Team, "many of the SF soldiers were prior OSS members" (Banks, 2006, p. 4). It may be one reason that this path of recruitment, screening, selection, and assessment and training, is a model that most teams still use, although as we will see with significant modifications.

Finally, the decision to publish their findings in the book Assessment of Men allowed later researchers to reproduce parts of their work, so that almost all of the U.S. Based teams in this study can, to one degree or another, trace their attributes back to this program (MacKinnon 1980).

"Where did such an extravagant idea as assessment centers come from? The credit is usually given to the Germans, from whom it was copied by the British and then by the Americans in World War II for use in selecting candidates for the Office of Strategic Services. And did it work for the OSS? The war ended and everyone went home, so no one really knows." (Howard, 1974)

Critique of Assessment Centers

By the 1950's, however, their researchers were starting to push back on the idea that holistic assessment programs were superior to the quantitative ones that simply measured test scores (Highhouse & Kostek, 2013). This was by no means a new debate, considering that in 1926, in the very early stages of what would become experimental psychology, 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). In the post war years, however, a surge of new research was emerging regarding the efficacy of Assessment Centers and the results were decidedly mixed. 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 Highouse 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 use a consistent methodology. Even if psychologists did play a greater role, and a more consistent methodology was used, it is unclear whether the Instructor Cadre could 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, White, Dorsey, & Pulakos, 2005).

If we accept the fact that the outcomes of Assessment centers are not settled science (Arthur et al., 2008; Lance, 2008; Monahan et al., 2013), it enables us to consider a more multifaceted approach that goes beyond just being aspirational and instead focus on what is both possible and practical. The point is not to suggest that the Assessment Center approach is not valid, in fact, "Assessment centers are useful tools for predicting the future success of potential managers" (Klimoski & Brickner, 1987, p. 243). The point is to suggest that MCT's are selecting candidates on issues that are "broader than just task performance" (A. M. Ryan & Ployhart, 2014, p. 696). A modern MCT is looking for both aptitude and fit and requires different types of

expertise to achieve those two goals. At the same time the Instructor Cadres are at risk of repeating the mistakes the British made in using the "Magic Eye" (Ahrenfeldt, 1958, p. 52) as "Seasoned practitioners sometimes neglect to seek out new evidence because they trust their own clinical experience more than they trust research" (Pfeffer & Sutton, 2006, p. 64). The point is that whatever the solution is, it will need to be balances between experience and research.

In Summary, Historical Assessment Centers were based on the following framework.
1. Recruitment: Reaching out to any potential applicants
2. Screening: Using data from testing, job history, and interview does the Applicant meet the minimum requirements to be eligible to enter selection?
3. Selection: A three day evaluation, followed by an Assessment Board, to determine if the candidate was qualified to enter training.
4. Training: After the Candidate was selected, they left the supervision or evaluation of the psychologists and entered a period where they were trained on how to execute the job they had been selected.

Modern Context

As mentioned previously, "war is a process of continuous mutual adaptation" (Corps, 1997). The primary driver of MCT's, both now and into the future is not just adaptation, but the fact that the rate of adaptation acts as a forcing function on a number of other aspects of the MCT ecosystem (Table 8), primary of them is the fact that the way that human based systems adapt is by learning. Therefore, the faster the problem set is adapting, the faster we will need to learn. Ultimately, this will require new ways of learning and new technologies to expand joint cognition.

Table 8: Rate of Adaptation and Learning
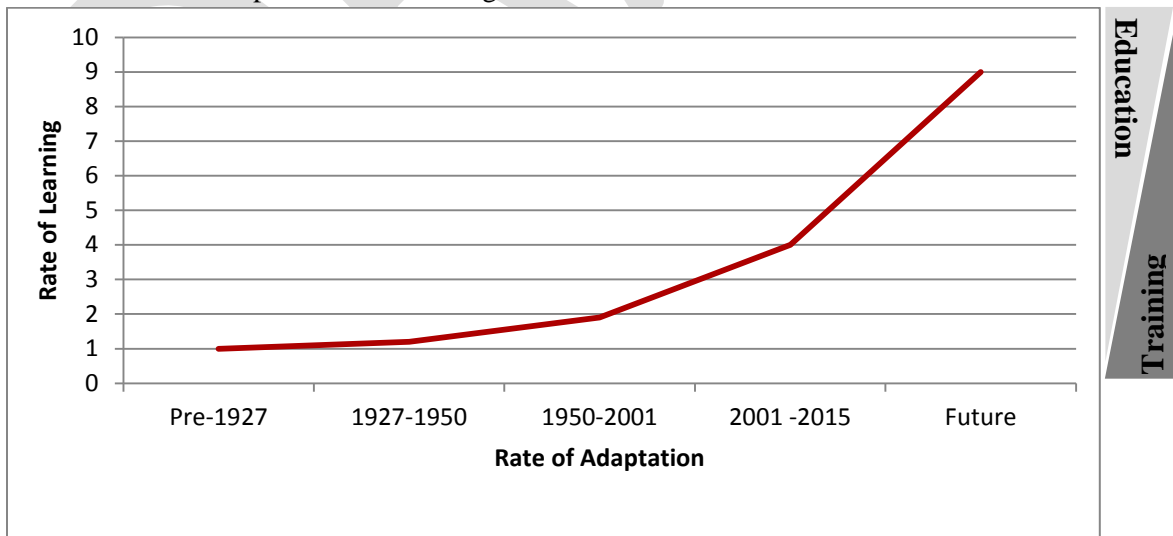
In the years following the permanent formation of the British SAS, other countries around the world would form small MCTs to resolve emergent, and immersive, complex adaptive problems sets. Complex adaptive problem sets are unique, in that unlike technical or complicated problem sets where the problems have known solutions; complex adaptive problems are problems that are both novel and are adapting in real time. As a result, they require a small integrated team of experts capable of adaptive and generative learning (Chiva, Grandío, & Alegre, 2010).

For a while now, Special Operations has been aware of the impact of Complex Adaptive Systems (Maher, 2014), but have struggled to find ways to implement sustainable solutions (Anonymous, 2014). In 2015, however, General Stanley McChrystal and a team of researchers published a book entitled Team of Teams (S. C. F. McChrystal, Tantum Collins, David Silverman, 2015) detailing the Generals experience commanding the Joint Special Operations Task Force during combat operations. Within the book he explains how when he was the Task Force Commander in Afghanistan he "began to view effective leadership in the new environment as more akin to gardening than chess" (S. C. F. McChrystal, Tantum Collins, David Silverman, 2015). The problem that he had been encountering is that the availability of vast amounts of data

"Can seduce leaders into thinking that they understand and can predict complex situations— that they can see what will happen. But the speed and interdependence of our current environment means that what we cannot know has grown even faster than what we can." (S. C. F. McChrystal, Tantum Collins, David Silverman, 2015)

The transition from technical problem sets to adaptive ones (Heifetz, 1994) has forced leaders away from depending entirely on contingency planning for every possible threat, and toward the process of building the capacity of the team to respond to whatever might emerge. In reflecting on his transition from being a chess player, examining specific technical moves, to that of a gardner who creates the environment for adaptation and success. "we nurtured holistic awareness and tried to give everyone a stake in the fight.pg 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 own the problem set.

The Mission

The actual creation of MCT's have to be viewed in the context of the problem sets they were initially created to resolve. In responding to an emergent complex problem set we created another nested complex adaptive system in the form of an MCT. In order to function effectively within that nested system however, candidates must be mindful, robust and resilient enough, both emotionally and neurologically, to thrive during periods of rapid change. A dramatic illustration of this requirement for adaptability was demonstrated during the battle of Mogadishu (Bowden, 1999).

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"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)

It was shortly after that battle that General McChrystal would be chosen to command the 2nd battalion, 75 Ranger Regiment (S. McChrystal, 2013) and the events in Mogadishu would influence his thinking about both training and leadership for years to come (S. McChrystal, 2014). Later, as Joint Task Force Commander, his experience leading a team made up of many teams would solidify his Leader/Gardner approach to command. 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 "smart autonomy" S. C. F. McChrystal, Tantum Collins, David Silverman (2015, p. 225) and "shared consciousness" (S. C. F. McChrystal, Tantum Collins, David Silverman, 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" (S. C. F. McChrystal, Tantum Collins, David Silverman, 2015, p. 225). It was the job of the gardeners to foster the optimal environment for success (S. C. F. McChrystal, Tantum Collins, David Silverman, 2015).

It turns out that what General McChrystal had discovered through years of hard won experience was also supported by a number of researchers. Scientists such as David Nadler & Michael Tushman (Nadler et al., 1982), and Daniel Katz (Katz & Kahn, 1978) have argued that "organizations can be better understood if they are considered as dynamic and open social systems" (Nadler et al., 1982, p. 36), or Complex Adaptive Systems (Arrow et al., 2000). To further support General McChrystal's theory, some researchers believe that "Ecosystems are prototypical examples of complex adaptive systems" (Levin, 1998, p. 1). With that in mind it is worth investigating the principles that underlay ecological theory to determine if they might be applied to the Complex Adaptive Systems that HRO's and MCT's are nested within. The physicist Fritjof Capra has identified eight principles that enable an ecosystem, like a garden, to sustainably grow and adapt. These systems include: networks, nested systems, interdependence, diversity, cycles, flows, development, and dynamic balance (Capra, 2005).

- **Networks:** Mission Critical Teams cannot operate in isolation; they require both partners and enablers. They depend on these relations to survive, generate innovations, and ultimately remain relevant. In fact, it is not uncommon for a Mission Critical Team to be assigned a task or a region simply because they hold the relevant relationships.
- **Nested Systems:** An operator exists within a team, a team exists within a High Reliability Organization and that organization exists within the cultural and legal context

that surrounds it. Each individual component is whole unto itself and at the same time an integral part of a larger system. Changes at any level can impact the whole and as a result, no part of the system can truly be ignored. It must be remembered however that each level of the nested system has its own culture and temporal environment. For example, the HRO may be thinking in terms of technical problems on a 3-5 year timeline, while the internal Mission Critical Team is focused on Adaptive problem on 0 to 10 minute timeline.

- **Interdependence:** Ongoing combat operations of recent years has shown that the growth of strong internal and external relationship between MCT's, their partners and their enablers has demonstrated that strong networks of strong teams are far more effective against complex adaptive problems, than strong teams alone.
- **Diversity:** The transition from contingency planning to capacity building starts by increasing the cognitive, social and experiential diversity of the team itself. The diversity of the team is directly related to the strength of their protective factors, mindfulness, robustness and resilience.
- **Cycles:** Nested systems require the ongoing exchange of resources both in terms of money, equipment, information and personnel.
- **Flows:** At every level of the system a continual flow of resources is required. In the case of both people and ideas good ones need to be constantly flowing into the system and sub optimal ones need to be flowing out of the system.
- **Development:** All parts of the system will adapt and evolve over time.   Operators must develop and learn, Teams must adapt and evolve, and parent organizations must find ways to coevolve.
- **Dynamic Balance:** One of the ways that an ecosystem maintains homeostasis is through continuous feedback loops. Even though new problem sets will emerge and disrupt the hard one balance, the feedback loops act to increase the overall mindfulness, robustness and resilience of the system. While parts of the system may struggle, the overall system will continue to thrive.

It is also important to remember that while these larger principles might help us better navigate uncertainty overall, the lived experience of a MCT is still both immersive and consequential. When an MCT crosses the event horizon, or line of departure, into a mission they are fully immersed within that experience for the duration. The nature of that alternate reality is that if they fail, the consequences will be death or catastrophic loss.

The Structure

One clear way to understand the evolving structure of an MCT is through its evolving language and culture. Over the last 70 years MCT's have developed their own unique language, rites and rituals (Turner, 1995; Van Gennep, 2011) built around a common or shared practice. These types of groups are often referred to as communities of practice and throughout history

have taken many forms, from groups of indigenous hunter gatherers to tradesman in the European Middle Ages. In fact, Navy SEAL's commonly refer to their collective members as "the community," and most MCT's refer to other teams as "Tribes." In addition, it is not uncommon for MCT's to use the symbology of Native American Tribes or Spartan Warriors, or in the case of New Zealand Special Operations, to have a very unique relationship with Maori people. Because the term "tribe," is both a created term (Fried, 1975), and connotes notions of kinship and spirituality, the educational research term of community of practice is more appropriate. With that said, by examining the way in which indigenous people study their own way of knowing, like that of the Maori's "Kaupapa Maori" (Walker, Eketone, & Gibbs, 2006), we may be able to better articulate the teams often hard to describe tacit truths.

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). One of the core principles of a community of practice is that "competence is historically and socially defined" (Wenger, 2000, p. 226), which is why within MCT's status is most often "conferred by expertise and not rank" (Jacobs & Sanders, 2005, p. 13).

"There are three elements to be considered competent in a community of practice. First you need to understand what the mission of the community is and be willing to hold yourself and others accountable to its success. Second, there needs to be ongoing mutual engagement focused on developing norms and relationships that strengthen the community. Lastly, the community needs to develop a shared language, tools, stories, etc. and individuals need to know how to navigate them appropriately." (Wenger, 2000, p. 229)

By reframing the Instructor Cadre as a Community of Practice, who is focused on both talent identification and evaluating fit, we are able to legitimize the fact that these Instructor Cadres are made up of the community's elders (McIntosh, 2009) who represent unique "Funds of Knowledge," which are "historically accumulated and culturally developed bodies of knowledge and skills" (Moll, Amanti, Neff, & Gonzalez, 1992, p. 133). These funds of knowledge represent more than just a collection of old stories, they are also represent the essential elements necessary for a community of practice to function effectively. Evidence of the impact of these funds of knowledge can have on an MCT Selection Cadre 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 when you consider that during those 22 years they were part of at least 8 major conflicts, it begins to make sense. Communities of Practice, like that of the Special Forces Instructor Cadre rely heavily on the oral tradition to pass on institutional knowledge from senior operators to newer operators. 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.

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The average profile of a modern MCT's candidate is a 25 year or older, generally male, professional that has achieved a certain level of expertise. This profile is significant because there is compelling research to suggest that it takes until around age 25 for the adult brain, specifically the prefrontal cortex, to completely form (Lenroot & Giedd, 2006; Spear, 2000). In the context of MCTs, this is consequential for two reasons. The first, is that 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; Cline, 2014) which means that the team can rely more on principles than rules which is critical for the rapid resolution of complex problems. The second has to do with the neuroplasticity of adolescent vs adult learners. According to Generative Learning Theory (Wittrock, 1992) new information coming into the adult brain must be integrated into the existing neural network. Adult learners have denser neural networks which means that it takes longer for new information to become integrated into the neural networks (Wittrock, 1992). Generally speaking this means that adolescents can remain focused on knowing a thing, while Adults a required to understand the thing.

This might be better understood through the metaphor of moving furniture into a house. Imagine for a moment that you have just won a whole new set of furniture for your house. For the younger learner, the metaphorical house is mostly empty, so you can put the new furniture wherever you want right away. With adult learners, however, you have already furnished your house. This introduction of new furniture forces you to decide whether you want your current couch, or your old couch. Not only that, but in many ways it is not just a couch as it fits with the table, the lamp and the rug. You have to figure out if the new couch fits as well, or will you have to replace the other furniture to match. The more furniture in the room, the harder it is to integrate new furniture. For example, you might already have an existing habit or belief around how to aim a weapon. When someone introduces you to a superior idea or habit, it must be integrated into the same neural network that held the old habit or belief. The old couch may not be as functional as the new couch, but it is really comfortable.

This is the challenge of adult learning; the adult brain is already fully furnished. Every time new stuff, or ideas, arrive it has to be integrated into the existing mental models, and this rearranging creates both discomfort and a certain amount of incompetence. Often, in an effort to compensate, some candidates will try to predict what is happening in training or what the operators often call "choreographing." This strategy will often lead the candidate to pause at crucial moments as they try to reconcile the reality of their situation with their alternate expectations of the situation. The expression that many of the Instructor Cadre's use is a purported quote from the boxer Mike Tyson "Everybody has a plan until they get punched in the mouth."

The notion of cognitive or emotional dissonance is important because a candidate within the MCT selection pipeline is already an expert 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

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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, within the timeframe required.   Not only is the rate of learning, or relearning, critical but it is also important how learning effects the 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).

When they enter the selection process, some of those same mental models actually slow them down, as they do not match the new skill set being requested. As a result, one of the things being implicitly tested is whether a candidate has both an effective rate of learning and whether they can adapt their neural architecture fast enough, while also maintaining their focus and confidence. Fundamentally, these are not tests of courage, or entrepreneurship, or character, but of neural adaptability, a minimum rate of learning and previously developed protective factors (Waller, 2001). While these latter selection criteria may not be the only criteria a team is looking for, without them the former criteria will not be enough. The point of this is that many of what is currently considered tests of attributes may in fact be tests of neural adaptability and robustness. And as a result, we may not need evaluators as much as we need master coaches (Coyle, 2010).

The Candidate Lifecycle

While many of the terms associated with the MCT lifecycle have remained the same, their interpretations have changed significantly. When the OSS spoke about selection, they were primarily speaking about using a three and half day assessment for membership into an organization. Once "selected" the candidate would attend several weeks of training and then be deployed. In a modern MCT, the line between Selection and Training has mostly been erased and overall the process has become much harder, longer, and more sophisticated (Table 9).

Table 9: Modern Candidate Development and Assessment Lifecycle

		Candidate Development & Assessment Lifecycle (Selection is ongoing)								
	Stage	Intake (Separation)			Development & Assessment (Liminal Stage)					Incorporation
	Phases	Recruit	Test	Screen	Induct	Select	Train	Educate	Crucible	Transition
Domains	Emotional									
	Intellectual									
	Moral/Ethical									
	Physical									
	Psychological									
	Social									
	Team									

The above table has been broken into the three stages associated with an anthropological rite of passage, separation, liminality and incorporation (Van Gennep, 2011). In one form or another all MCT's have some sort of Rite of Passage (Jacobs & Sanders, 2005, p. 18). The separation phase is to indicate that if a candidate chooses to enter the selection process of an MCT, they must leave their old life, and old identity, with no guarantee of success. The liminal stage refers

to the idea of "liminality"(Van Gennep, 2011) which literally means threshold and describes the place "betwixt and between" (Turner, 1995, p. 107). It is relevant here, not only because for the time candidates are in selection they are between roles, but because MCT operations happen in temporally constrained (10 minutes or less) liminal spaces. Lastly, reincorporation means that upon rejection or completion of the selection and training pipeline the candidate is reincorporated into both a community and an identity.

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.
2. **Stage Two: Development & Assessment (Liminal Stage) –** Increasingly, this phase recognizes that even if the candidate does not meet the standards, they should go back to the parent organization better (in some way) than when they entered the process.
   a. **Induction:** The exposure to unique culture of the MCT. "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:** According to the U.S. Army Command and General Staff College, training is for certainty and education is for uncertainty (U. S. Army, 2012; Draude, 2011). This is an important distinction both as it recognizes the evolution of the problem set but also because these are distinct processes that allow the team to assess the candidates' rate of learning.
   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 – Incorporation -**At this point the candidate leaves the liminal stage to move on to a team, either the one they are returning to or the one they are headed.

a. **Transition** – This marks the end of the Development & Assessment pipeline and is usually in the form of an exit interview or graduation.

If a candidate fails their selection program, they do not leave the larger High Reliability Organization. Therefore, the parent organizations need to recognize these communities of practice as learning communities. Everyone who enters their screening pipeline should be improved by the process, whether that person is a good fit for the team is a separate question. The point is that, much like the OSS model created by Murray where a diverse group of experts where brought together, current MCTs require a multi-disciplinary approach where the perspective of the individual cadre members, the Community of Practice, is recognized as legitimate as the consulting psychologists.

The Instructor Cadre

During each iteration of the Wehrmacht, the British, and the OSS evolution of the Assessment Center approach, a new instructor cadre was formed without history or mythology. Since those first days, many generations of Instructor Cadres have passed through the halls of the MCT's represented within this study and those cadres now have established standards, a shared history & Mythology and a unique way of knowing.

When we think about an MCT as a community of practice we need to consider that their epistemological framework (or way of knowing) is often divergent from an academic way of knowing. It needs to be understood that an operators way of knowing is situated within the culture of the community, in a similar way to a traditional tribal way of knowing (Bishop, 1995, p. 224). In addition, it is more often than not experientially based knowledge, which according to Heron and Reason manifests in four different ways (Heron & Reason, 1997, 2006).

- **Stage 1:** The stage of **Propositional Knowing** which is to know "about" something, a theoretical understanding, like knowing the about swimming without knowing how to swim. This stage is one of reflection, observation and discussion as the researchers cooperate in determining the topics and methods of inquiry. Mostly, it was my opportunity as an outsider to test assumptions and prior beliefs.
- **Stage 2:** The state of **Practical Knowing** which is about knowing 'how to' do something, like knowing how to swim. It is expressed through skill, competence or expertise. It was here we determined if the reality of the lived experience matched the assumptions in Stage one. Often it was done by having discussions with elders of the community.
- **Stage 3:** The stage of **Experiential Knowing** that represents the perceived lived experience. As this research was conducted during a time of war, both training and operations continued, which meant that the ideas being explored in Stage 1 & 2 could be tested against actual events. It was often these experiences that would validate or end a specific line of reason.

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- **Stage 4:** The stage of **Presentational Knowing** which emerges from experiential knowing often in the form of stories that team members tell about their experiences to make shared meaning of them. MCT's by their very nature are communities that transmit information through stories. It was through stories that we would communicate the nature of this research to determine if something we said struck people as odd (dissonant) or normal (congruent).

To properly understand Reason and Heron's models of cooperative inquiry, they must be understood as a matrix of variables that combine in multiple iterations. The nature of the iterative process is the exchange of language and the use of new language "to make the tacit explicit" (Ravitch, 2015). It is not uncommon for a cadre member to exclaim "that is the word I have been looking for!" to describe a phenomenon they have observed for years. In some cases there were epiphanies as members would suddenly have new words to describe an old phenomenon or obtain access to a new perspective they had never experienced before. It was here that we would solidify or reframe the topics and methods of inquiry in a process that moves back and forth through the phases as we continue to align our way of knowing and our implicit assumptions.

Research Methodology

This process of observing the development and assessment programs of a number of MCT's took place between 2008 and 2015. Given the secretive status of these organizations the only way to enter is to be recommended by an existing member, and for this reason it was necessary to use "Snowball" or "Chain Referral" sampling methods, where a key informant of one team would refer me to a key informant of another team and so on (Robson, 2002, pp. 275-276). In most cases it was these same key informants that would later become collaborative research partners for this study. In each case the key informant was a senior member of their teams Screening and Training Instructor Cadre. Given that the initial goal of my research was to observe the interactions between the candidates and the instructor cadre I was typically provided a list of attributes or traits the Instructor Cadre was using to evaluate the candidate. Then one day, after collecting five or six of these lists of attributes I decided to line them up against one another and was somewhat surprised how similar they were. Given that I had already identified a number of shared characteristics between the teams it seemed reasonable that they might also share some core attributes or traits. With this in mind I reached out to the key informants that I had been working with and explained the potential research project. While they were all supportive of the potential research project two concerns were consistently mentioned. First, the teams had 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 the findings. Secondly, there was a concern about the qualitative reliability of the traits or attributes as they were interpreted differently by each team.

In order to address the first concern, given that the project was a collaborative inquiry process between established communities of practice, I decided to use the collaborative inquiry model developed by the Maori communities of New Zealand called Kaupapa Maori (Walker et al., 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). The Kaupapa Maori 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. While MCT's are neither Maori, nor indigenous people, the principles were created to honor a unique way of knowing.

a. **Initiation:** Who initiated the research, why did they initiate and what are the goals?
b. **Benefits:** What and who benefits from the research? How will this help specifically help the teams?
c. **Representation:** Whose voice is heard, who does the work, whose interests are represented, who can edit the data?
d. **Legitimation:** Who defines what is accurate, true and complete in a text? Who constructs theories to explain the findings?
e. **Accountability:** Who is the researcher accountable to? Who is to have accessibility to the research findings? Who has control over the distribution of the knowledge?

By using these principles, the goal is not to recreate the Maori process but rather to use this framework to insure that the teams who are participating in the research are both intimately involved in the research process and authorized to influence the process.

The second concern regarding inter-team trait reliability is a concern about both the traits themselves and the descriptor terms used to define the trait. While it is easy to understand how two teams might define the attribute of "Maturity" differently, it is more complicated to understand why or how the descriptor terms related to "Maturity" might evolve. For example, in the original data, four of the 11 teams had "Maturity" a trait used in selection. The terms the teams used to define "Maturity" included:

- "Immediately adapts to changing situations/unexpected events (e.g., easily shifts mindset and does the course backward)"
- "Is open and receptive to feedback from others"
- "Admits mistakes and takes responsibility for actions"
- "Not overly cynical"

Yet, upon closer examination and a more thorough conversation what is discovered is that for at least one team, the attribute of "Maturity" was part of the "fossil record." Meaning that it was a trait that had been developed in previous generations and the culture of tradition had prevented it from being updated. So the team had simply kept the term, but changed the definition to match the attribute "Adaptability." Given the twin challenges of language interpretation and evolution, there needed to be a way to benchmark all of the terms against one another. To this end each of the team attributes were benchmarked against the definition of that word in the Oxford English Dictionary(OED) (Simpson et al., 1989). Due to the international nature of the teams in the study, the OED was chosen as a source document both because it was the original English dictionary as well of the fact that it was tolerant of the cultural nuances of language. As a result, all of the teams who listed the trait of "Maturity," for example, had the opportunity to determine if what they meant was Maturity: Deliberateness of action; mature consideration, due deliberation (Simpson et al., 1989). Ultimately, this process led to the decision to use grounded theory when evaluating the teams screening attributes. Grounded theory is based on the idea that any theory about the data must emerge from the data through a process of investigation and constant comparison (Robson, 2002; Schwandt, 2007). In other words, the goal is not to adopt an academic interpretation of the attributes, but uncover what the teams actually mean by constantly comparing the evolving codes back to the original attributes.

Once we satisfactorily resolved the initial concerns, we went about obtaining 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). It should also be noted that 9 of the 11 teams are what one key informant calls "destination teams" (Anonymous, 2014). They represent the last stop, or terminal destination, in

the team screening and training pipeline for operators within their own HRO. It is also true that most of these teams are the first asset that is used in response to a national emergent threat, but for our purposes it is their position at the terminal end of the training pipeline that is relevant. In some cases acquiring the traits meant that command approval was required and obtained, in other cases the information was not seen as sensitive. In all cases the identity of the key informant and the associate team will be kept anonymous, to mean that no one other than the author (including the teams) will have access to the raw data (Miles et al., 2013, p. 63).

Lastly, the question of participation needed to be resolved. How often and where would the key informants participate in the process? The intent was for all of the key informants to be fully participative, the constraints were that the original data for each team needed to remain confidential, and the key informants were all over the world and still part of active and unpredictable tactical operations. Therefore, the proposal that we agreed upon was that the coding process would be broken down into distinct coding cycles (Saldaña, 2012, p. 58) and that at the end of each cycle each team would have the chance to evaluate the development of the codes against the original intent of the submitted attributes. Their replies were often in the form of emails that were then filed as analytic memo's (Saldaña, 2012, p. 41). These memos and the subsequent discussions they generated were continued until everyone involved felt that the current evolution of the codes were consistent with the original intent of the submitted attributes.

Study Design

Once I received the screening attributes from all 11 teams, each of them was placed in a separate excel file. The data that the team submitted included a list of attributes as well as the descriptor terms used to define the attributes. The descriptor terms came in one of three forms, Behavioral Anchors, Attribute Descriptor words/phrases, or a Foundational definition. For example, a number of teams cite "Discipline" as an attribute they are screening for, but define that attribute in a different format:

1. **Behavioral Anchors** (Schwab, Heneman, & DeCotiis, 1975) "Discipline"- Does job well even if menial, Completes all tasks thorough and competent regardless of importance, consistently reliable.
2. **Attribute Descriptor words:** "Discipline" – Dependable, Self-reliant, Self-controlled, Attention to detail.
3. **Foundational Definition:** "Discipline"- The ability to control and direct ones activities to achieve a desired outcome (Simpson et al., 1989).

One challenge that remained unresolved in this research was the question of how to properly align those different formats. Behavioral anchors actually reference different screening methodologies than those referenced by descriptor words, for example. While it is beyond the scope of this paper, the use of different formats have significant implications for the interpretation of screening competencies (Dooley & Lindner, 2002; Hatcher et al., 2013).

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Upon receiving each team's data it was formatted and copied directly into a separate excel spreadsheet to maintain the integrity of the original. The data were then copied onto a second sheet in the same file to be prepared for *coding* (Saldaña, 2012) by taking all the words that described the attributes so as to partition them into discreet concepts (Miles et al., 2013, p. 285).

First Cycle Coding

The original raw data provided 148 attributes and 2,219 descriptor words. This raw data had to be further refined because the nature of how it was presented would prevent it from being appropriately evaluated during the first round of member checks (Saldaña, 2012, p. 35). For example, some attributes came in the form of a statement such as "Emotional Intelligence over Intellect" or a combination of attributes such as "Physical & Mental Robustness," which referenced several attributes. In addition, different teams used variations of the same word which needed to be condensed. For example, the attributes of "innovator," "innovation," and "innovative" were all condensed to the common code of "innovate." The term condensing indicates that the goal of the coding process is not to reduce the data, but to make "the data stronger" (Miles et al., 2013, p. 12). To determine which of the attributes would become the dominant code I used the OED to benchmark the root version of the attribute. Once that was done, the new codes were sent back out to each team to review and compare against their original attributes.

First Cycle Member Check

A member check is a tool that researchers use to insure that they are maintaining fidelity to the original data, by regularly having their work evaluated by their research partners (Miles et al., 2013). Given that the study represents 11 teams, in 5 different countries, some method to standardize the meaning of the attributes was required. This need for standardization led to the creation of a master glossary (included in the appendices) based on the Oxford English Dictionary (OED) (Simpson et al., 1989) to define each attribute. Upon receipt of the first cycle codes the key informant was asked to verify that the codes were representative of the original attributes. If not, they were asked to provide specific edits to represent a more accurate representation of the key concept. Upon receipt of the member's feedback, the data were then reedited based on the recommendations of the key informant. 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. In other words, as you can see in Table 10, ten of the teams shared "Adaptability" as a trait while only seven teams shared "Agency."

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Table 10: First Cycle 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		

Second Cycle Coding

   As mentioned previously, one of the challenges with the data is that due to cultural evolution the attribute and the descriptor words may no longer be aligned. Therefore, I decided to take all of the attributes, and their descriptor terms and combine them into one long column. The intent of this step is to remove the threat of cultural artifacts. Once the data were combined into one long list, the attributes were clustered together (Boyatzis, 1998, p. 136; Miles et al., 2013, pp. 279-280) using thematic analysis (Robson, 2002, pp. 467-470) based on obvious synonyms. Once the clustering was complete, the next step was a process of Pattern Coding "Pattern codes are explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation" (Miles et al., 2013, p. 86). The goal here was to combine very similar concepts, or even synonyms, under one attribute. For example, I placed: "no such thing as no," "stay with it,", "tenacity," under the attribute "perseverance." At the same time, some teams might use the same descriptors for the screening attribute of "Drive." As the goal of the research is not to evaluate which term is superior, the solution was to find which term was more inclusive of both concepts. To do this I used the OED to determine which term had etymological authority. For example:

   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).

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

The term "Drive" includes the word persistence in it and "Persistence" is a derivation of "perseverance" (both emerging from the Latin *perseverantia*). Therefore "Drive" was chosen as the dominant attribute to include both "perseverance" and "determination."

In one case, a neologism (new word) "Feedbackology" (Kaufman, 2015) was required as no existing word captured the ability to give AND receive feedback. This process brought us to 70 unique attributes and 1,700 descriptor words. Because of the way the coding process works, certain traits might emerge multiple times. For example, a team might want a candidate to be both physically and mentally adaptable, so "adaptable" would appear twice in their data, which is why 11 teams can produce 30 cases of the trait "adaptability" and 454 total traits. As with the first cycle, the attributes were ranked by the number of times they appeared in the second cycle of coding as you can see in Table 11.

Table 11: Second Cycle Coding

							Bias for		
30	Adaptability	9	Assiduous	4	Action	1	Aspiration
19	Drive	9	Bearing	4	Candor	1	Curiosity
16	Autonomy	9	Initiative	4	Dependable	1	Grit
16	Communicative	7	Character	4	Principled	1	Maturity
15	Diplomacy	7	Discerning	4	Professional	1	Motivation
15	Proficient	7	Unpretentious	4	Solver	1	Resourceful
15	Fitness	6	Resolve	4	Toughness	1	Situational Awareness
14	Judgement	6	Followership	3	Contribute	1	Cooperative
14	Leadership	5	Agency	3	Courage	1	Creative
14	Intellect	5	Aggressive	3	Loyalty	1	Decisive
13	Aptitude	5	Confident	3	Rational	1	Entrepreneurial
13	Service	5	Discretion	3	Restraint	1	Patience
12	Emotional Stability	5	Fortitude	3	Trust		
11	Discipline	5	Innovator	2	Determined		
11	Integrity	5	Positive	2	Endurance		
11	Mindfulness	5	Proactive	2	Humor		
11	Teamwork	5	Feedbackology	2	Modest		
11	Trainability	4	Accountability	2	Resilient		
10	Peer Acceptance	4	Assertive	2	Robustness		

Second Cycle Member Check

The second cycle member check included the second cycle coding in the context of an early draft of this paper, absent of a conclusion to allow for their unbiased input. It was important for the key informants to not only comment on the fidelity of the emerging codes to their initial

attributes, but to also see them in the context of this paper. In this way, they were able to comment on both the attributes, as well as the theories that were being developed alongside of them. As in the first cycle, each key informant was given an opportunity to comment on the work and suggest changes. In most cases the changes were accepted immediately. In cases where there was either conflict or ambiguity, the key informant was engaged in a discussion to clarify their comments and intentions. Additionally, the paper was distributed to certain academic researchers who are part of, or oversee, my doctoral work to insure that the writing is maintaining the necessary academic rigor.

Third Cycle Coding

Once all of the feedback from the second cycle member check was processed, the data were then coded for a third time to place similar attributes under one category (Saldaña, 2012, p. 9) with the goal of reducing them to a list of 20 attributes 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.

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

While some of the above terms are going to be familiar to the teams their specific definitions are included in the glossary, some require more explanation.

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.

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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 (Schwandt, 2007; Simpson et al., 1989). 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.

Final Member Check

The final member check is the distribution of this paper in its final draft form for validation. This includes both the data analysis and conclusions. It should also be noted that at the conclusion of the second member check, the reviewers associated with University of Pennsylvania recommended that I expand the section regarding my positionality. Ultimately, this led to the decision to include the story of Rob Reeves and Heath Robinson. It needs to be understood that the use of their names in this research was not undertaken lightly. Before sending out the final member check, I reached out to several members of Rob and Heath's community to ask them to review the writing and insure both accuracy and appropriateness. It was done with the understanding that if they had any objections I would remove the story in its entirety. After reviewing the story, and correcting some inaccuracies, they agreed that it was appropriate to use.

Findings

This study shows that MCT's do share a number of screening attributes, lead among them being "peer acceptance" which appears to substantiate the theory that MCT selection has evolved from a selection based on task and role to selection based on being a good fit for their community of practice. In addition, interviews and observations with the teams seem to indicate that certain implicit attributes, such as Rate of Learning, Sense of Humor, ability to engage in reversal learning should be made explicit and tested to determine if they can be positively influenced.

In regards to whether MCT's should still rely on trait theory as the foundation of their screening and selection process, the answer seems to be more complicated than yes or no. Unlike the traditional Assessment Centers, modern MCT's have existing cultures and shared mythologies that have been passed down through the generations, which means that there are now competing priorities related to selection. 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 unanimously no, they would not accept them. Where it gets complicated is when the opposite situation is asked. 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 proficiencies, would you take them? The answer was that "it depends." The point is that trait theory still has value to the community, but that it is ineffective if used in isolation. As modern MCT's are seeking both aptitude and fit in their candidates, they are going to require applied theoretical models that go well beyond trait theory alone.

Data Analysis

Given the numerous studies that have been done on trait theory and assessment centers, the question needs to be asked, how is this study any different than previous ones, and how can anyone be sure this is just not another exercise of exchanging synonyms, like tenacity and perseverance, to make the research team feel as though it has accomplished something? Furthermore, why should the teams invest any more time in searching for the "ideal" attributes in the context of a highly dynamic and complex human-based system? While there is no perfect answer to these questions it has to be remembered that the Instructor Cadre is tasked with assessing and developing the next generation of operators who are likely to face their own September 10th problem. If we are going to move beyond the transactional and into the transformational we are going to need to continue to find innovative ways to develop the capacity of the team. To do that we are going to need to find ways to identify and influence the characteristics that make great operators. Trait theory and assessment centers can still contribute to that goal.

As we examine the attributes that were submitted it is helpful to first examine them in contrast to both the original attributes of the OSS and then against a long-established and respected conventional military screening program such as the U.S. Marine Corps Officer Candidate School. Lastly, it is important to recognize that as MCT's have evolved they have transitioned from the whole man approach of determining if an individual is capable of executing a certain job to examining a candidate against a number of attributes that go beyond the intellectual, physical and emotional. This matters because we need to know what attributes we can, or want to, influence and attributes which will remain static.

Comparison Group: Office of Strategic Services (OSS)

It is worth remembering that the OSS was selecting for "The task was to measure the readiness of selected men and women for special, often hazardous duty, most of it behind enemy lines" (Handler, 2001, p. 560). These individuals would often be alone and isolated trying to gather intelligence or coordinate local resistance. With that in mind, when the original OSS Attributes are compared to the current findings it looks as follows (Table 12):

Table 12: OSS attributes comparison to MCT's

MCT Attributes	First Order	Second Order	Implied
Peer Acceptance		Social Relations	
Adaptability			
Drive		Motivation for Assignment	
Professional			Security
Bias for action		Energy and Initiative	
Aptitude			
Integrity			
Toughness			
Agency			
Communicative			Propaganda Skills
Mindfulness		Emotional Stability	
Discerning			
Discipline			
Leadership	Leadership		
Accountability			
Fitness		Physical Ability	
Confident			
Loyalty			
Trust			
Courage			

First Order Matches: These are considered direct matches. While leadership is a direct match, because the OSS referenced other attributes in their definition of leadership: "…a man's ability to take the initiative in social situations, to plan and organize action, and in so doing to evoke cooperation" (O. o. S. Services, 1948, p. 301) it makes difficult to isolate specific attributes as singular variables.

Second Order Matches: These are attributes that showed up in the first cycle of coding that became clustered under the final codes. It suggests that some MCTs also share these attributes. Social Relations, Energy and Initiative, Physical Ability all track consistently to the attributes included in MCTs, and much like the second order attributes for the USMC OCS are reasonable pre-requites for interacting with complex adaptive problems sets. Both Motivation for Assignment and Emotional Stability, however, create an opportunity for clarification. Motivation for Assignment is a term that the OSS used to determine why someone wants to even work for the OSS. While it is beyond the scope of this paper, it begs the question as to what is the primary motivation for someone to choose to enter a MCT. Emotional Stability, is a term that I have coded into Mindfulness, but it is worth remembering that the reason that the OSS selection program was created was because a number of operators had "dramatic mental crack-ups"

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(Banks, 1995, p. 49). This is important, because the OSS was building a selection program to resolve a current flaw in their system. They were looking for people who would have a less of a chance of failing. In today's MCT, that assumption is baked in and we are now looking for individuals who are able to maximize their own potential.

Implied Matches: These are cases where the word does not directly show up in the codes, but is a clear synonym for one of the codes. Both Propaganda Skills and Security speak to communication and discretion respectively. In this context discretion is more than just remaining the unpretentious quiet professional; it is also about having the right expectations around communication, no communication and miscommunication.

No Matches: The MCT traits that are not explicitly talked about in the OSS Attributes (Adaptability, Aptitude, Integrity, Toughness, Discerning, Discipline, Accountability, Confident, Loyalty, Trust and Courage) are certainly implied within their research. The one exception to this is Agency, which is more of a modern research concept that was not available to researchers in 1948. On the OSS side as mentioned earlier both Effective Intelligence and Observing and Reporting are more catch all attributes that are represented amongst the other MCT Attributes.

In regards to the attribute "**Effective Intelligence**" it should be noted that it was created by the OSS to describe a number of criteria, including memory, judgment, leadership and persuasiveness (O. o. S. Services, 1948, p. 270). In recent times it is more often associated with the concept of Coup d'oel, a term that Napoleon used and Clausewitz (Clausewitz, 2004) built upon. Specifically it relates to strategic intuition or that flash of insight followed by the will to act upon that insight (Duggan, 2005). This is worth mentioning, because two of the teams within this study still use it as an attribute. The significance of this lies in the fact that when the OSS researchers originally developed the trait of effective intelligence it was split the trait into two categories Afferent & Efferent. Afferent deals with "the collection, analysis, interpretation, and reporting of information (O. o. S. Services, 1948, p. 267), While Efferent dealt with "the planning, teaching, and execution of physical acts" (O. o. S. Services, 1948, p. 267). Decades later Daniel Kahneman (Kahneman, 2011), would label them as systems one and systems two thinking. System one, what Gary Klein would term a naturalistic decision making process (Klein, 2008), functions "automatically and quickly, with little or no effort and no sense of voluntary control." System two, on the other hand use a deliberative or analytic decision making process (Slovic, Finucane, Peters, & MacGregor, 2004).

These theories are analogous to recent theories of duel system decision making which state that those differences are not simply different ways of thinking (the software) but actually use different parts of the brain (the hardware) (De Neys & Goel, 2011; Evans & Stanovich, 2013). Why this matters in the context of screening and selection is because it is unclear whether different parts of the brain learn the same way and as the problem sets become more complex our need to be able to access both systems are increases.

The original Assessment Centers were founded to build the Wehrmacht and British officer corps for their conventional military forces. It stands to reason that given the relatively recent introduction of MCT's that a modern unconventional operator differs in some way from a modern conventional officer. With this in mind the United States Marine Corps (USMC) and specifically their Officer Candidate School (OCS) presents a compelling comparison group for this study as they are widely respected for the emphasis they place on character development and their expertise as a conventional fighting force. Founded in 1775, by a University of Pennsylvania Graduate (Samauel Nichols), the United States Marine Corp was initially tasked with amphibious raids, sharpshooting, and pirate interdiction (Branch, 2001). As such, it is reasonable to consider them the United States first unconventional warfare unit, perhaps even the first MCT. Over the last two hundred years, however, their mission has become a much more conventional one. When it comes to selecting their officers, for most of the Marine Corp's history there was not a program of screening and training that we would expect today. It wasn't until 1911 that Major General Biddle would require a two month training program for new recruits that a formal screening and training process would emerge (Branch, 2001). Up until 1949, the process of selecting officers was primarily based on college graduation, or in the case of Non Commissioned Officers, the recommendations of a commanding officer. In 1949, the U.S. Marine Corps Instituted a formal "Officer Candidate Screening Course" (Butler, 2014). This program was heavily influenced by the principles that the OSS had created and published within the book the "Assessment of Men" (Butler, 2014, p. 2), including the use of the OSS attributes. The reason that the new program was created was that the year prior, one-third of the "former enlisted men who entered The Basic School failed to complete the course of instruction satisfactorily. Those who failed were deficient in educational and cultural development, in strength of character, in motivation, and in leadership ability" (Butler, 2014).

The program was discontinued in 1953, but the USMC continued their "time honored policy of offering commissions to outstanding enlisted men" (Nalty, 1970, p. 20). By 1995, the U.S.M.C. had solidified the following core leadership traits in the field manual entitled "Leading Marines" (Corps, 1995).

- Justice
- Judgment
- Dependability
- Initiative
- Decisiveness
- Tact
- Integrity
- Enthusiasm
- Bearing
- Unselfishness
- Courage
- Knowledge
- Loyalty
- Endurance

These continue to be the traits that are used to assess candidates at the U.S.M.C. Officer Candidates School as future leaders of a modern sophisticated conventional army.

In comparing the shared attributes of MCTs against the Leadership Traits of the U.S. Marine Corps it looks as follows (Table 13):

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Table 13: USMC-OCS trait comparison to MCT's

MCT Traits	First Order	Second Order	Implied
Peer Acceptance			Unselfishness
Adaptability			
Drive		Endurance	
Professional			
Bias for action		Initiative	
Aptitude			Knowledge
Integrity	Integrity		
Toughness			
Agency			
Communicative			Tact
Mindfulness			
Discerning		Decisiveness/Judgment	
Discipline			
Leadership		Bearing	
Accountability			
Fitness			
Confident			
Loyalty	Loyalty		
Trust		Dependability	
Courage	Courage		

First Order Matches: The MCTs that are in this study, are all either military or para-military organizations, so it stands to reason that **Integrity**, **Loyalty**, and **Courage** would all have a direct match for these U.S.M.C. Characteristics.

Second Order Matches: These include **Endurance**, **Initiative**, **Decisiveness**, **Judgment** and **Bearing**. Much like the first order matches; it stands to reason that both a conventional force as well as MCTs would require these attributes as war itself equalizes the need for certain attributes. With that said, it is here that significant differences begin to emerge. As mentioned previously, the U.S.M.C. is legendary for their development of future leaders, but it needs to be said that they are doing that within a very specific context. For example, the way that the U.S.M.C. conceives of initiative is not the same way that an MCT would. When the U.S. Marine corps talks about initiative they define it as "taking action in the absence of orders" (Corps, 1998, p. 15:19Appendix A). Yet their example is telling: "In the unexplained absence of the platoon sergeant, an NCO takes charge of the platoon and carries out the training schedule" (Corps, 1998, p. 15:19Appendix A).

The key to understanding that example is to understand that a Marine is supposed to take initiative within the context of their rank and the preexisting "Commander's Intent." The commander's intent, is a written or verbal message that a commander provides to subordinates informing them of both the context in which they are operating and direction on how to best

exercise judgment and initiative if they are forced to move away from the original plan (Corps, 1997).

"A Marine leader does not focus on mission execution for the sake of accomplishing the mission. If things change and the mission is no longer germane, he or she focusing on taking actions that meet the commander's intent. (Van Opdorp, 2015)"

In an interview with a leader of one of the MCTs in this study, who also was a U.S. Marine Corps officer in a former career, they explained that when the U.S.M.C. is selecting for a potential leader, it is to operate in very hierarchical conventional military structure. When a U.S. Marine acts, there are very large systems grinding forward behind them and whatever innovation they pursue must also be in concert with, and supportive of, the enormous machine they are an integral part. MCTs, however, will for the most part seek out divergent thinkers (Woodman, Sawyer, & Griffin, 1993) as they require operators who may be operating autonomously for long periods of time, in highly dynamic settings, and constantly innovating (Anonymous, 2014). In the context of conventional warfare those requirements create far too much friction and chaos for a large organization like the U.S.M.C. to tolerate.

Implied Matches: This includes **Unselfishness**, **Knowledge** and **Tact**, as professional organizations that must interact with other agencies to accomplish their mission; it stands to reason that both groups require knowledge and tact. In terms of unselfishness, this is a term that tracks directly to the trait of peer acceptance as selfish candidates tend to be excluded by their peers. One of the criteria considered within the U.S. Officer Candidate School are the candidates peer evaluations. It is also important to understand, that in the same way that MCTs use operators to screen for future team members, the U.S.M.C. uses non-commissioned officers (NCO) to implement the Officer Selection process. The reason for this is because the NCO's have to be willing to be led by the officers that graduate from the program. One of the strong similarities that the U.S.M.C. has with MCTs is their commitment to a very strong culture, the core of which is peer acceptance.

No Match: As one would expect there are 'no matches' on both sides. For the U.S.M.C., the terms **Justice** and **Enthusiasm** unique to their culture and mission and speak to a traditionally rigid military hierarchy. In terms of the lack of matches to the attributes found in the final coding of this research, they tend to fall into two categories. The first category is attributes that can be considered to be assumed by the U.S.M.C. such as Professional, Toughness, Discipline, Accountability, Fitness and Confidence. From the perspective of the U.S.M.C., you may not have these attributes when you arrive at O.C.S., but if you intend to graduate you will develop them, because they are part of the U.S.M.C. culture.

The second category are the three attributes that are universally true for MCTs, but are not universally true for the U.S.M.C.; **Adaptability**, **Agency**, and **Mindfulness**. These terms must be examined from where they reside on a continuum of extremes. The point is not to suggest that individual marines do not possess these qualities, but that they are not the dominant values

of the organization. Adaptability, in an MCT context, does not simply mean being flexible or being good at solving problems, as Marines are well trained to find solutions around challenges, it is about being able to evolve as fast as the problem set is evolving and innovate in real time. In fact, the culture of the U.S.M.C. encourages adaptability within the construct of the commander's intent. Depending on where you are on the chain of command, that construct can be either narrow or broad given that the larger system can only tolerate a certain type of innovation before it starts creating too much friction. In terms of **Agency**, this refers to the capacity for human beings to make choices and to impose those choices on the world. In the context of the U.S.M.C. this is significantly restricted by the nature of both the Mission and the Culture.

 "The Marine Corps' vision of warrior-leadership had evolved into being less concerned with rank, self-identity, recognition, or privilege. The emphasis had refocused on the essence of the Corps: the individual Marine as part of a greater whole; coupled with the unyielding determination to persevere because Marines do not fail." (Quintrall, 1997, pp. 30-31)

Lastly, the attribute of Mindfulness is like the OSS definition of Effective Intelligence, in the sense that it is a catch all for a number of attributes. When asked about the term, the current commanding officer of the U.S. Marine Corps Officer Candidate School, Colonel Van Opdorp replied "we may not teach it directly, but I think we expect it" (Van Opdorp, 2015) as evidenced by clear directions to "know thyself" and efforts toward heightened situational awareness, both individual and shared.

Reframing the Attributes

By reorganizing the shared attributes by the domain in which they seem to belong, we can better identify which behaviors and domains Instructor Cadres intend to influence. Given that the context in which these attributes are being used is a learning environment, it made sense to divide them into a modified version of Gagne's five domains of the learning process (Gagné, 1972; Knowles, 1978, p. 15) (Table 14):

Table 14: Reframing the Attributes

Behavior	Domain	Attributes				
Think	**Cognitive**	Adaptability	Aptitude	Confident	Discerning	Discipline
Feel	**Affective**	Drive	Agency	Courage	Positive	Loyalty
Believe	**Character**	Accountability	Toughness	Bias for action	Integrity	Leadership
Engage	**Social**	Peer Acceptance	Communicative	Unpretentious	Trust	Professional
Endure	**Physical**	Fitness				

* Mindfulness is not included because it (like effective intelligence) bridges across several domains.

Given that there will always be a top 25% and a bottom 25% we have to reconcile the fact that a percentage of candidates will not be selected. When this happens, they are then returned to

another branch of the HRO.   This creates a tension where the HRO both wants more people to be accepted, and for those who are not accepted, to in some way be improved by the selection process. With that said, it is worth taking a moment to consider the ethics related to the influencing of traits, as it is one thing to influence a person's ability to endure or engage, but it is another one entirely to influence how they, think, feel, or believe in the name of improvement.

Discussion

In the fall of 2013, I had a chance to briefly speak with Daniel Kahneman, a Nobel Prize winner in economics, to ask him 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). At their core Mission Critical Teams were designed to innovate and adapt at the same rate that emerging problems sets were adapting. The way in which human based systems adapt, is by learning. The challenge is that the rate of change, or adaptation, related to emergent problems sets appears to be increasing. If we do not find a way to increase MCT's rate of learning they will cease to be experts and as a result cease to be relevant.

In order to positively influence MCT's rate of learning we will have to start by positively influencing the Instructor Cadre as they are located at the place where the human factor intersects with complex adaptive problem sets. Unless we are able to create more sustainable ways to navigate that intersection we may not be adequately prepared for the next September 10th problem.

Any attempts to help the instructor cadre resolve these two intersecting variables, the human factor and complex adaptive problems, needs to account for their mission, history, culture, language within the larger context of the ecosystem they are nested within. In order to incorporate these variables I am adapting a framework developed by Michael K. Stone and Zenobia Barlow (Stone, 2015), and the work of Fritjof Capra at the center for ecoliteracy (Capra, 2005), to embed the discussion within the seven principles of a sustainable ecosystem.

Principle One (Networks): "The Power of Relationships" – Over and over again key informants have related a story regarding a key relationship that made the difference in a battle, job or career. As the problem sets continue to increase their rate of adaptation the need for strong relationships between MCT's, their partners, and their enablers are going to be critical for innovation. Historically, an MCT's freedom to maneuver was based on their performance (Anonymous, 2014). Moving forward, an aspect of that performance will be based on their ability to innovate and develop internal and external relationships.

Principle Two (Nested Systems): "Move from Transactional to Transformational" In addition to relationships, an HRO's ability to innovate rests in part on their internal appetite for change. When you consider that an HRO is actually made up a number of teams, all nested within one another, who experience different temporal and cultural perspectives, the question of

change becomes increasingly complicated. What might be a strong reason for change in one part of the organization is an asset in another. To further complicate the situation, not all teams have access to the same language. Confucius was quoted:

> "The Master said, "What is necessary is to rectify names.... If names be not correct, language is not in accordance with the truth of things. If language is not in accordance with the truth of things, affairs cannot be carried on to success." (Confucius & Legge, 2006)

HRO's and MCT's must find ways to adapt and coevolve and to do that they need access to the same language or a schism can occur between their unique understandings of the "truth of things." The problem with sharing the same language, however, is that many of the rules that govern military systems were written at time when enlisted personnel were primarily uneducated and it was the job of the educated officer to do the thinking for everyone. In fact, both the German and British psychologists stated concerns that as war became faster and more technically complex the traditional lines of authority between officers and enlisted personnel would start to blur with inevitable increase in distributed leadership (Ahrenfeldt, 1958, p. 254; Fitts, 1946, p. 157). This concern is so deep in the culture that there are still rules stating that training funding should be used on enlisted personnel, but only officers should have access to funding for advanced education. The truth is that the modern enlisted operator is has either already graduated from college prior to entering or are in the process of completing a degree while on active duty. "College education is becoming more of an arbitrary delimiter" (Anonymous). If we are to fully transition modern MCT's from the transactional to the transformational HRO's will have to fundamentally reexamine what they really mean by training and education in the context of Complex Adaptive Problems. Yet, even if they do want to change they will, much like the British who in trying to resolve a procedural problem first had to resolve cultural one, will have to address both sides of the debate.

The reason enlisted personnel often give as to why their access to education is so limited is to chalk it up to the officer class not wanting to "dilute the superior classes" (Crang, 2000, p. 22) by allowing enlisted personnel to pursue higher education. The fact is, to some small degree, there is truth in that assentation. As part of this research we have encountered a number of officers who feel quite strongly that we are wasting everyone's time by educating 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 in behind the closed doors of a gathering of MCT Non Commissioned and Warrant officers "no one wants to be the smartest kid in class" (Anonymous, 2014). The dominant culture among the enlisted operators is to be self-depreciating to a fault and never let on that you are too smart. This stems from the fact that from very early in their career enlisted personnel are told not to think, but to act, to let the officers do the thinking. Yet, at the same time, by the time operators have made it onto an MCT anyone with an average or below average intelligence has left the pipeline. The reality of a modern MCT is that to become and an operator you need to demonstrate above average intelligence.

This paradox, between operationally selecting for intelligent operators while culturally downplaying the importance of intelligence, acts as a hidden barrier to innovation. While ultimately it will come down to power and culture, the fact is that if it does not get resolved the teams that function this way will slowly cease to be relevant because they will be unable to fully unleash the raw intellectual horsepower required to resolve the next sept 10th problem.

Principle Three (Interdependence): "Aggressively pursue synergy" One of the "Truth's" that Special Operations lives by is that they require partners and enablers in order to complete their mission (Headquarters, 2014). Many of the key informants related to this study have relayed stories of how key relationships between MCT's, their partner teams, or their enablers, was the key factor in a mission's success. No matter how strong an independent MCT might be, a network of MCT's is exponentially stronger. Not just due to size, but because the whole becomes much greater than its parts.

Principle Four (Diversity): "Put more tools in your toolbox" One of the greatest current threats to existing MCT's is the shrinking of the operator "gene pool." While having senior operators involved in selecting candidates has much strength, one of its greatest weaknesses it the system tries to replicate itself by creating more of the same. The challenge to this strategy is that MCT's core mission is to solve adaptive problems, in order to do that they need a group of people capable of divergent thinking.

Principle Five (Cycles): "Everyone needs to own the problem: In order to influence the trajectory of the team, there must be some attempt at influencing the innovation cycles of the teams. To do that we have to beyond the practice of rewarding iterative technical solutions while losing patience for adaptive solutions. To be clear technical problems still exist and will always need to be resolved. The problem is that because technical solutions are tangible and easy to see, they can seduce leaders into believing that they are making transformational change, when in fact the change is incremental. The challenge with adaptive solutions is that they are often messy, inconclusive and have a longer timeline. What can happen within the team is that the individual focused on iterative technical solutions can often be seen as the team's best player while the person engaged in adaptive solutions can be viewed as eccentric or unfocused, even though they are the best strategy for creating transformational change. The point is that teams need to find way to reward operators for both technical and adaptive solutions. For example, one team has introduced the concept of an "Innovation Tournament" (Terwiesch & Ulrich, 2009). Their version of the tournament works as follows; anyone on the team, regardless of rank, has access to an initial $500 do build a prototype solution (Brown, 2008) to a problem they have identified. They then take present their prototype to a group of their peers to see if it is worth developing. If they say yes, they are granted another $5,000 to pilot the solution on a small scale. Once that is completed, it is presented to the commander to determine if the pilot should

be approved for full funding, refined, or terminated. What this has done is to empower everyone on the team to own the problems they are currently facing.

Principle Six (Flows): "Embrace Emergence as Opportunity" All systems require a constant flow of energy in order to remain sustainable. In the case of human based systems that energy is often in the form of information and learning. In order to fully exploit the information that is arriving teams must be willing to push through the dissonance that new ideas can sometimes create and;

> "By introducing information that contradicts old assumptions. By demonstrating that things people believe they can't do are already being accomplished somewhere. By inviting new people into the conversation. By rearranging structures so that people relate in ways they're not used to. By presenting issues from different perspectives" (Stone, 2015)

In order for MCT's to remain relevant, they must continue to learn. In order to learn they must be willing to let go of past solutions to past problems in order to embrace new ideas and new solutions to new problems.

Principle Seven (Development): "Start at the source" MCT's must continue to learn if they are to stay relevant, but for the most part, HRO's are not designed to create new knowledge, they are designed to exploit existing knowledge (March, 1991). The reality is that the current rate that HRO's are acquiring and disseminating new knowledge is neither fast enough, nor diverse enough to cope with the rate of change problem or the demands of the Sept 10 problem. The MCT's of the future will be forced to partner with those organizations, such as Universities, who are positioned at the beginning of the knowledge creation pipeline. For this partnership to work, however, the operators must be recognized as legitimate communities of practice within the process and not just recipients of diluted and decontextualized research.

Principle Eight (Dynamic Balance): "Stop playing chess and start gardening" Those who are part of MCT's must begin to understand that often their job is not to control change, but to facilitate change. One of the ways that an ecosystem maintains homeostasis is through continuous feedback loops. Even though new problem sets will emerge and disrupt the hard won balance, influencing the feedback loops will act to increase the overall mindfulness, robustness and resilience of the system. While parts of the system may struggle, the overall system will continue to thrive.

The ultimate goal of this research is to support solution that lead to less operator funerals. With that said, given the mission set of MCTs, this actually requires them to accelerate, not decelerate. More than ever they need the tools required to fully exploit their core strength, their freedom to maneuver, so that they can continue to adapt in the face of emergent complex adaptive problem sets.

A Final Note

It is the nature of collaborative inquiry that this research would not have been possible without the incredibly generous involvement of the 11 key informants, and the various subject matter experts that supported this project over the last year. It needs to be noted, that some of the key informants who partnered with me in developing this research were often deployed while responding to member checks. The fact that in between missions, they were up trying to make sense of my overly academic language instead of getting some much needed sleep is something I will never be able to repay. So this paper is dedicated to all the ones who put their boots back on, even when they could choose otherwise.

Glossary

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 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): (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).

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).

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).

Authority Gradient: Refers to the balance of decision-making power or the steepness of command hierarchy in a given situation. Members of a crew or organization with a domineering, overbearing, or dictatorial team leader experience a steep authority gradient. Expressing concerns, questioning, or even simply clarifying instructions would require considerable

determination on the part of team members who perceive their input as devalued or frankly unwelcome. 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: The carrying of oneself (with reference to the manner); carriage, deportment; behavior, demeanor(Simpson et al., 1989).

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).

Blunt End: The "blunt end" refers to the administrative positions in the organization not in direct contact with participants, but which influence the personnel and equipment at the "sharp end" who do contact participants. The blunt end thus consists of those who set policy, manage programs, design curriculum, and other people and forces, which, though removed in time and space from direct service to the participant, nonetheless affect how that service is delivered.

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

C

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. An analogy is often made to aviation pre-take-off checklists. A checklist is used as a visual or oral aid that enables the user to enhance short-term human memory. Used in the context of technical or linear tasks.

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)**.**

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; Van Gennep, 2011; Wenger, 2000).

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.

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

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).

Courage: That quality of mind which shows itself in facing danger without fear or shrinking; bravery, boldness, valor (Simpson et al., 1989).

Courage (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).

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).

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: Crew resource management (CRM), emphasizes the role of "human factors"-the effects of fatigue, expected or predictable perceptual errors (such as misreading monitors or mishearing instructions), as well as the impact of different management styles and organizational cultures in high-stress, high-risk environments.

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: Is made up of three immediate "moments" following the emergence of a problem set, followed by recovery and stabilization to a new normal.

- **Moment of Recognition:** Is a term used to describe a threshold of sensory cues that triggers a person's awareness of an emergent problem set.
- **Moment of Reaction:** Following Recognition the Amygdala will trigger a fight, flight, freeze response.
- **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

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.

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)

- **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.
- **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.

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).

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

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

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).

Diversity: In this context it refers to the ability to think differently.

Dread Factor: The idea that people do not base their fears on statistics. Instead, each of us develops our own personal Dread Factor for various frightening scenarios based on personal experience, knowledge and, more important, our sense of the situation.

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

E

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(O. o. S. Services, 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 (O. o. S. Services, 1948).

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).

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

Energy and Initiative (OSS): Activity level, zest, effort, initiative(O. o. S. Services, 1948).

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

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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).

Error Chain: Error chain generally refers to the series of events that led to a disastrous outcome, typically uncovered by a root cause analysis. Sometimes the chain metaphor carries the added sense of inexorability, as many of the causes are tightly coupled, such that one problem begets the next. The checklists that are included in teamwork training programs have categories corresponding to these common links in the error chain (e.g., establish team leader, assign roles and responsibilities, and monitor your teammates).

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, kick off, 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

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.

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.

G

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

Genesis Story: The story of the team's origin. What were the factors that led the team to be created.

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

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

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. Heuristics provide cognitive shortcuts in the face of complex situations, and thus serve an important purpose. Unfortunately, they can also be disguised avoidance behaviors. Are 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. Detailed case studies of specific HROs have identified some common features, which have been offered as models for other organizations to achieve substantial improvements in their safety records. These features include: Preoccupation with failure.

Human Factors: Refers to the study of human abilities and characteristics as they affect the design and smooth operation of equipment, systems, and jobs. The field concerns itself with considerations of the strengths and weaknesses of human physical and mental abilities and how these affect the systems design.

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.).

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).

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

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

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

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).

Interpersonal: Existing or occurring between persons.

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: 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).

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

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).

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(O. o. S. Services, 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.

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 by Tribes to recognize a change of status. The liminal state is characterized internal and external uncertainty, where new ways of being are possible. (Turner, 1995; Van Gennep, 2011).

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

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

M

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

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. Sometimes called schemas, they are 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.

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)

MCT: 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 ten minutes or less. Where the consequence of failure is death or catastrophic injury.

Mistakes: 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. 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. Slips occur in the face of competing sensory or emotional distractions, fatigue, and stress. Mistakes more often reflect lack of experience or insufficient training. Reducing the risk of slips requires attention to the designs of protocols, devices, and work environments—using checklists so key steps will not be omitted, reducing fatigue among personnel (or shifting high-risk work away from personnel who have been working extended hours), removing unnecessary variation in the design of key devices, eliminating distractions (e.g., phones) from areas where work requires intense concentration, and other redesign strategies. Reducing the likelihood of mistakes typically requires more training or supervision.

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: (See *Crisis Response)*

Moment of Recognition: (See *Crisis Response)*

Moment of Response: (See *Crisis Response*)

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)

Motivation for Assignment (OSS): war morale, interest in proposed job.(O. o. S. Services, 1948)

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

N

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

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 (O. o. S. Services, 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.

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.

P

Participator 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).

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.

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).

Physical Ability (OSS): agility, daring, ruggedness, stamina (O. o. S. Services, 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).

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. In this way those parts can be re-enforced.

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

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 MCT 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): 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 (O. o. S. Services, 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.

R

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).

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)

Risk management: The culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.

Risk: The effect of uncertainty on objectives ISO 31000:2009.

Rite of Passage: 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.

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.

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(O. o. S. Services, 1948).

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: The following is the definition of just 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).

Sensemaking: 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: An adverse event in which death or serious harm to a Participant has occurred; usually used to refer to events that are not at all expected or acceptable. The choice of the word "sentinel" reflects the egregiousness of the injury the likelihood that investigation of such events will reveal serious problems in current policies or procedures.

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.

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)"

Social Relations (OSS): Ability to get along well with other people, good will, team play, tact, freedom from disturbing prejudices, freedom from annoying traits(O. o. S. Services, 1948).

Solver: One who solves (Simpson et al., 1989).

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).

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.

T

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).

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.

Transfer of Learning: The use of principles or concepts learned in one context to another context in which they remain applicable.

Trust: The quality of being trustworthy; fidelity, reliability; loyalty, trustiness(Simpson et al., 1989)

U

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).

References

Ahrenfeldt, R. H. (1958). *Psychiatry in the British army in the Second World War*: Routledge.

Alcorn, R. H. (1962). *No Bugles for Spies: Tales of the OSS*: D. McKay.

Anderies, J. M., Janssen, M. A., & Ostrom, E. (2004). A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society, 9*(1), 18.

Anonymous (2014). [Personal Communication from a member of the collaborative inquiry community].

Ansbacher, H. L. (1941). German military psychology. *Psychological Bulletin, 38*(6), 370.

Army. (1998). *Army Field Manual 100-14 Risk Management*. Washington, DC Department of the Army, Headquarters.

Army. (2006). *Army Field Manual 5-19 Composite Risk Management*. Washington, DC Department of the Army, Headquarters.

Army, U. S. (2012, January 4, 2012). Principles of Command and General Staff College. from http://usacac.army.mil/cac2/cgsc/principles.asp

Arrow, H., McGrath, J. E., & Berdahl, J. L. (2000). *Small groups as complex systems : formation, coordination, development and adaptation*. Thousand Oaks, Calif.: Sage Publications.

Arthur, W., Day, E. A., & Woehr, D. J. (2008). Mend it, don't end it: An alternate view of assessment center construct-related validity evidence. *Industrial and Organizational Psychology, 1*(01), 105-111.

Asher, M. (2008). *The Regiment: The Real Story of the SAS*: Penguin.

Ault, F. W. (1968). Report of the Air-to-Air Missile System Capability Review. *Naval Air Systems Command, Washington, DC, ADA, 955142*.

Bailey, M. (2000). Evolution of Aptitude Testing in the RAF: DTIC Document.

Bank, A. (1986). *From OSS to Green Berets: The Birth of Special Forces*: Presidio Press.

Banks, L. M. (1995). The Office of Strategic Services Psychological Selection Program: DTIC Document.

Banks, L. M. (2006). The history of special operations psychological selection. *Psychology in the service of national security*, 83-96.

Beckwith, C. A., & Knox, D. (1983). *Delta Force* ("The Military book club's collector's edition", from jacket. ed.). San Diego: Harcourt Brace Jovanovich.

Bennis, W. G., & Nanus, B. (2004). *Leaders*: HarperBusiness Essentials.

Bernstein, P. L. (1996). *Against the gods : the remarkable story of risk*. New York: John Wiley & Sons.

Bishop, R. (1995). Collaborative research stories: Whakawhanaungatanga. *Unpublished PhD thesis, University of Otago, Dunedin*.

Bishop, R. (1999). Collaborative Storytelling: Meeting Indigenous Peoples' Desires for Self-Determination in Research.

Bowden, M. (1999). *Black Hawk down : a story of modern war* (1st ed.). New York: Atlantic Monthly Press.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*: Sage.

Branch, R. (2001). History of Marine Corps Training.

Brown, T. (2008). Design thinking. *Harvard Business Review, 86*(6), 84.

Burt, C. (1942). Psychology in war: the military work of American and German psychologists'. *Occupational Psychology, 16*, 95-110.

Butler, W. (2014, 1988). [Historical Papers Regarding the Evolution of the USMC Officer Candidate School].

Capra, F. (2005). Speaking Nature's Language: Prinicples for Sustainability. In M. Stone & Z. Barlow (Eds.), *Ecological literacy* (pp. 18-29). San Francisco: Sierra Club.

Casey, B., Jones, R. M., & Hare, T. A. (2008). The adolescent brain. *Annals of the New York Academy of Sciences, 1124*(1), 111-126.

Center for the Study of Intelligence (U.S.). (2010). Center for the Study of Intelligence bulletin. 2010, from http://blogs.hbr.org/bigshift/2009/01/the-new-reality-constant-disru.html

Chambers, I., & John, W. (2010). Office of Strategic Services Training During World War II: DTIC Document.

Chiva, R., Grandío, A., & Alegre, J. (2010). Adaptive and generative learning: Implications from complexity theories. *International Journal of Management Reviews, 12*(2), 114-129.

Clausewitz, C. V. (2004). *On war*: Digireads. com Publishing.

Cline, P. (2013). Risk Management for U.S. Army Special Operations: Addressing the need to continuously adapt to a changing problem set. *WHITE PAPER*. University of Pennyslvania: Graduate School of Education.

Cline, P. (2014). What happens to experts when the rate of change exeeds the rate of learning? A Mission Centric, University Assisted, Professional Development Framework for U.S. Army Special Operations Command *WHITE PAPER*. University of Pennsylvania: Graduate School of Educaton.

Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as Stance: Practitioner Research for the Next Generation. Practitioners Inquiry*. Columbia University: Teachers College Press.

Collins, J. C. (2001). *Good to great: Why some companies make the leap... and others don't*: Random House.

Confucius, & Legge, J. (2006). *Confucian analects*: Kessinger Publishing.

Corps, U. M. (1995). FMFM 1-0, Leading Marines: Washington, DC: Headquarters, US Marine Corps.

Corps, U. M. (1997). MCDP 1: Warfighting. *Washington, DC: United States Marine Corps*.

Corps, U. M. (1998). *Marine Corps Values: A User's Guide for Discussion Leaders*. Quantico, VA: Marine Corps Reference Publication.

Coyle, D. (2010). *The talent code: Greatness isn't born, it's grown*: Random House.

Crang, J. A. (2000). *The British Army and the People's War, 1939-1945*: Manchester University Press.

Creswell, J. W. (2007). *Qualitative inquiry & research design : choosing among five approaches* (2nd ed.). Thousand Oaks: Sage Publications.

Csikszentmihalyi, M. (1990). Flow: The psychology of optimal performance: New York: Cambridge University Press.

Darwin, J., & Melling, A. (2011). Mindfulness and Situation Awareness: DTIC Document.

De Neys, W., & Goel, V. (2011). Heuristics and biases in the brain: Dual neural pathways for decision making. *Neuroscience of Decision Making*.

Dewey, J. (1938). Experience and Education. *New York: McMillan*.

Dobbie, E. V. K. (1944). The word "Commando". *American Speech, 19*(No.2 (April, 1944)), 81-90.

DOD. (2011). DOD Identifies Service Members Killed In CH-47 Crash [Press release]. Retrieved from http://www.defense.gov/releases/release.aspx?releaseid=14728

Dooley, K. E., & Lindner, J. R. (2002). Competency-based behavioral anchors as authentication tools to document distance education competencies. *Journal of Agricultural Education, 43*(1), 24-35.

Draude, T. V. (2011). Brigadier General U.S. Marine Corps (Ret), President and Chief Executive Officer U.S. Marine Corps University Foundation.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology, 92*(6), 1087.

Duggan, W. R. (2005). *Coup d'Oeil: Strategic Intuition in Army Planning*: DIANE Publishing.

Earles, J. A., & Winn, W. R. (1977). Assessment Centers: An Annotated Bibliography.

Endsley. (2000). Situation Awareness Infantry.pdf>.

Endsley, M. R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 37*(1), 32-64.

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition advancing the debate. *Perspectives on Psychological Science, 8*(3), 223-241.

Fitts, P. M. (1946). German applied psychology during World War II. *American psychologist, 1*(5), 151.

Fried, M. H. (1975). *The notion of tribe* (Vol. 342): Cummings Publishing Company Menlo Park, CA.

Gagné, R. M. (1972). Domains of learning. *Interchange, 3*(1), 1-8.

Gardner, H. (2006). Multiple intelligences: New horizons (Rev. ed.). *New York, NY: A Member of the Perseus Books Group*.

Gersick, C. J. G. (1991). Revolutionary change theories: A multilevel exploration of the punctuated equilibrium paradigm. *Academy of management review*, 10-36.

Gifford-Smith, M. E., & Brownell, C. A. (2003). Childhood peer relationships: Social acceptance, friendships, and peer networks. *Journal of School Psychology, 41*(4), 235-284.

Goldstein, J. (1999). Emergence as a construct: History and issues. *Emergence, 1*(1), 49-72.

Graziano, W. G., & Tobin, R. M. (2009). Agreeableness.

Hacking, I. (2001, 5/2001). *Risk and Dirt.* Paper presented at the Risk and Mortality, Green College.

Hackman, J. R. (2002). *Leading teams : setting the stage for great performances*. Boston, Mass.: Harvard Business School Press.

Hackman, J. R. (2011). *Collaborative intelligence: Using teams to solve hard problems*: Berrett-Koehler Publishers.

Handler, L. (2001). Assessment of men: Personality assessment goes to war by the Office of Strategic Services assessment staff. *Journal of personality assessment, 76*(3), 556-578.

Hatcher, R. L., Fouad, N. A., Grus, C. L., Campbell, L. F., McCutcheon, S. R., & Leahy, K. L. (2013). Competency benchmarks: Practical steps toward a culture of competence. *Training and Education in Professional Psychology, 7*(2), 84.

Heifetz. (1994). *Leadership without easy answers* (Vol. 465): Harvard University Press.

Heifetz, R. A., & Linsky, M. (2002). *Leadership on the line: Staying alive through the dangers of leading* (Vol. 465): Harvard Business Press.

Helmreich, R. L. (2000). On error management: lessons from aviation. *BMJ, 320*(7237), 781-785. doi: 10.1136/bmj.320.7237.781

Helmreich, R. L., Merritt, A. C., & Wilhelm, J. A. (1999). The evolution of crew resource management training in commercial aviation. *The International Journal of Aviation Psychology, 9*(1), 19-32.

Heron, J., & Reason, P. (1997). A participatory inquiry paradigm. *Qualitative inquiry, 3*(3), 274-294.

Heron, J., & Reason, P. (2006). The practice of co-operative inquiry: Research 'with'rather than 'on'people. *Handbook of action research*, 144-154.

Herr, K., & Anderson, G. L. (2005). *The action research dissertation: A guide for students and faculty*: Sage.

Highhouse, S., & Kostek, J. A. (2013). Holistic assessment for selection and placement.

Holland, J. H. (2006). Studying complex adaptive systems. *Journal of Systems Science and Complexity, 19*(1), 1-8.

Howard, A. (1974). An assessment of assessment centers. *Academy of Management Journal, 17*(1), 115-134.

Jacobs, T., & Sanders, M. G. (2005). Principles for Building the Profession: The SOF Experience. In L. J. M. Don. M. Snider (Ed.), *The Future of the Army Profession* (pp. 441-462). New York: McGraw Hill.

Jenkins, R. L. (2014). [ARSOF Screening Characteristics evolution].

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research, 2*(1999), 102-138.

Johnson, S. (2010). *Where good ideas come from: The natural history of innovation*: Penguin UK.

Kahneman, D. (2011). *Thinking, fast and slow* (1st ed.). New York: Farrar, Straus and Giroux.

Kahneman, D. (2013). [Personal Communication].

Kalyuga, S., Rikers, R., & Paas, F. (2012). Educational implications of expertise reversal effects in learning and performance of complex cognitive and sensorimotor skills. *Educational Psychology Review, 24*(2), 313-337.

Katz, D., & Kahn, R. L. (1978). The social psychology of organizations.

Kaufman, D. (2015). [Personal Communication].

Klein, G. (2008). Naturalistic Decision Making. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 50*(3), 456-460. doi: 10.1518/001872008x288385

Klimoski, R., & Brickner, M. (1987). Why do assessment centers work? The puzzle of assessment center validity. *Personnel Psychology, 40*(2), 243-260.

Knowles, M. (1978). *The adult learner: A neglected species*: Gulf Publishing.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1): Prentice-Hall Englewood Cliffs, NJ.

Kozlowski, S. W. (1998). Training and developing adaptive teams: Theory, principles, and research.

Kuhn, T. S. (1996). *The structure of scientific revolutions* (3rd ed.). Chicago, IL: University of Chicago Press.

Lance, C. E. (2008). Why assessment centers do not work the way they are supposed to. *Industrial and Organizational Psychology, 1*(1), 84-97.

Lansing, J. S. (2003). Complex Adaptive Systems. *Annual Review of Anthropology, 32*, 183-204. doi: 10.2307/25064826

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*: Cambridge university press.

Lenroot, R. K., & Giedd, J. N. (2006). Brain development in children and adolescents: insights from anatomical magnetic resonance imaging. *Neuroscience & Biobehavioral Reviews, 30*(6), 718-729.

Lenzenweger, M. F. (2014). Factors Underlying the Psychological and Behavioral Characteristics of Office of Strategic Services Candidates: The Assessment of Men Data Revisited. *Journal of personality assessment*(ahead-of-print), 1-11.

Levin, S. A. (1998). Ecosystems and the biosphere as complex adaptive systems. *Ecosystems, 1*(5), 431-436.

MacCoun, R. (1993). What is known about unit cohesion and military performance. *Sexual orientation and US military personnel policy: options and assessment*, 283-331.

MacKinnon, D. W. (1980). *How Assessment Centers Were Started in the United States: The OSS Assessment Program*: Development Dimensions International.

Maher, A. (2014). The application of complex adaptive systems concepts to contemporary special operations.

Mandler, G. (2007). *A history of modern experimental psychology: From James and Wundt to cognitive science*: Mit Press Cambridge, MA.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science, 2*(1), 71-87.

Marcinko, R., & Weisman, J. (1992). *Rogue warrior*: Pocket Books.

McChrystal, S. (2013). *My share of the task: A memoir*: Penguin.

McChrystal, S. (2014, 4/18/2014) *Personal Communication/Interviewer: P. B. Cline*.

McChrystal, S. C. F., Tantum Collins, David Silverman. (2015). *Team of Teams: New Rules of Engagement for a Complex World*. New York, NY: Penguin Publishing Group.

McIntosh, J. (2009). Elders and 'frauds': Commodified expertise and politicized authenticity among Mijikenda. *Africa, 79*(01), 35-52.

McRaven, W. H. (1996). *Spec Ops: Case studies in special operations warfare: Theory and practice*: Random House LLC.

Mehra, A., Smith, B. R., Dixon, A. L., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly, 17*(3), 232-245.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative data analysis: A methods sourcebook*: SAGE Publications, Incorporated.

Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into practice, 31*(2), 132-141.

Monahan, E. L., Hoffman, B. J., Lance, C. E., Jackson, D. J., & Foster, M. R. (2013). Now You See Them, Now You Do Not: The Influence of Indicator–Factor Ratio on Support for Assessment Center Dimensions. *Personnel Psychology, 66*(4), 1009-1047.

Mueller-Hanson, R. A., White, S. S., Dorsey, D. W., & Pulakos, E. D. (2005). Training adaptable leaders: Lessons from research and practice: DTIC Document.

Murray, H. (1990). The transformation of selection procedures.'. *The Social Engagement of Social Science, 1*.

Nadler, D. A., Tushman, M., & Hatvany, N. (1982). Managing Organizations. *Boston, Mass.: Little, Brown and Company*.

Nalty, B. C. M., Raph F. (1970). A Brief History of USMC Officer Procurement 1775-1969. In H. D. U. S. M. Corps (Ed.), (Marine Corps Historical Reference Pamphlet ed.): Historical Division Headquarters U.S. Marine Corps Washington, D.C.

NSA. (2010). Declassified UKUSA Signals Intelligence Agreement [Press release]. Retrieved from https://www.nsa.gov/public_info/press_room/2010/ukusa.shtml

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Thousand Oaks, Calif.: Sage Publications.

Perrow, C. (1984). *Normal accidents : living with high-risk technologies*. New York: Basic Books.

Peters, T. J., & Waterman, R. H. (1982). In search of excellence: Lessons from America's best-run companies. *New York, 203*.

Pfeffer, J., & Sutton, R. I. (2006). Evidence-based management. *Harvard Business Review, 84*(1), 62.

Polanyi, M. (1968). Logic and psychology. *American psychologist, 23*(1), 27.

Quesada, J., Kintsch, W., & Gomez, E. (2005). Complex problem-solving: a field in search of a definition? *Theoretical Issues in Ergonomics Science, 6*(1), 5-33.

Quintrall, M. L. (1997). The Chesty Puller paragon: leadership dogma or model doctrine: DTIC Document.

Ravitch, S. M. (2015, 4/6/2015). [Tacit to Explicit].

Ravitch, S. M., & Riggan, M. (2012). *Reason & rigor: How conceptual frameworks guide research*: Sage.

Raybourn, E. M., Deagle, M. E., Mendini, K., & Heneghan, J. (2005). *Adaptive thinking & leadership simulation game training for special forces officers.* Paper presented at the The Interservice/Industry Training, Simulation & Education Conference (I/ITSEC).

Reason, J. T. (1990). *Human error*. Cambridge [England] ; New York: Cambridge University Press.

Reason, P. (1996). Cooperative inquiry: JSTOR.

Richards, C. (2001). Boyd's OODA loop. *Slideshow. URL: http://www. dni. net/fcs/ppt/boyds_ooda_loop. ppt [Online*.

Robson, C. (2002). *Real world research* (Vol. 2): Blackwell publishers Oxford.

Rogers, S. S., Ami. (2012). Army Cuts: how have the UK armed forces personnel numbers changed over time?

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs: General and applied, 80*(1), 1.

Ruiz, c. (2014). [Personal Communication].

Ryan, A. (2009). The Foundation for an Adaptive Approach. *Special Edition: The Adaptive Army*, 69.

Ryan, A. M., & Ployhart, R. E. (2014). A century of selection. *Annual review of psychology, 65*, 693-717.

Saldaña, J. (2012). *The coding manual for qualitative researchers*: Sage.

Scales, P. C., & Leffert, N. (1999). *Developmental assets: A synthesis of the scientific research on adolescent development*: Search Institute.

Schwab, D. P., Heneman, H. G., & DeCotiis, T. A. (1975). Behaviorally anchored rating scales: A review of the literature. *Personnel Psychology, 28*(4), 549-562.

Schwandt, T. A. (2007). *The SAGE dictionary of qualitative inquiry* (3rd ed.). Los Angeles, Calif.: Sage Publications.

Senge, P. M. (1994). *The fifth discipline : the art and practice of the learning organization* (A Currency paperback. ed.). New York: Doubleday/Currency.

Services, A. C. (2005). Human Performance: Error Management. *Flight Operations Briefing Notes*. Retrieved from

Services, O. o. S. (1948). *Assessment of men: Selection of personnel for the office of strategic services*: Johnson Reprint.

Shrader-Frechette, K. S. (1990). Perceived risks versus actual risks: Managing hazards through negotiation. *Risk, 1*, 341.

Simpson, J. A., Weiner, E. S. C., & Oxford University Press. (1989). *The Oxford English dictionary* (2nd / ed.). Oxford University Press,: Clarendon Press ; New York :.

Skinner, Q. (1969). Meaning and Understanding in the History of Ideas. *History and theory*, 3-53.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*(2), 311-322.

Snowden, D. J., Boone Mary E. (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, 10.

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience & Biobehavioral Reviews, 24*(4), 417-463.

Spychalski, A. C., Quiñones, M. A., Gaugler, B. B., & Pohley, K. (1997). A survey of assessment center practices in organizations in the United States. *Personnel Psychology, 50*(1), 71-90.

Staff, C. o. t. J. C. o. (2014). *Counterterrorism*. Suffolk, VA: Jpoint Doctrine Analysis Center.

Staff, J. C. o. (2014). *Special Operations*. Sufolk, VA.

Stone, M. B., Zenobia. (2015). Seven Lessons for Leaders in Systems Change.

Sutcliffe, A., & Rugg, G. (1998). A taxonomy of error types for failure analysis and risk assessment. *International Journal of Human-Computer Interaction, 10*(4), 381-405.

Sutcliffe, K. M. (2011). High reliability organizations (HROs). *Best Practice & Research Clinical Anaesthesiology, 25*(2), 133-144.

Svyantek, D. J., & Brown, L. L. (2000). A Complex-Systems Approach to Organizations. *Current Directions in Psychological Science, 9*(2), 69-74. doi: 10.2307/20182626

Taleb, N. (2007). *The black swan : the impact of the highly improbable* (1st ed.). New York: Random House.

Terwiesch, C., & Ulrich, K. T. (2009). *Innovation tournaments: Creating and selecting exceptional opportunities*: Harvard Business Press.

Thomas, D. (1983). The Importance of Commando Operations in Modern Warfare 1939-82. *Journal of Contemporary History, 18*(4), 689-717.

Turner, V. (1995). *The ritual process: Structure and anti-structure*: Transaction Publishers.

Van Gennep, A. (2011). *The rites of passage*: University of Chicago Press.

Van Opdorp, H. R. C. (2015, 2/2/15). [Personal Communication].

Vaughan, D. (1996). *The Challenger launch decision : risky technology, culture, and deviance at NASA*. Chicago: University of Chicago Press.

Walker, S., Eketone, A., & Gibbs, A. (2006). An exploration of kaupapa Maori research, its principles, processes and applications. *International Journal of Social Research Methodology, 9*(4), 331-344.

Waller, M. A. (2001). Resilience in Ecosystemic Context: Evolution of the Concept. *American Journal of Orthopsychiatry, 71*(3), 290-297. doi: 10.1037/0002-9432.71.3.290

Weick, K. E. (1988). Enacted Sensemaking in Crisis Situations *Journal of Management Studies, 25*(4), 305-317.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications.

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty*: Jossey-Bass.

Weiner, I. B., & Greene, R. L. (2011). *Handbook of personality assessment*: John Wiley & Sons.

Wenger, E. (2000). Communities of practice and social learning systems. *Organization, 7*(2), 225-246.

Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*: Harvard Business Press.

Wikipedia. (2015a). 2011 Chinook shootdown in Afghanistan. from http://en.wikipedia.org/wiki/2011_Chinook_shootdown_in_Afghanistan

Wikipedia. (2015c). Wikipedia: The free Encyclopedia.

Wittrock, M. C. (1992). Generative Learning Processes of the Brain. *Educational Psychologist, 27*(4), 531-541.

Wlodkowski, R. J. (2011). *Enhancing adult motivation to learn: A comprehensive guide for teaching all adults*: John Wiley & Sons.

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a Theory of Organizational Creativity. *The Academy of Management Review, 18*(2), 293-321. doi: 10.2307/258761

Woods, D. D. (1985). Cognitive technologies: The design of joint human-machine cognitive systems. *AI magazine, 6*(4), 86.

Woods, D. D., & Hollnagel, E. (2006). *Joint cognitive systems : patterns in cognitive systems engineering*. Boca Raton: CRC/Taylor & Francis.

Yun, S., Faraj, S., & Sims Jr, H. P. (2005). Contingent leadership and effectiveness of trauma resuscitation teams. *Journal of Applied Psychology, 90*(6), 1288.