MMXXI ON OPERATIONAL VERTICALITY anifesto of mindful rescue principles, practices, protocols, and their affect on responses in VUCA-T2environments

Operational Vertical Manifesto

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> The Gangsters from: The Evil Empire & Silver Syndicate

This document focusses on vertical response, although all of the principles, tools, & frameworks discussed can permeate through most varied responses in VUCA-T² environments.

This document is dedicated to the memory and enduring legacy of U.S. Army Master Sgt. Joshua L. Wheeler (1975-2015), "Big Wheel"- a driving force, always pushing the boundaries of possibility and disruption as a man & an operator... specializing within the vertical realm. A Quiet Professional. You are missed. Thank you. Your words speak to your life, "On me".

Till Valhalla - "Principle 13"



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Julie McKay, Element Rescue







General Flow Of Manifesto Manifesto - man·i·fes·to : a written statement declaring publicly the intentions, motives, or views of its issuer

This document is a living document. We have taken information, data, and experiences accumulated over several decades and disciplines, translated what we learned into definable <u>core</u> principles and beliefs, and drafted this Manifesto from that acquired knowledge. This work was penned, not to deliver an irrevocable and definitive statement for readers to accept or reject as truth, but to state our beliefs (citing academia, empiricism, & stochastic "tinkering") and offer them as a means to open a dialog. A dialog that will hopefully grow to include and engage a wider and more diverse audience. It is what we believe, and why we believe it. Its intent is to encourage questioning, to assist in finding answers, to affect change where needed, and to provide a solid foundation on which rescue practitioners can confidently build their own operational framework. This document contains what we consider to be the "bigger" friction points which exist in the realm of vertical maneuvering. Most of these friction points have emerged through the decades of working within, training, and supporting operational organizations. We also consolidated disputes that we are commonly asked to help resolve, from diverse vertical specialists countering internal & external misunderstandings, antiquated / irrelevant practices, and at times, disheartening hubris that plagues the SOP / TTP modernization and development within their respective areas of operation. And although we went deep into many of the topics, we hope to spark the interest of our readers to research further on their own. As this is a living document, it is intended to change over time and will be updated as such through updates on our website. We encourage and look forward to any and all questioning, debate, criticisms, and counter-arguments that will come; we only ask that our readers 1) *Keep an open mind, if something goes against what you believe, read further and ask questions, 2) Read the document in its entirety, what doesn't make sense now, may be made clear later, a*

This document structure consists of three main layers of information: Layer 1- Our 13 Principles. Each principle is a single sentence containing context-specific - weighted terminology. Whereas the topic of operational verticality and the environment in which it is practiced is innately nonlinear, it was essential for the authors to incorporate the correct scientific language when necessary. Some of these Principles may contain verbiage, concepts, and / or explanations in which the reader may not be familiar, so following the 13 principles is Layer 2- with a *Focused Synopsis* of each principle and explanation of the intended context of each statement. The principle-focused synopsis content gives structure, additional insight, and contextual relevance *but does not* go into lengthy concept explanation or application. The nonlinearity / complexity of not only vertical rigging within VUCA-T² - *Volatile, Uncertain, Complex, Ambiguous, Threat embedded, & Time-constrained* (McKay 2021) (Van Stralen 2018) environments but also the science, models, and associated frameworks are all inter-connected, like a web, losing the nuance & subtle when reduced (*personal communication with Daved van Stralen*). For this reason, after the Focused Synopsis portion, is Layer 3- where the bulk of the document expands fidelity to the friction points, operational gaps, and misunderstandings impeding and handicapping operational vertical practitioners. Integration of the interdependent processes & concepts contained in the Focused Synopsis is also addressed in this section. A small appendix & bibliography are located at the conclusion of the document.

Normative	Pragmatic	C ometimes people hold a core belief	
Idealistic & Prescriptive: Not concerned with context / specifics of situation - "one size fits all" approach. Prescribes certain conduct, techniques, & do's / don'ts by making assumptions.	Concerned with consequences - Perceptions are real & mediate actions. Context, Nuance & Subtle are embraced. "In Situ" actions are optimized.	that is very strong. When they are presented evidence that works agains that belief, the new evidence cannot be accepted.	
Theory - Centric	REALITY - Centric. Focus on context, nuances, subtleties, & novelty	t creates a feeling that is extremely	
Linearizes the Nonlinear situation, ignores outliers, specifics & novelty - Gaussian (Normal Bell Curve)	Embraces the uncertainty, ambiguity, complexity and novelty existing in real-world events. This meets the requirements for Inverse power law / Pareto principle.	uncomfortable, called <i>cogniti</i> <i>dissonance.</i> And because it is so importa to protect the core belief, they w rationalize, ignore and even deny anythi that doesn't fit in with that core beli ~ <i>Van Stralen (personal communication)</i>	
Codifies / creates a "norm" (or set of norms) - A false perception of " <i>Security</i> " arising from the structures we create & actions we take reinforces the normative frame (Ivanov 1998).	There are no "set of norms" - real world events & response incidents do not fall into a "normal" category. Every response we will ever participate, is austere & "ahistoric" (DvS 1998).		

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WE HOLD THE FOLLOWING TRUTHS TO BE SELF-EVIDENT...



The crux of Operational Rescue lives at the intersection of casualty pathology & environmental pathology.

OPERATIONAL RESCUE IS PRAGMATIC BY NATURE ~

TRADITIONAL UERTICAL MOBILITY PHILOSOPHIES & PRACTICES INTRODUCE COUERT UULNERABILITIES TO THE PRESERVATION OF THE FORCE

1RECOGNITION OF THE VITAL INTERDEPENDENCE BETWEEN HRO PRINCIPLES (CHARACTERISTICS),
NONLINEAR PHYSICS, & MATERIAL SCIENCE - IS IMPERATIVE

Efficiency begets Speed! Speed amplifies responder security & safety, while reducing "Time" as a potential comorbidity during casualty response

Integration of the "Drop Your Tools" philosophy is pivotal

Operational Vertical Response <u>does not</u> yield to the "weak link" or "lowest common denominator" doctrine ŋ



REQUISITE DIVERSITY YIELDS & CRITICAL SHIFT IN MINDSET

Techniques, Equipment, & Mindsets must be Elastic to achieve an efficient Light & Fast Capacity -

Innovative Rigging Solutions emerge from <u>Operational Hacking</u> fueled by a <u>Neophile Approach</u>

Vertical System Safety Factors <u>must</u> reflect the <u>intricacies</u> & <u>interdependence</u> of Engineering / System Design principles

Operational Vertical Response promotes Allostatic over Homeostatic behavior

THERE ARE RESCUE SITUATIONS THAT REQUIRE "BEAST MODE"



The following section contains a quick basic overview of the previous 13 principles. The remainder of the document dives deeper into many of these topics, concepts, & frameworks - providing fidelity and illustrating cross-pollination & interdependence.

1. The crux of Operational Rescue lives at the intersection of casualty pathology & environmental pathology. Each pathology contains its own emerging threats & vulnerabilities that require solutions not codified in TTP's / SOP's - this becomes the impetus of contextual best practices - developed in real-time interaction (van Stralen et al 2018). This is "Casualty Management" - weaving together the KPP's (*Key Performance Parameters*) of Casualty Care (Assess & Stabilize) and Casualty Rescue (Access, Extraction & Evacuation). The merging & interaction of these two skill sets (casualty care & casualty rescue) creates the 4 Pillars of Casualty Management - Access / Assess & Stabilize / Extract / Evacuation (McKay/Galdes 2019) (McKay 2021) (van Stralen et al 2018). Imbalance of either skill-set can have a negative impact on casualty outcome; morbidity and mortality will increase. Every decision occurs at the interaction of these two skill sets, requiring mindful appreciation of possible variables and fluctuating options - each with distinct, changing consequences & tangential effects. Consideration of ambiguity, equipoise, & deliberate heuristics becomes critically relevant, ~ not only for understanding, but for incorporation into operations. Casualty Management requires the ability to seek, appreciate, and use the "novel", continually re-calibrating what is salient and monitoring what was previously considered irrelevant that becomes relevant [LC-NE function], not only tolerating but welcoming uncertainty. Always be look to exploit environmental assets & innovate.

2. Operational Rescue is Pragmatic by Nature - A normative approach inherently handcuffs the operator, limiting options while increasing the opportunity for failure. The core of pragmatism is action, by tracing 'practical consequences' in specific situations, not action from ideal antecedents [Stanford Encyclopedia of Philosophy; Star Classification]. Normative (linear) approaches utilize a *categorization model* (framework precedes data / info) which forces the practitioner to continually hammer the square peg through the circle hole. The pragmatic approach utilizes a sense-making model (data / info precedes framework), which enables the operator to appreciate the novel, while embracing the uncertainty, ambiguity, and complexity existing in real-world events. The linear categorization model leads to the misspecification, misestimation & misunderstanding of the situation & problem. Every rescue contains its own organic constraints, requirements, unique opportunities, & hazards - meaning there is NO "normal" or "average" rescue incident. These variances make the framework of Gauss (bell curve) & normative verbiage, incompatible with operational rescue. Operational Rescue resides in the Inverse Power-Law (IPL), 1/f Frequency (pink noise), Pareto realm, & is inherently pragmatic. No two responses are ever the same. Every response is abistoric - containing its own unique variables and space of possibilities. These environments are sensitive to initial conditions, where a slight alteration of the initial conditions can result in very divergent & unpredictable outcomes. Integration of HRO, re-framing, and antifragility are all key process inputs (KPI's) for the pragmatic approach.

3. Traditional Vertical Mobility (Access, Rescue, Evac / Climbing) Philosophies & Practices input covert vulnerabilities to the preservation of force. Unconventional Warfare requires Unconventional Verticality. Traditional models do not account for or meet the requirements, framework, or mission critical parameters for operational utilization within the VUCA-T² (Volatile, Uncertain, Complex, Ambiguous, Threat embedded, & Time-constrained) environment (compare / contrast with original 1996 KPP's of TCCC Butler, et al). Doing the right thing - at the wrong time can have negative outcomes. A long-held principle of TCCC reinforces this concept, "Good medicine can sometimes be bad tactics. Bad tactics can get everyone killed and / or cause the mission to fail." Deliberate movement away from utilizing open and closed feedback loops - adopting reciprocal feedback / decision loops - assist in this liminal transition.

Traditional models have become inaccurately framed as normative by removing the context. The nuance & subtle signals of the incident reside within the context. By ignoring the context, traditional or normative models become disguised as "believable" through the use of abstractionism. It is actually abstractionism *and / or* the total lack of anything related to operational reality, that has unfortunately infected USSOCOM climbing elements with a dangerous vertical doctrine absent of *in situ* capabilities. Requirements for team member proficiency in the disciplines of <u>recreational sport & trad climbing</u>



ignores the <u>context</u> & <u>constraints</u> entangled in the diverse mission-sets that operational / tactical climbing is executed. It is equivalent to the (pre - 1996) <u>flawed belief</u> that normative ATLS & pre-hospital EMS models deliver the "standard" for how combat medicine should be performed (thus the emergence of TCCC). The **context** of operational verticality, <u>just as it was for TCCC & TECC</u> (*environmental pathology, mission constraints / restrictions, assets, etc*) dictates **other unique performance parameters** not fulfilled by recreational climbing.

When specifically looking at *sport climbing*, not only is this **completely irrelevant** to an assault or operational climbing team but mindlessly implementing much of the sport-specific kit and techniques can be detrimental when inputted into the operational realm. The end-state of operational climbing **is not** to successfully accomplish a *first ascent* (FA), adhere to the "rules" of whichever *climbing "game"* you are participating (*Tejada-Flores 1967*), overcome various vertical "crux" situations, to finally be lowered down or rappel down and hit the local bar to brag about the *Yosemite Decimal System* (YDS) rating of the climb you just "*bagged*". **Operational climbing** is a **means to an end**. It yields a *tactical* advantage to an operational unit. Operational climbing teams often obtain access for the purposes of; observation, area denial, assisting with commanders contingency planning, obtaining an offensive high ground, and variety of other vital tactical assets.

These ascents or traverses are **not** done with a chalk bag, full racks, climbing shoes, etc. Instead they are executed with weapons systems, comms gear, tactical uniform, body armor, maybe approach shoes, and probably Night Vision Goggles (NVG) unless you choose to opt out of "owning the night". These are only some of the contextual constraints, which completely alter the key process inputs (KPI's), this **does not** include the robust environmental pathologies.

Operational Rescue exists in the Outlier Region of the Traditional Rescue Bell Curve - more accurately it often lives within the fat tail of the power law (inverse). *Many vertical practitioners unknowingly operate handcuffed*, as a result of the innate "training wheels" which are tightly fastened to traditional / normative vertical dogma & interpretation. This promotes the belief that the techniques and systems acquired and /or utilized in vertical certificate courses is "the way" or a "one size fits all" capability. These training wheels are needed early in a practitioners evolution (apprentice level) to maintain stability / operate safely while maturing & engaging diverse vertical problems...BUT if you want to ride that mountain bike in Moab, the training wheels must be removed! If a vertical practitioner is intent on succeeding in the operational arena, they must learn to interpret, innovate & adapt in diverse environments. A comprehensive knowledge of system principles, vulnerabilities, and nonlinear behavior will eclipse memorization of any prescribed / dictated "practice" every time...practitioners create the "best practice" for a specific problem on-the-fly, in real-time based on organic assets, threat level, & level of experience. These "best practices" emerge based on forged principles, endless hours of practice involving continual reevaluation of systems, always inputting increasing stressors & variables - while encouraging & evaluating novel solutions *in situ* (problem-solving).

4. Recognition of the vital interdependence between Nonlinear Physics, Material Science, & HRO principles - is Imperative. These building blocks, when applied, interface creating a symbiotic relationship with an order of magnitude outcome. These enable the end-user to rapidly identify covert vulnerabilities, perform real-time quality assurance (QA), assess both the macro and micro states of system behavior, avoid catastrophic failures within complex systems - while providing a framework promoting engagement which facilitates the enactment & sense-making duality in non-Euclidean, time constrained environments. The principles of nonlinear physics / phenomena, scale-free networks / webs, & open-system / non-equilibrium entropy are innate to every rescue response (actually every response / mission regardless of a rescue occurring) in which you will ever participate. You can either study, understand & apply these principles and remove blind spots, maneuvering within these environments / incidents with greater efficiency, effectiveness, & fidelity... or not. Ignoring these operational truths dramatically increase the vulnerabilities to you as an individual, your team, and any casualty relying on your proficiency.

5. Efficiency begets Speed! Speed amplifies responder security & safety, while reducing "Time" as a potential comorbidity during casualty response - Time delays within *Access, Extraction, & Evacuation* become comorbidities (exponentially interlaced) in the operational realm. If performing a rescue, with the need to get a rescuer down to the casualty - to do something like assess, treat & package - maybe we should put a priority on getting our ass down to them instead of looking for a 3rd redundant anchor that only needs to handle the force of a single rescuer. Don't focus on making an individual "process" faster - rather assess, identify & exploit (operational hacking) the entire interactive system - detect the system exponent(s) (usually within the bifurcations / transitions) - then leverage assets efficiently. Economy of work / effort - seeking out system elements that are typically ignored may contain the hidden gem. In nonlinear systems, *signal & noise* are **not** always independant - signal often coexists or is concealed within noise. This requires the ability to reframe problems, processes, & system interaction. (*ref: "do fast things fast" in the appendix sample tools of this document*). This capability also requires an understanding and application of UI / UX (*User Interface / User Experience*) principles. It all starts with Efficiency.

6. Integration of the "Drop Your Tools" Philosophy is Pivotable! Karl Weick's analogy from wildland firefighting, permeates into all Operational Response situations. Success **can not** be dependent on having specific equipment on hand, a tightly-coupled TTP/SOP, or a single constrained philosophy of "what's right". The "drop your tools" philosophy has permeated out of the wildland firefighting realm into businesses, special operations command, and even NASA (ref - Challenger tragedy). Whether discussing tools utilized in wildland firefighting or the equations / data sets of NASA engineers, be prepared to jettison that which is irrelevant to the problem at hand (although, sensemaking is the one tool that cannot be dropped - van Stralen). This can be clearly seen in the California Firescope REMS ICS-223 (2022) guideline. The authors cling onto NFPA 1983 "G" & "T" rated gear - even though the environment in which these items will be used contradicts what NFPA states in its scope (1.1.5 & 1.3.2).

Training up and down the spectrum of assets within varied environments using a P-A-C-E (Primary, Alternate, Contingency, Emergency) methodology is imperative - from allowing all primary gear to be available for utilization - to restricting / constraining all gear down to contingency & emergency, requiring complete improvisation or "off-label" utilization of on-hand assets. Everything should be evaluated through the lenses of HRO, Requisite Diversity, & Multi-Scale Requisite Variety - re-framing problems for novel innovative solutions.



7. Operational Vertical Response does not yield to the "weak link" or or the "lowest common denominator" doctrine. This verbiage is negligently thrown out too often by trainers & administrations. This is typically just a feeble excuse under the guise of a legitimate justification. This tactic has become so commonplace many thoughtlessly accept it a truth without question. within various domains - in many instances it can be considered hubris. If you have personnel on a "special" team or expected to respond to "special" mission sets / call-outs, and their tactics, techniques, and procedures (TTP's) training is designed for the "weakest link" - there is a problem! The problem resides with either the organizations member selection criteria / hiring board or the training division (and their guideline selection) is incompetent and/or out of touch with specialized response requirements. Agencies should actively seek any and all relevant options, methodologies, & TTP's which would enhance their specialized responses. Operational rescue TTP's & load-outs must appreciate the context, physiological responses & dynamic nature of the emergent threats organic to the variable mission sets they are expected to apply their craft.











8. Requisite Diversity yields a critical shift in mindset. VUCA-T² environments necessitate a complete overhaul or outright abandonment of the most revered dogmatic notions relating to the *mindless application* of redundancy from an acronym, often misunderstood in the vertical realm. This topic ties in directly to #11 concerning SSSF's. Requisite Diversity mindfully (Langer) shifts what is salient to the vertical rigger when interfacing with unforgiving environmental pathology. Misinterpreted, misapplied, & ill-defined redundancy has become a slippery slope leading to backing-up everything in a vertical system, revealing a complete disregard of nonlinear / interdependent system design & behavior. If placing redundancy everywhere it is not needed within a vertical system was the only issue, we could just chalk it up to lack of knowledge, naiveté, negligence, or hubris but this is not the critical friction point. Redundancy is typically accomplished by placing "more of the same" into the system to back up a specific or perceived vulnerability - yet this is only *potentially effective* if the



component / process failure is due to wear & tear **NOT** <u>environmental pathology</u>. Within the rope rescue community, many teams are moving towards mirrored systems (*in the name of safety*) which drastically increases system vulnerability and decreases system stability / resilience in the case of environmental pathology.

9. Techniques, Equipment, & Mindsets must be Elastic to achieve an Efficient "Light & Fast" Capacity. Techniques, equipment & mindsets must be adaptable to the subtleties & nuances of the both the <u>environment & mission context</u> - exploiting reciprocal feedback / decision loops. Continually striving to upgrade an antifragile response. Utilizing processes like "via negativa" - less is more, "avoiding stupidity is easier than seeking brilliance" (Taleb 2012). Inputs & Decisions should be in a bottom-up vector vs top-down during dynamic operations (remaining mindful of Commanders Intent & CCIR (Commander's Critical Information Requirements). The operator "in the arena" recognizes both the time-dependent subtlety & nuance of actions often not appreciated or visible to command and control. This requires an educated operator/agency; who can, 1) articulate the *intent* and *application* of 1.1.5, 1.3.2, A.5.1.2(6) & 1.1.7 of NFPA 1983's scope & appendix, 2) educate and create a relevant, adaptable, & context-focused AHJ as NFPA advises, and 3) recommend <u>how</u>, when & why to wisely jettison inappropriate / inapplicable NFPA stamped components in favor of contextually appropriate and safer EN / UIAA components. This capacity <u>decreases the load</u> *both* physically & mentally - while *optimizing efficiency, decreasing fragility, & cultivating an operationally lean posture*.

10. Innovative Rigging Solutions Emerge from Operational Hacking Fueled by a Neophile Approach. The first iteration of the word hacker was used at Massachusetts Institute of Technology (MIT) in reference to dealings with a computer. In the 1960's and 1970's the term referred to those who were very committed to perfecting their computer software. Hacking also refers to **non-computer oriented activities** that involved "manipulation of a complex system" (SANS Institute 2004). Eric S. Raymond, "There are people who apply the hacker attitude to other things, like electronics or music - actually, you can find it at the highest levels of any science or art. Many claim the hacker nature is independent of any specific medium in which the craft is applied. "The Jargon File" & Raymond (2001) maintain to be a hacker, a person must get a thrill from solving problem, sharpening skills, and exercising intelligence.

The following is extracted from, *Understanding a backer's mind – A psychological insight into the hijacking of identities*, a White Paper by the Danube-University in Krems, Austria;

"The most obvious common 'personality' characteristics of hackers are high intelligence, consuming curiosity, and facility with intellectual abstractions. Also, **most hackers are 'neophiles'**, stimulated by and appreciative of **novelty** (especially intellectual novelty). Most are also **relatively individualistic** and **anti-conformist**. Another trait is probably even more important: the <u>ability</u> to mentally absorb, retain, and reference large amounts of 'meaningless' detail, trusting to later experience to give it context and <u>meaning</u> (Fötinger, C et al).



NEOPHILES FOUNDATIONAL TRAITS

- The ability to adapt rapidly to extreme change.
- A distaste or downright loathing of tradition, repetition, and routine.
- A tendency to become bored quickly with old things.
- A desire, bordering on obsession in some cases, to experience novelty.
- A corresponding and related **desire to create novelty** by creating or achieving something and/or by stirring social or other forms of unrest.
- A complete objection to or distrust of commitment.

OPERATIONAL APPLICATION

Mindset - A hacker's mind is optimized for discovery - for figuring out what is possible, for breaking down walls that were thought impenetrable, and finding vulnerabilities within systems to exploit or strengthen.

Protocol Exploiting - Similar to how a computer hacker exploits an SSL Protocol, convert current or potential TTPs, guidelines, mission planning and / or equipment into protocol diagrams and begin to attack at every point or bifurcation to expose any vulnerabilities or weaknesses - and find the exploit.



<u>A neophile is distinct from a</u> **REVOLUTIONARY** in that anyone might become a revolutionary if pushed far enough by the reigning authorities or social norms, **WHEREAS NEOPHILES ARE REVOLUTIONARIES BY NATURE**. The meaning of neophile approaches and *is not mutually exclusive to the term* **visionary**. **but** differs in that a neophile actively seeks first-hand experience of **NOUELTY** rather than merely pontificating about it.



11. Vertical System Safety Factors must reflect the intricacies & interdependence of Engineering / System Design principles. Many principles from engineering have been placed into vertical system evaluation, specifically the concepts of System Safety Factors (SSF), and Static System Safety Factors (SSF). Believing the technique in which we are applying Factors of Safety in rope work is equivalent to how structural or aeronautical engineers utilize this complex evaluation - is incorrect. There exists a multi-scale analysis requirement that goes way deeper than dividing the strength of each component by the estimated load weight - when static or moving (in the case of a haul system) then identifying the lowest number as the overall SSSF of the system. NFPA has never stated a SSSF that end-users must adhere - ever, not in 1983, 1006, or 1670. There is a reason <u>BS like</u> "*NFPA states rope rescue systems need to have a 15:1 SSSF*" yet these authors have never once work cited this mythological unicorn. Some **Basic / Foundational Engineering Considerations** which the Factor of Safety depends includes; 1) Actual load, 2) Working load, 3) Material type, 4) Material density, 5) Environmental condition & 6) How the various components (processes) interact. Seriously? SSSF is listed in far too many agency SOP's / TTP's to list and Rope Rescue uses all of 2 of the above mentioned considerations. Not only are the estimated safety factors we are calculating far from reality these arbitrary numbers are contributing to irrelevant / useless rigging complexity.

12. Operational Vertical Response advocates Allostatic over Homeostatic Behavior. Homeostasis = Stability through Constancy while Allostasis = Stability through Change. Homeostasis is a significant part of the Linear world view with its simple feedback mechanisms

producing the relaxation of a disruption back to a relatively quiet undisturbed state. The negative feedback loop in Homeostasis is a linear dissipative process intended to ensure that the complex physiological network Knowledge remains at or near equilibrium, which is the defined state of system health. However - such stability is only true for a given range of parameter values in complex systems. The intrinsic nonlinearity of homeostatic systems make their long-time behavior unpredictable. Sociology has shown...From a certain perspective, Industrial Firms, Organizations, Universities, Response Teams, etc. may be viewed as Homeostatic Systems -

Seeking to resist change (limit liability and mistakes) by primarily utilizing negative feedback loops to obtain equilibrium (return to defined set point) while the implementation of TTP's designed around positive feedback loops could meet and/or exceed threshold to regain initiative in significant perturbations (ie. active shooter). Organizations including emergency response agencies have begun to adopt the principles of traditional homeostasis in hopes of maintaining tighter tolerances of performance BUT such organizations utilize the critical capacity to learn from experience & reassess their predictive vulnerabilities which is not a characteristic found in Homeostasis but rather Allostasis. From a response perspective, the frustration many feel when seeing or hearing of the active shooter responses in the U.S. - is primarily due to them being entrenched in a homeostatic / negative feedback loop framework. When the response is activated, the perturbation is already outside the narrow parameter(s) of homeostasis. The framework innate to Allostasis represents the KPP's for dynamic organizations & response agencies to template operational mission-sets. The ability to rapidly adapt, gain stability through change & thrive in varied environments is key. The end-state for engaging chaos is not "order" or equilibrium (not possible in open systems) but rather an accepted / manageable level of randomness & structure.

NEGATIVE FEEDBACH LOOP	Positive Feedbach Loop	SITUATION/SHORT-TERM: FOR SPECIFIC RANGE	Environment / Long-Term: Adaptive	
ampen environmental perturbations Amplify environmental perturbations		Homeostasis / Linear - Be Safe	Allostasis / Nonlinear - Become Safe	
		Has structure (Not Problem-Solving)	Unstructured (Problem-Solving)	
original stimulus	increases stimulus	Trivial Problem - Rules, Protocol, or algorithm	Undefined Problem (VUCA-T ²)	
Counters unwanted effect - reverse	Adapt & changes for desired outcome	Negative Feedback Loop - departure from safe	Negative Feedback Loop - identifies boundaries of	
IE Pupil contraction	IE Childbirth		operational envelope, capabilities, & system borders	
IE Hypo / hyperthermia	IE Blood Clotting	Positive Feedback Loop - is growth & development	Positive Feedback Loop - is progress, no friction, & flow state	
IE Blood Glucose	IE Virus	Not learning - "If - Then" / dictated response	This is learning / adapting / engagement	

Effector

ALLOSTASIS

Setpoint

Senso

Prediction / Preemptive

Σ

Controlled

Variable

13. There Are Rescue Situations that Require "Beast Mode". Speed, Surprise, & Violence of Action, although often overused, is just as relevant in operational access & rescue - as it is in CQB and overall "on target" disposition. This obviously ties back into the allostasis vs homeostasis principle (#12)...& #9, #8, #6, #5, #4, #3, etc. When a rescue need emerges, traditional vertical rescue tactics promote a [defensive / prey posture]. The initial reaction to an emergent rescue is often reactive by nature, however, the execution should not mirror a defensive-prey disposition but rather be engineered to regain the initiative by enacting a coordinated apex predatory assault rescue. These instances require us to rescue like we are *committing a 211* (armed robbery) and FIERCELY reclaim



the casualty while laying waste to any opposition / threats, obstructions, or interference (*internal & external*). We can not engage heightened environmental pathologies in a VUCA-T² environment nervously or rattled. Engaging in this amplified posture requires continually pushing boundaries in training - constantly seeking performance gaps. Templating operational success for these types of incidents starts with implementing many of the tenants of anti-fragility, IE embrace becoming "non predictive", always input & welcome - volatility, uncertainty, & randomness, always plan, prepare, & train with increasing stressors - becoming anabolic instead of catabolic (team, skill & organizational atrophy). This demands a depth of game & mindset which is not found in a book, on the internet & rarely in training...also read about how that whole fight or flight - increased cortisol that blocks your executive function & makes you "dumb" is actually an advantage not a hinderance (*van Stralen, McKay, 2022 May*)(*van Stralen, McKay, 2022 June*).





manifesto background: stray uoltage leading down this rabbit hole

This is a result of thousands of conversations with vertical L practitioners in an extremely wide spectrum of environments while pushing the limits of gear / techniques out of both curiosity and These conversations seem to always lead to long-winded need. frustration about the antiquated mindsets of vertical organizations and what often appears to be a complete misunderstanding of system behavior. The result is a hubris, producing a stagnation of technique innovation, SOP / TTP evolution, and a significant void understanding vertical system dynamics. This hubris propagates an abstractionist (see chart on next page for add'l information) belief that there is only one proper way of executing vertical mobility and a rigid set of rules which must be strictly followed - although these "experts" can never logically explain why or give any supporting data (whether research, knowledge-driven, or context-relevant - empirically derived) to support these unfounded beliefs. <u>Contextualism</u> is a foreign concept and due to their lack of understanding (or maybe brainwashing), believe through cognitive dissonance that continuing to hammer the square peg into the circle hole makes perfect sense. One of the culprits leading to the misunderstanding of system behavior is reliance on the wrong linear "science" / "research" model(s) believing they are "following the science" & consequently obtaining a false "scientific truth".

Real-world systems, including every vertical system we rig, contain <u>multiple processes</u> that are interconnected / interdependent...<u>no</u> piece or process of our vertical system acts independently. This is why our rigging systems are classified as <u>nonlinear or complex systems</u>. This fact means that many Newtonian principles, like *reductionism* or *superposition* are irrelevant or worse blinding the practitioner from

really understanding the truth of vertical system behavior. Eyes are opened with the introduction of nonlinear physics. As a side note the Cliff's Notes of reductionism, state that within a mechanistic system we can remove each individual process (like an anchor, or a knot, or a PCD, etc) solve the process issue or problem independently from the system, then plug it back in and expect everything to work as it should - in a completely predictable manner. To decrease the amount of writing to illustrate this cross discipline linear naiveté which exists in verticality concerning system behavior, we did an experiment. This consisted with us putting out a post on Instagram of a bunch of "sketchy" anchors, hoping that a few social media experts would opine on how unsafe they were, not asking how the rest of the system was engineered or what techniques were employed when using the less than optimal anchor. The response was better than we could have ever imagined, many even commented without reading the context! North American Rescue reposted, and for those IG'ers out there, we officially submit the following comments into evidence, CLICK HERE.

Due to each process being interdependent on other processes within the nonlinear system (often the output of one process is the input for another), in many instances the output is not proportional to the input, not following simple or trivial rules. This type of system behavior is the reason misapplying linear principles like reductionism / superposition lead to negative consequences like wasting valuable time & equipment, mindlessly over-engineering a system, while decreasing the safety to both the system due to complexity & the casualty, because of rigging delays (while they are still lying there injured - waiting for medical / rescue intervention).

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Example - by doing a soft start edge transition we can take up to 70% of my weight off the anchor...if our rope can hit a few angles (door frame, furniture, wall corners, etc) between our anchor and terminal edge, we can take an exponential amount weight off the anchor (radian angles & coefficient of friction are the exponents to Euler's constant for the Capstan / Belt Friction Equation)...and if we can rub our body along the wall while descending...that is even more weight off the anchor <u>BUT</u> as soon as we decide to "L" out or even worse, bounce on our rappel - it all goes to waste (so - don't do this, not a good look)! Click image for additional Capstan information.



T ot unlike the emergence and initial requirements / discriminators of TCCC (Tactical Combat Casualty Care) in 1996 (Butler et al 1996) & TECC IN (Tactical Emergency Casualty Care) in 2010, Operational Rescue requires a different mindset and framing due to the context & pathology / threats organic to the environment in which the vertical craft is inputted. Once again, it requires the critical shift from abstractionism to contextualism.

BREAK OUT BACKGROUND KNOWLEDGE

When evaluating sense-making, categorization or the verbiage one uses to describe a situation, incident, or friction point, the abstractionist purposefully removes the context, nuance, and subtle. It becomes a "one-size fits all" universalism. This is often done by "SME's" and is an extremely effective tactic when forecasting & critiquing, using an *optimal* course of action when debating due to their ambiguity and utilization of precise measurements / statistics. It is through the usage of these linear Gaussian data points, which purposefully removes variables and outliers, that make their arguments / course of action(s) appear valid, well researched, and academic. Karl Weick examines this topic and points out that by abstractionism, the making of the context into abstractions, the operator is at risk of becoming a spectator with dire consequences.

The abstractionist, upon becoming a spectator, is invincible, as you cannot win an argument against someone who solely uses abstractions. Through the abstractionist's effective use of precision for measurement and non-contextual data points, it conceals its irrelevancy and ambiguity to "real-world" application. Aristotle placed the abstractionist approach low in his list of types of knowledge while highest on the list is the application of knowledge in context. This is where you detect HRO in people (DvS - personal communication).

Abstractionism	Contextualism
Removes / Disregards - nuance, subtle, operational constraints, environmental pathology, potential emergent friction points & contingency operations	Includes & Highlights - the granular, nuance, subtle, spectrum of operational constraints, environmental pathology, potential emergent behaviors (experienced prior), & the inclusion of contingency operations
Intent = A need for action / indication for action (theoretical constraints & ambiguity prevents specificity - labeling what the action is)	Intent = Action(s) initiated / completed, Reciprocal Feedback
Response = Theoretical , scripted (generalized), conceptual, belief-centric, algorithmic / binary, familiar, categorized based on linear SOP's / TTP's, top-down input / decisions / micromanagement	Response - Pragmatic, "in flux", engagement-centric, thinking while doing / real-time sense-making, "best practices" are created in real-time / what works, audibles called from forged principles, enables bottom-up input / decisions
Hedgehog / Tight-Coupled / Linear - Fragile to perturbations / stressors / unforeseen impacts	Fox / Loose-Coupled / Nonlinear - Antifragile to perturbations / stressors / unforeseen impacts
Dependent on and rationalizes use of Gaussian Framework	Understands and meets conditions of Power-Law (IPL)/ Pareto
Meets conditions for only using <u>Risk Assessmen</u> t Risk = all options, consequences, and probabilities are known Quantified Mindlessness (Langer)	Appreciates and utilizes both <u>Risk & Uncertainty Assessment</u> <i>Uncertainty</i> - all options, consequences, and probabilities are Not known Quantified & Qualified Mindfulness (Langer)
Specialized, Stalwart, Stubborn, Order-Seeking, Confident, Ideological	Multi-Disciplinary, Adaptable, Self-Critical, Tolerant of Complexity, Cautious, & Empirical
Homeostasis - Stability through Constancy	Allostasis - Stability through Change
Error is viewed as movement (deviation) away from normal or planned	Error is viewed as a signal, Error is information unfulfilled - "Noise" the meaning yet to be known
<i>Little / No Exposure</i> - consequence(s) to be wrong / no skin in the game	<i>High level of exposure</i> / Skin in the game
Put theories into practice	Create theories out of practice

Operational Vertical Manifesto

PHILOSOPHY & METHODOLOGY

O perational vertical capabilities must be adaptive, principle-based, and relatively simple. Introducing complex, complicated, or rote rigging systems into what is likely an already complex response environment rarely contributes to operational success. Fluid environments compel responders to clearly identify the environment's characteristics, appreciate relevant organizational standards and intentions, and adapt organic resources to emerging threats. The following examples illustrates how responders, regardless of their level of training, cannot rely on the presence of specialized personnel or equipment during the dynamic execution of emergent vertical extractions in VUCA-T² (Volatile, Uncertain, Complex, Ambiguous, Threat containing and Time-compressed) environments (McKay, et al. 2020).

CONTEXT

During the response to the September 11, 2012 attacks on U.S. diplomatic facilities in Benghazi, Libya, a United States (US) military Special Operations Forces (SOF) member executed an improvised vertical extraction under enemy fire. In <u>Benghazi: The Definitive Report</u>, Jack Murphy describes how a hastily composed response element evacuated critically injured Americans from a rooftop defensive perimeter, including how "they (SOF) lowered the bodies down with webbing they had cut from gym equipment" (Murphy & Webb, 2013) (McKay et al, 2021). This construction of a lowering system with non-standard yet on-hand materials demonstrates how unexpectedly requirements for vertical mobility can emerge under such VUCA-T² conditions.

A well-televised New York City Fire Department (FDNY) high-rise rope rescue is an excellent example from the fire-service of effective improvisation with on-hand resources. In May 1991, FDNY's Rescue-1 crew extracted two workers trapped in

smoke-wreathed windows on the top floor of a commercial office building. Upon accessing the roof immediately above the fire-engulfed 12th floor, Lt. Patrick "Paddy" Brown's crew performed "the most daring rooftop rope rescue in FDNY history" by executing two hasty single-line lowering systems from locations devoid of suitable anchor points. To compensate for the architectural disadvantage, two firefighters held fellow firefighter and default "meat-anchor" Kevin Shea in place while a rescuer executed a gentle edge transition. Shea produced enough friction to control two-person descents by rigging the rope as a spine-wrap on his harness's carabiner and maximizing its angular contact over parapets. Despite the absence of more preferred equipment, Brown's Rescue-1 crew effectively lowered rescuers to secure (hasty pick-offs) and transfer window occupants to the safety of evacuation crews waiting in 11th floor windows (Ceder1956, 2016) (Fratus, 2020) (McKay et al 2021).

In 2016, Marc-André Leclerc completed the first solo ascent of the Infinite Patience route on Mt. Robson's Emperor Face. After completing this climb, he wrote on his blog that he "was intimidated by (the Emperor's) strong aura but in the end we became friends and the King generously shared his wealth leaving me a much richer person indeed. Thank You." (Leclerc Blog).

Leclerc is quoted, "I lay on my sleeping pad with these thoughts running through my mind, feeling very small and very alone, until as evening approached certain calmness overtook me. I realized that I was approaching the route with a healthy amount of respect, and that the King also respected me and my ambitions in return. I was being drawn toward the mountain in a search for adventure, by a desire to explore my own limitations and to also be immersed in a world so deeply beautiful that it would forever etch itself into my memory." (Leclerc Blog).

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This should be <u>our attitude towards all vertical tasks</u>...we have <u>no guarantee</u> of success or safety, ever - any anchor can blow out....although being mindful from experience can greatly <u>reduce</u> the *occurrence or probability* - we also have to acknowledge the more covert nonlinear sucker punch of *possibility*. Any edge can unexpectedly cause a rope failure, any anchor can cut our sling or webbing...even when we believe we are "keeping an eye on it" - without a healthy respect of the environment and its innate pathology effecting & interacting with our activity...we are committing **naive hubris** - an empty overconfidence in 1) our capabilities, 2) our understanding of a complex environment, and 3) our equipment behavior and interaction (which we probably haven't tinkered with in every environmental pathology that we could potentially be required to work within).

Our typical rigging in training <u>should not</u> be considered representative of an "on-target" or mission-ready capability. What occurs during training is only a small slice of the pie - of an often unappreciated and unpredictable system that we may have to

work within during a real-world response. Training is planned, most real-world variables aren't inputted into operational training or scenarios. If the weather sucks, due to rain, ice, heavy mud, etc, we cancel or move training inside - never understanding how our systems or individual components will behave or articulate with each other when called to respond under less than optimal conditions. If this simple principle is argued by any of our peers, do not ever let them rig a system outside of their training tower!

enuironmental pathology & maneuvering within...

The term *pathology* is most often associated with the domain of casualty care. For many of us that have worked in a prehospital setting - wherein providers do not <u>diagnose</u> but rather rapidly identify and intervene, pathology can at times be straight forward and other times be a complex web. This casualty pathology may take the form of penetrating trauma, traumatic brain injury, or various disease processes. Pathology has its roots in ancient Greece from pathos, meaning "experience" or "suffering" and -logia, meaning "study of". Definitions span the spectrum from "deviations from normal that constitute disease", "deviations giving rise to social ills", to the ambiguous "something abnormal".

It is critical that vertical practitioners recognize that the environment also carries & inputs its own pathology. In other words, the environment always has a say. VUCA-T² is often used to describe the unpredictable environment we are often called to work within. This pathology can take the form of a behavioral or physical threat, weather conditions, topography within the area of operations (AO), enemy disposition, or adjacent supporting units. When these two pathologies become interdependent, the environment typically becomes the comorbidity to the casualty pathology.

The **Environmental Pathology** & **(Onstraints** are a given and often emerge unexpectedly, this we cannot change. The only process capable of changing in these response systems is us...this is **ALLOSTASIS** (*stability through change*) vs. **HOMEOSTASIS** (*stability through constancy*). We must take <u>nothing</u> for granted while respecting, appreciating, & planning against the known (and potential) environmental variables.

Question everything - Always ask why - whether current SOP's / TTP's, administrative philosophy / decisions, or the rambling of opinions from an instructors *pie hole*. Most responses to your inquiry will be inaccurate / misunderstood antiquated dogma, and / or have zero data to support the technique or system being promoted or defended. Without data, research or empirical (contextually relevant) evidence - all they have is an opinion - and not unlike ones rectum, everybody's got one. These responses will also typically collapse under the weight of the KPP's of a dynamic high threat environment.

like Wu-Tang -

it's for the children...

INPUTTING SOME HRO CHARACTERISTICS:

A lways have a **PREOCCUPATION WITH FAILURE** - of our skill level, rigging techniques, & equipment, always assessing what is...or has the potential to fail & what do you want to avoid? Cultivate a **RELUCTANCE TO SIMPLIFY** - the task or incident at hand regardless of how often we have rigged this or that system - or have been at the location we are at, we will always be operating in an "ahistoric" context - we have never been at this specific location - at this specific time - under these specific variables. *Things that have never happened...happen every day.* Continually question whether you are oversimplifying "this" and ask what are you missing - what will go wrong next, which may knock you on your ass? Habitually seek an improved **SENSITIVITY TO OPERATIONS**...knowing the team dynamic - strengths / weaknesses and system behavior, questioning yourself what are you or your team doing & why...is there a potential to reframe the problem or engagement priorities? Continuously improve your **COMMITMENT TO RESILIENCE** posture - knowing 20 different ways to rig various systems - calling audibles based on of what the environment gives you to use, frequently reassessing / asking what assets (organic & external) do you have to work with - & what can you do about deficits now? Finally, cultivate & defend a culture of **DEFERENCE TO EXPERTISE** - when rigging or problem solving, identify your personal or team skill boundaries - and exploit internal or external knowledge of human assets regardless of time & grade on team, rank, or certification level - remaining inquisitive to who knows "this" more than you (or team) & who has the best handle on "this"?

We must appreciate that <u>we are not</u> typically working in an open or closed decision / feedback loop - which is the verbiage of self-proclaimed SME's trying to sound academic, using abstractionism for justification...when in reality they are linearizing a nonlinear problem due to a negligent level of naiveté or blatant ignorance. <u>Rather</u> we are engaging the environment to <u>promote</u> the sensemaking & enactment duality. Operational AO's are more complex than many realize - so the Educated Operator will actually utilize a <u>reciprocal feedback loop</u>, facilitating superior fidelity while appreciating the nuance and subtle - allowing the team to actually become stronger & more efficient when operating within a VUCA-T² environment...<u>becoming</u> Antifragile.

REALITY CHECK...ASSESSING YOURSELF, YOUR TEAM & INSTRUCTORS



LON'T BELIEVE THE HAPE or that you know what the hell to do in every situation...bring your experience to the fight, but don't try to hammer a square peg through the circle hole, fight cognitive dissonance - adapt to what the environment gives you to work with. Know how to rig whatever you need regardless of your organic assets - train thru the whole spectrum of what is available or "at hand" (internally - gear, personnel, etc or externally - anchor options, edges, weather, time of day or night, etc)... Don't suck at your craft & <u>don't</u> open yourself, your team members, or your students up to

vulnerabilities. Approach every incident w/ a **CONFIDENT HUMILITY**. Remain Confident, because of the hours and hours... and hours of training (blood, sweat, & tears or profanity) - divergent rigging - trial and error, pushing limits of every piece of kit carried - for prescribed and "off-label" use, actively seeking out individual / team weaknesses to address and overcome. Always train with increased stressors (Anabolic) instead of just training the same old shit - the same old way (Catabolic) - which results in atrophy. Atrophy - not just of your skills but of your capabilities, innovation, decision-making, dynamic adaptation, self-organizing, contingency forecasting...and the list goes on & on.

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If you haven't or at least considered changing or updating your TTP's / SOP's in over a year - this directly correlates to stagnant knowledge acquisition and / or a lack of innovation. Constantly seeking more efficient & adaptable vertical rigging techniques / processes, load-outs, and contingency options is a requisite if attempting to transition verticality from a capability to a craft. Technology advances much faster than skill sets & TTP's - staying ahead of the curve takes a commitment. Understanding the "pro's & con's" of new technology - specifically when & when not to use new technology is vital.

REMAIN HUMBLE - because you apply your craft in an unforgiving & unpredictable environment. The second you let your guard down and forget that at any time - anywhere - Murphy will emerge and an unexpected failure will occur in your system due to negligence or environmental



pathology. The cost of this negligence or over-confidence is your blood or that of a team member. We are one mistake from being viewed as a dumb-ass! "Starve the Ego – Feed the Soul" - DJ AM. What you don't know is much more important than what you know - Taleb refers to this through the "antilibrary" analogy but <u>if you don't like nonlinear academics or despise reading</u> - You can get a small grasp on this concept by recalling your favorite '80's girl band, Exposé and their hit "What you don't know" from May 20th, 1989 (which you may have had or still have on repeat in your car).

As an instructor, when teaching a technique and not including <u>at least</u> the following <mark>2 points</mark>...you're probably wrong or insecure in your knowledge and understanding of the context in which the technique will be utilized;

"The loudest one in the room is the weakest one in the room." - Frank Lucas

hy are you teaching the end-user a technique? Which may deviate from their current TTP's/SOP's - <u>meaning</u> what are the data points supporting what you are teaching & if it is something different, why is it better for their utilization based on the KPP's of their missionset(s)? What is the MBS, efficiency, complexity or simplicity, weight / footprint, and what are your references...*peer-reviewed* - if it is research, what is the "n"...what variables were removed to utilize Gaussian framework, or what variables were permitted, to utilize a Power-law? If this is not communicated to the end-user *it is only the instructors opinion* - which <u>doesn't mean shit</u>...(think *prison purse* analogy with opinions)...If the the enduser disagrees with you...<u>verbalize this point</u>, they <u>are not</u> arguing with you, <u>they are</u> arguing with <u>science & validated research</u> (which you need to provide for them from your own continually evolving knowledge library) and ask them kindly to produce the data points & context-specific/ relevant studies supporting their preferred technique so the group can make an educated analysis of conflicting information. If they don't have this data - respond with WTF (as my teenage kids would text).

Also, keep in mind - not all "research" is VALID or RELEVANT for the operational context of your organization - learn how to read / analyze research, understand statistics (and its misuse), and recognize overt or covert bias within published works- basically own your shit & call out irrelevance publicly, make peers, instructors, admins, & committees defend what is written or comes spewing out their pie hole. If you torture the data enough it will tell you whatever you want to hear. But that being said, we won't always have data points for everything - so when addressing this type of circumstance - TELL the end-user, you don't have the research, peer-reviewed literature, or data points for this or that technique - BUT here is my/our empirical or experiential history with rigging this technique versus that technique AND this is how it relates to the context in which the end-user operates...so, give it a try and "take it or leave it" based on the knowledge the end-user has of their team / organizational operational flow.

Operational Vertical Manifesto

Donce you have taught them how to ID the system behavior to keep a vigilant mindful eye on (early sign of failure) - then present them with various strategies to mitigate this rapidly unfolding system failure (this includes the "West Coast vertical LARP'er" ABOK #1410). We can make anything fail...freaking anything, even if the probability of that occurring is minimal...it is still a possibility. Never be overconfident in any rigging, although some technique may work 1,000 times, on the 1,001 attempt everyone dies because the environmental context or pathology was different. There is no "ONE or Only WAY" - whether a technique or equipment, that works in all situations and environmental pathologies with 100% reliability! Instructors (also true for many equipment vendors) with limited commitment to resilience can always make their "one way" of doing something succeed in training by setting up the right context or conditions with the right environmental assets (usually never present in your next AOR). Make what you teach antifragile. Identify & Create an evolving list of ways "this or that" technique and "this or that" piece of equipment could fail operationally or not be ideal for certain applications, this is a must.

This quote is by Taleb - for those readers and practitioners of nonlinearity. Those who are constantly striving to gain better insight into real-world operational systems - removing cognitive barriers or operational blind spots which lead to misunderstanding, misestimating, and mis-specifying critical nuances in rigging or "on-target" behaviors.



"The writer Umberto Eco belongs to that small class of scholars who are encyclopedic, insightful, and nondull. He is the owner of a large personal library (containing thirty thousand books), and separates visitors into two categories: those who react with "Wow! Signore professore dottore Eco, what a library you have! How many of these books have you read?" and the others – a very small minority – who get the point that a private library is not an ego-boosting appendage but a research tool. Read books are far less valuable than unread ones. The library should contain as much of what you do not know as your financial means allow. You will accumulate more knowledge and more books as you grow older, and the growing number of unread books on the shelves will look at you menacingly. Indeed, the more you know, the larger the rows of unread books. Let us call this collection of unread books an antilibrary."

Instead of a celebrating everything you know, an antilibrary is an ode to everything you want or need to explore. The vastness of the unknown can feel overwhelming, which is why many people feel uncomfortable with the idea of accumulating books they haven't read - it shows operational vulnerability - which you must actively seek and embrace when you find - you were able to identify an occult vulnerability before it killed you or a member of your team operationally! *Embracing the unknown* is what drives discovery. As Scottish scientist James Clerk Maxwell once said: *"Thoroughly conscious ignorance is the prelude to every real advance in science."* An *antilibrary* is a reminder of everything we don't know & and it should be absolutely f#@king humbling...requiring us to be suspect of everything contained in our response TTP's - mentally filed under "VERITAS".

Operational Vertical Manifesto



By expanding our awareness of unknown unknowns, an antilibrary may even be an antidote / countermeasure to the Dunning-Kruger effect, where we tend to overestimate the extent of our knowledge. We always (almost always... depending on distractions, rabbit holes, and Adderall dosage) start our classes stating, we take what we do & teach serious but we don't take ourselves so serious that we wont fail 100 times trying to innovate a solution to a problem an end-user is having that has never been solved before...because on the 101st attempt - unicorn magic will emerge and our

collaboration just kicked the shit out of the line separating what is perceived as possible & impossible.



Strive to be the person or group that others call on the *Bat Phone* when the word impossible enters their description of a wicked operational problem they are attempting to solve! [*Drop ego, approach problem with humility and an unbiased mindset, frame/reframe problem, utilize nonlinear tools, start divergent then maneuver to convergent solutions with inclusion of operational constraints - iterate potential solutions - refine, collaborate, exploit organic assets, and redefine what is possible]...then continually re-evaluate a given solution, making it*

more efficient, faster, easier / less complex, and input a dash of **REQUISITE DIVERSITY** - reflect on the magnitude of what you just did <u>but</u> realize it only fit the specific context in which you designed it. Your new solution - the beautiful creation, emanating from your "brain loins" - <u>is not</u> a cure-all, change one variable and everything downstream and tangential also changes, which then makes the new TTP irrelevant but - like **VOK** (*Dirty Ghetto Kids*), you're "making somethin' out of nothin"...get amped & addicted to solving f'ed up problems that 99% of the earths population has no clue even exists...and finally <u>compare</u> / <u>contrast</u> what you did (and continually "do") to Post Malone's lyrical discourse in "Wow" or Kool Moe Dee's "I Go to WORK" blaring in your *Ear Goggles* (*RIP MCA - Adam Yauch*)...<u>then move on</u> with new insight & knowledge, put past successes where they belong behind you & innovate more;



"And this is not a 40, but I'm pourin' out this shit (Yeah) Used to have a lot, but I got more now (Yup) Made another hit 'cause I got bored now (Yup) <u>Always goin' for it, never punt fourth down</u> <u>Last call, Hail Mary, Prescott touchdown, ayy...</u> It's a moment when I show up, got 'em sayin', "Wow" (When I show up, got 'em sayin', "Wow") POST MALONE "And when this rhyme is done Your mind will become so trapped in the rap You'll lust another one But you gotta wait, it takes time I don't write, I build a rhyme Draw the plans, draft the diagrams An architect in effect And it slams And if it's weak when I'm done Renovate and build another one I Go To Work..." KOOL MOE DEE



Getting Granular on a few Key Points...

I had previously read & listened to Mark Twight's books, blogs & podcasts. Finally, a few years ago was fortunate enough to meet this legendary alpine climber in person at a small event we were both supporting in Moab, Utah. As a side note - potentially one of the best book titles ever (and great book too), Kiss or Kill: Confessions of a serial climber. I chose a few specific points taken from his books, blogs, and in-person communication to reiterate & get a bit more granular into a few of the concepts previously discussed. The first two are grounded on Twight's friendship and interviews with world-class competitive shooter and author Brian Enos.

Our past successes don't mean crap - We are only as good as our next endeavor

When we succeed - whether operationally, competitively, or by innovating something which altered peoples reality, we tend to cherish it like it's our baby - we defend it, become prideful of it, expect accolades for it, and often try to hang our reputation on it - many times exploiting it for personal gain, well beyond it's actual worth. Once we take this view of our accomplishments, it becomes a burden - keeping our accomplishment that may become outdated - still relevant, continually making our accomplishment 'a little bigger of a deal' than what it actually was because others are surpassing our benchmark, or worse - we anchor our self worth and associated inflated pride on that which is in the past, which occurred under specific circumstances, in a specific environment, under specific constraints and variables which may be completely irrelevant for future undertakings and ventures. This is not to say past accomplishments are not bad-ass, but we need to keep them in perspective and not become a burden or a crutch inhibiting us from continually evolving and advancing our craft exponentially. Mark Twight discusses the approach Brian Enos takes on this subject in the following:

"Brian was always curiously detached, or more accurately, non-attached. He could do without anything and disliked whatever might affect his freedom or sensitivity. Watching him burn the tokens of achievement (trophies and plaques and shirts won during the season) in a New Years Eve ritual made me reconsider why I held on to totemic reminders of an experience. Was the experience itself not enough? Why would I bind myself to the experience and the man I was when I had it with a token? Everything in life is a challenge. You can accept the challenge to improve, or you can bask and distract yourself with success"

CONTEXT - THOSE TRAINING WHEELS EVENTUALLY HAVE TO COME OFF ...

When going through vertical certification courses, we need to acknowledge that the techniques taught whether discussing knots, anchors, or haul & lower systems - we are being taught very general / benign tasks. If we use the NFPA 1006 Technician certification course as an example, although it is the highest rope rescue certification 1006 offers, it in **NO way** means we are competent or are even close to having the skill sets, knowledge, or "depth of game" to find our own ass with both hands in a complex vertical rescue situation. **NFPA 1006 is an extremely versatile and nonrestrictive guideline**, **never dictating any specific piece of gear or technique** to accomplish any of the JPR's. NFPA 1006 provides a phenomenal foundation for the vertical practitioner to continuously *frame / reframe techniques* for <u>varied environments response configurations</u> from **novice** to Yoda.

The problem <u>isn't with the guidelines</u>, it is with the belief that the techniques taught in a certification course are the techniques that should always use. The techniques taught in most certification courses are taught because of either tradition or because they are believed to be safe enough to keep the end-user from hurting / killing themselves or their casualty until they progress in their experience / knowledge base. These first techniques learned are similar to training wheels, which create a foundation for us to get our *balance, confidence, and appreciation of capability boundaries*. Eventually we are going to want or need to take that mountain bike off road in some pathologic terrain in Moab and those training wheels have to come off. Use those early "rules" until you grow out of them and they become dangerous constraints. Every response, environment, and vertical discipline have different KPP's. Remember most of the knot efficiencies, anchor configurations / strengths, and SSSF data we were taught has now been shown inaccurate and theoretical (Evans 2011, 2012, 2013, 2015, & 2016). I love a bolt action... or a lever action 30/30...revolvers are cool to shoot also. All of these are pretty safe, stood the test of time...all shoot projectiles...and still to this day you will see ranchers rolling with these BUT if the context wasn't riding a horse on a ranch but rather doing CQB, you may want to rethink your load-out.

Operational Vertical Manifesto

Next: Not appreciating the complexity of our task and the environmental influence

This relates to having the depth of game to be adaptable vs rote memorization of specific techniques, falsely believing they will always work, committing cognitive dissonance and continually hammering the square peg into the circle hole. We see this ad nauseam with various rigging systems. Ask someone on a traditional FD Tech Rescue team to build you a 54 MA and you will most likely see a Simple 54 constructed. Then ask them to build a 54 complex or 54 Spanish Burton - if they rationalize their inability to build these other versions of a 54 by stating. The simple 54 always works and there is no need to learn the others," then remind them, everything is good until it's not. Rote memorization when applied to stimulus - response is also a "training scar" which can have catastrophic consequences. Every situation is different, whether discussing shooting, high-threat medicine, hasty breaching, or rigging - if death could be a consequence of your actions - stimulus-response / rote behavior programming is a mindless (vs mindful) training

aid to avoid in most cases. The following is from Twight's blog:

"Ultimately, Brian taught me how to think or rather, he pointed out that patterns and formulaic responses as rehearsed habits, are not honest. The habitual response to stimulus prevents a new and fresh relationship with the environment - and with one's own feelings. I never imagined this revelation would help my shooting but it did. Over time I learned how to tune my sensitivity, to respond to stimulus as it was and I was - in the moment rather than reacting by rote. Brian taught me to notice things - To Be here. Be free. Simply B.E."

Follow on ... Part 2 ~ CONTEXT - TRAINING WHEELS EVENTUALLY HAVE TO COME OFF

In many cases, we are rigidly following "rules" from guidelines which in many cases these "rules" do not exist or absolutely do not apply. We are literally handcuffing our response under a false premise. This often comes from a misunderstanding / misinterpretation of NFPA 1983, then inappropriately transferring this flawed view into NFPA 1006.resulting in a compounded fallacious & counterfactual team SOP's / TTP's. This misunderstanding spans from SSSF's (static system safety factors), to approved anchors, to equipment (ropes, carabiners, PCD's, etc), to a complete misuse of "redundancy" which tragically impacts our view of appropriate system design. A wise buddy of mine who works on the federal operational side refers to this as "institutional incest", we know it's not right, but it's all we think we got...so might as well keep doing it - this is not a good look. For better fidelity on the confusion and mistakes surrounding NFPA & EN / UIAA Guidelines, read this <u>ARTICLE</u>. Know the critical role your AHJ plays!

A quick thought about redundancy - We see the word "redundancy" within every anchor pneumonic which contains an "R" - ERNEST, SERENE, etc. First look into the context of these acronyms and also the type of anchors they are describing. Redundancy to many, including aerospace has traditionally meant "more of the same" - inputted into a specific processes of a system where *failure must be avoided or mitigated*. In theory this sounds legitimate but when mindlessly put into practice, results vary. We often see redundancy installed into processes of a system which are not the most vulnerable - *system properties, which should be salient, is eluding many riggers* - IE. backing up the bomber anchor "just because" and not giving any thought to the AHD (artificial high directional) which has an angle of ~60°(included angle), which is seeing around 173% of the load weight - also, not a good look. We should be able to articulate clearly and logically *why* and *where* we are introducing redundancy. Doing it, just to do it is not the correct answer because we are actually inputting more complexity into a system that probably doesn't need it. Bringing complexity into a preexisting complex system has an exponential effect - try to avoid this.

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Redundancy in our opinion is not the correct word or methodology. We use the term Requisite Diversity. Engineering has terms like TMR (triple mode redundancy) which is inputted into designs of critical processes. This technique works for a failure due to normal "wear & tear" BUT not for failure occurring from environmental pathology - which accounts for the majority of failures in operational rescue. One example (of many) of TMR would be Air France flight 447 which disappeared over the Atlantic with 228 souls on board. It was a failure of the pitot tubes (all three) due to freezing. The statistical probability of a crash occurring from this was less than an alien attack - the pitot tubes didn't fail from being worn out, they failed because they froze (environmental pathology), and if one fails - they all fail.

This is a complex topic which has many critical aspects but how does this effect your rigging? <u>Design your system so any identified potential failure</u> <u>points</u> - fail into something which is just as strong if not stronger **but** has a <u>different vulnerability profile</u>. IE- If rigging a high directional anchor in a **CBRN** environment - in which the AHD could be exposed to agent, we know that our nylon webbing will probably fail quickly <u>if</u> exposed - <u>so more</u> <u>nylon webbing is not the right answer</u>. Consider backing it up with Innegra® Webbing, which is just as strong but resistant to acids, bases, & organic solvents...and way more cut resistant...So its pathology vulnerability differs from the material it is supporting or backing-up.



This ties directly into another Taleb-ism...*Platonicity* or the *Platonic Fold* (Taleb 2007), which encompasses or governs many organizations philosophy for response into the highly volatile environments in which they apply their craft. Like Plato, with his abstract and ideal "forms," human beings in general tend to favor neat, clean, "pure" concepts that are universally consistent (and linear). These concepts - *mathematical rules, notions of historical progress, algorithms, "best practices", and economic laws* - allow us to form & have confidence in *mindless* models (inaccurate or abstract at best) of the world so that predictions are much easier to make <u>but often riddled with failings</u>.

ELLEN LANGER DESCRIBES THIS IN THE FOLLOWING STATEMENT, "Mindlessness allows us to be frequently in <u>error</u>, but rarely in doubt".

The problem with these models = they lead us to "**mistake the map for the territory**"—that is, we are fooled into thinking the models represent reality (Abstractionism), rather than the unpredictable, context-specific, ever-changing reality, in which we actually work (Contextualism).

Keeping this in mind...Lets discuss the often unsung heroes of the operational vertical realm the Operational and / or Assault Climbing Team GANGSTERS...

O perational and / or Assault Climbing Teams have unique and broad spectrum capabilities and requirements. As previously mentioned in the *"Brief Synopsis"* under principle #3, these teams provide a multitude of tactical capabilities when operating in diverse AOR's (Areas of Responsibility) containing any kind of verticality including throwing assault ladders. The members of these teams input the skill-sets of climbing & scrambling (mountain & urban), hasty and deliberate rescue (hauls, lowers, high tensioned systems, etc), calculated tactical / assault access from varied *"at height"* platforms (rooftops, cliffs, ledges, etc), and emergency egress for themselves and / or their entire operational unit.

"Hey Brah, toss me that chalk pot so I can crank off this micro crimp and dyno to that nubbin without greasing off on the helicopter move." - Lee Vartanian (Esq.), Helicopter Sit Start Onsite Rock Town Georgia

One way the above concepts (Platonicity / irrelevant models) seem to keep playing out in the vertical arena is through the permeation of recreational climbing tools, techniques, & mindsets into mountain warfare / tactical vertical movement briefs, presentations, and courses (internal & external) - effectively disregarding operational KPP's. Those influencing and drafting the programs of instruction (POI's) seem to be fixated on trying to adapt an abstract normative recreational approach / framework into an operational specific context containing conflicting constraints, KPP's, end-states, priorities, and absurdly divergent environmental pathology. Although some of the topics / lesson plans covered in many courses have relevant operational sub components, IE. *mountain weather, water procurement, animal packing, etc.*, there is a glaring innate naiveté when *Freedom of the Hills* is the primary text work cited for the crux of the course. There are also state-side risk management influences that may explain the reliance on selecting well established and heavily protected recreational routes for trainings, exercises, and yearly proficiency requirements. <u>Also.</u> for the military, curriculum development requirements like TRADOC ensure that the program will always be antiquated, never being able to keep up with technology, material science, or pertinent technique evolution. This is blatant concerning ropes. Although potentially discussed in a few courses, the integration of twin/half ropes to exponentially increase speed & efficiency for small party movement has yet to occur. Oddly enough, we have yet to see the obvious push towards equipment like *Edelrid's Swift Protect Dry* dynamic ropes (*8mm / 9mm*) - which somehow figured out how to integrate aramid fibers into the sheath, obtaining unprecedented cut resistance / durability while still adhering to the required EN standard for impact force.



Real-world operations are far less predictable than normative climbing models provide and will frequently involve a vertical operator using a variety of climbing techniques and equipment to traverse, ascend or descend mountainous terrain in what would be a "First Ascent" scenario or FA. In contrast to the structured recreational routes where all qualifiers for risk assessment are met (all options, consequences & probabilities are known), the determination to utilize a technical vertical approach to access a designated area is vastly different in the ill-structured tactical environment. The tactical evaluation for route selection includes variables like avoiding expected routes (those common mountain passes, paths and routes used by indigenous people), threat location, feasibility of alternate or contingency high ground locations, time allotment to accomplish access, and impact to mission if unsuccessful or compromised, all of which meet the criteria of uncertainty (handled very different than risk - later in this document). The operational end-state = overall mission success, don't compromise mission, don't get injured or die and execute assigned task when high ground is obtained vs recreational end-state = get a red point on another YDS graded route.

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T n order to ensure a technical approach is not one used by indigenous people, it would need to be a route requiring a mix of modern climbing gear and techniques adhering to requisite diversity - rendering it possible and safe. Continuing in this mindset, the criteria for selection of a technical route by the operational vertical specialist(s) would potentially include the ability to employ area denial options to the enemy. The tactical advantage gained by having an organic highly-skilled vertical team with the capability of rapidly negotiating a technical approach is comparable to that gained with the integration of helmet mounted night vision & thermal devices. Night vision & thermal optics allowed tactical units to reshape and disrupt the battlefield utilizing TTP's unthinkable to their enemies (who did not previously have knowledge or access to such technology). The ability to exploit this technology across the entire spectrum (ground, maritime, aviation, etc) of battlefield assets, resulted in operational domination & the maxim "We Own the Night". We submit, with the adoption of the context-specific Operational Traditional (Op Trad) skill-set, the impact to operational / tactical mission-sets would be at the level of TCCC / TECC for casualty care and night vision for low-light / no-light tactical operations. Op Trad is a departure from the traditional tactical vertical movement / mountain warfare curriculums, which rely heavily on the Recreational Sport & Traditional (Trad) climbing domains. The weapon systems, R&D technology, vehicles (ground/air/marine), point of wounding medicine, and asymmetric TTP's utilized within special operations do not mirror civilian or recreational disciplines...why would vertical access & rescue be the exception. When examining operational verticality as a whole, it closely resembles and interacts with tactical medicine, which broke free of civilian influence in 1996 after AAR's from the Battle of the Black Sea (1993). Op Trad was developed & continually evolves - innovating context-specific / mission-centric vertical access techniques and re-calibrated vertical problem framing - constantly refining through close collaborative iterations (Agile-centric) with diverse SOF (special operations forces) end-users. Op Trad's consolidated intent / end-state = "Own the High Ground" in modes not vet imagined.



TRYING TO CLIMB WHILE HAVING YOAR HANDS TIED BEHIND YOAR BACK



As a modern fighting force, the issue restricting operators from gaining access to strategic high ground utilizing preferred / optimal routes is not a lack of technical equipment to safely maneuver. Although, when ounces count the equipment needs to be minimal, hence the case for an "Alpine Light" or a "Light & Fast" approach to gear selection and corresponding climbing techniques. The issue is not a lack of value or mission impact from acquiring the locally inaccessible high ground. To date, everyone we have trained has an operational example of when these capabilities have saved lives or saved time generating a massive tactical advantage. The issue, is a void concerning the dissemination of operationally relevant skills, including equipment selection considerations and operational route selection criteria. This vacuum of mission critical skills originates from training venues, then permeates into specialty teams, inevitably leading to the shelving of misapplied skills and irrelevant gear due to the absence of any true executable capability being transferred to end-users.

Believing recreational climbing skills taught, which are relevant if the end-user will be ascending already established routes that are either prebolted or have a string of bomber placement options for protection (pro), has the relevance of training tactical medics in zero threat environments while only focusing on blunt trauma.

I f FA's are on the METL (mission essential task list) for the vertical specialist, preparing for this is difficult. Those recreational climbers who establish FA's are one in several thousand. These climbers are not advocates of teaching their craft due to their desire to preserve the purity of the sport as well as the conservation of the rock faces they hold sacred, not to mention, they are on a different level, usually busy planning their next venture. Yet this is the correct operational context (minus any real planning & operational constraints) and should be foundational for all mountain warfare/vertical access trainings.

THE PROBLEM: BELIEVING THAT THE RECREATIONAL CLIMBING DOMAIN IS NORMATIVE AND APT TO ASSIMILATE INTO THE OPERATIONAL REALM



As a guide your job is to travel light and fast which is often relevant operationally, but, as a guide, your reason for speed is to ensure that you are climbing as little as possible. This allows the client, typically a novice climber, the maximum time allowable on the route so they succeed at topping the route out with time to get to the local Mexican restaurant for beer and tacos. During this time they can discuss their days adventure making sure to update their online climber profile. *From there everything falls apart*.

It's critical to appreciate that the recreational guide doesn't need to read the route because it is "established" & they have run it so many times. They know the exact piece of pro to place in the exact rock feature and rarely need to deviate or "call audibles". The fall lines are well established for the route and the client is always top rope belayed for speed and / or "assisting" them through problem sections. Even on the most adventurous trad route, anchors at each pitch are likely bolted or have trad placements so bomber, it might as well be. The recreational route naturally lends itself well to being climbed, probably set by a legendary climber, & besides being well established, the beta is likely available on multiple websites. Even with the possibility of damage due to wear and weathering, the quality of the holds is ensured through inspection of the guide - who shares that information with peers on forums. These forums will also include advice on route alterations (ie- due to holds breaking), reports about the quality of bolts placed, and descriptions of anchor(s) at each pitch. Guides refer to these routes and belay ledges as their "Office" due to the amount of time they spend working at these locations. The benefit of this intimate site knowledge is the use of niche equipment or rigging that wouldn't be used without beta.

The recreational dilemma also impacts the way that the use of artificial protection (pro), is taught when protecting routes. To a recreational climbing guide, who's equipment is usually their own personal fiscal asset or is owned by the company employing them, there is no consideration that would involve abusing or leaving their artificial pro. This is both a fiscal consideration of the guide as well as a mater of personal pride in their craft. The loss or damage of a piece of pro on a climb is viewed as a failure on the part of the guide, this is also evident in the trainings currently offered by both civilian and military instructors. We see this often during Op Trad courses with students hesitant to bend wire cam stems over rock features or placing a cam deep into a crack (potentially making retrieval difficult) when using these as anchors for mechanical advantage systems.

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We have to remind them, "this isn't recreational trad this is op trad". This is similar to the contextual differences in practices between civilian prehospital medicine and TCCC / TECC regarding hemorrhage control or airway management. The "rules" found within various climbing games to preserve purity of the climbing discipline - are erroneous in the operational context. The only rule is *Failure is not an option*.

In an operational context, recreational rules, best described in *Games Climbers Play* (*Tejada-Flores 1967*), have to be thrown out and logic must prevail. To accomplish this, practitioners must be versed in the various equipment manufacturers specifications, the dynamics of the tested functions, the component interactions with intended natural environment, and relevant component material science. This is the minimum pre-requisite information required prior to exploiting the equipment in potential "off-label" use in varied terrain. In an operational context, the gear used can be damaged and even be left if operationally permissible. Of course, the goal should be to recover & maintain gear accountability since equipment carried will be minimal, far from a full traditional recreational rack. To engrain the meticulous gear practices that a guide performs, is operationally irrelevant and is destined to inflict training scars which could surface during real-world skill execution.

The proper context of an FA means that the leader will likely be "cleaning" the route as they go, working to clear any potential spots where rock fall could be a safety or security concern. Route selection (operational) prioritizes route characteristics which provide a team with the most efficient and tactically relevant approach possible. This highlights the potential capability of "reading" the terrain through the use of surveillance assets. They will need to select their path based on its tactical / mission relevance, threat level and / or vulnerability including its compatibility to the team capability / skill-level. These "soft skills" are typically not taught and if they are, the medium is a recreational setting . The necessary approach may involve multiple avenues of approach (P-A-C-E) to allow each team member the capability to provide the others with cover. While innovating nontraditional TTP's are paramount, we still see goals of recreational climbing permeate into military manuals like, "have a minimal impact on the natural environment" (*don't mistake this inclusion for tactical reasons*). This recreational pre-occupation with minimal impact ends up influencing route selection in the choosing of a specific route, requiring every subsequent team to ascend same route.

A few things to consider

Ellen Langer describes that when someone shows you an image or belief, as concrete or "fact" - our brains will always see it in that one context, unable to view it in a different context. Here is a link to her video, <u>VIDEO LINK</u> - check out first 8 minutes (and the reference to the cow head) - this lays out some great examples for "mindlessness". *Also - for those who dabble in the Human Hacking / Social Engineering trade craft, Langer also appears on a few podcasts with Christopher Hadnagy.*

To build on this concept (above) - because we always associate climbing with the use of ropes, are we unconsciously omitting the option of "ropeless" ascents as one of our primary discriminators when performing route selection? <u>We are not suggesting becoming the Multicam, velcro, tobacco dipping version of Alex Honnold</u>. We are stating that operational climbing does not lend itself to climbing the same routes as you would if recreational climbing due to weapon systems, comms gear, NVG, PPE, approach shoes, etc. Actively seeking routes which can effectively be "scrambled" or free climbed by at least one team member, then set up a top rope belay for *team assist* - would absolutely speed the ascent up - by removing complexity.

As the complexity / technicality of a route increases - the speed of team movement decreases (and Vis Versa).

To decrease complexity while speeding up small party movement in canyoneering - down-climbing becomes a valuable skill-set. This option is used when terrain lends itself to other option besides just rappelling on a retrievable anchor. The skill-set requires various techniques and some team assists like spotting while sliding down. There are also some valuable small team techniques in the discipline of canyoneering for pothole escapes which would be highly advantageous to the operational climber utilizing unconventional ascent techniques.

If a climbing team focused on <u>non-rope</u> scrambling techniques & approaches utilized in other vertical domains (IE Canyoneering) to efficiently move up & down vertical spaces using team assists (literally viewing it as a separate "craft")- the impact would not only increase a teams capability but also diversify their options during vertical mission sets.

"RECREATIONAL" SAFETY CONCERNS

Recreational guides are also pre-occupied with the safety of their clients in a way that is not relevant operationally. As a guide, your clients ascent up a rock face is likely the most risk they have ever experienced. They are also concerned about the legal / liability of an injury, even a minor one, leading to a law suite. These potential legal implications also influences the preferred rigging, equipment utilization, and practices within the recreational domain. Although, this litigious and cautious approach makes sense in a recreational context it bears no relevance operationally. Operationally the climbing team likely has already performed tasks that were as risky or perhaps even more risky than the FA itself. In an operational context where speed can be your security / safety, it may be necessary to climb certain sections without any protection, in the end, making that section safer due to the absence of the constraints of climbing safety equipment. These considerations and the subsequent determinations of what climbing techniques are to be used and where they are to be used necessitate training in all relevant climbing techniques, from "Free Soloing" to "Aid Climbing". These techniques must be used, combining & mixing vertical disciplines without any consideration of the rules ascribed in "the games climbers play". Recreationally the end goal is for a clean ascent of a route without the reliance on anything besides your own strength to claim a route having been climbed successfully. Operationally there are no such considerations, if one needs to pull on a piece of gear, weight the rope or get an "assist" then "have at it". That is what is done to achieve the tactical objective, which unto itself is secondary to overall mission success. The current paradigm of operational vertical access / mountain warfare must be re-framed to include the diverse threats, constraints, restrictions, and KPP's of varied special operations mission sets.



Sante Muerta de procedimientos verticales irrelevantes (Saint Death of irrelevant vertical procedures)

This specific Santa Muerte offers the vertical practitioner a path to achieve "via negativa" of ridiculous or irrelevant vertical SOP's / TTP's that are present within organizational dogma. Present these SOP's / TTP's to a depiction of this saint (a polychrome seven-colored candle, with gifts like alcohol, cigarettes, fruit & coins may be needed), and she will provide safe passage and delivery of these SOP's to the afterlife, where they will never re-emerge to cause confusion & stupidity.



WRAPPING IT UP "Very often it is familiarity that gives the illusion of simplicity and leads to misunderstandings." Bruce J. West, Simplifying Complexity

Taleb calls this natural human tendency to "box in" an illusionary preferred reality - Platonicity, and he holds it responsible for our dangerous overconfidence in our own knowledge and skill capability. We become so enamored of our elegant, self-consistent models that we are unable to see beyond them. The Platonic fold is the gap between our predictive models and unpredictable reality. It's where the trajectories of our hubris or naively projected capabilities intersect with an unforgiving & uncertain reality. Uncertain of emerging threats - like rapid weather change, anchor options and availability, environmental rigging constraints, casualty severity, rockfall / avalanche / increased water CFS rates, etc...but find solace in our collective overconfidence - grounded in the fact that we have adequately trained to a level of mediocrity for this exact situation because we consulted with a psychic hotline operator...or at least we performed our "risk assessment" form (which we were able to predict this event & assign an accurate probability of occurrence w/ a proper "best practice" mitigation strategy) so we should be just fine! (*This is sarcasm*) - *see next page*...

{Why Bad Things Happen When We Are Forced To Use The Wrong Models To Mitigate Risk}

Also - Frank Knight wrote about this in 1921 but whatevs.... "...there are known knowns; these are things we know we know. We also know there are known unknowns; that is to say we know there are also unknown unknowns - the ones we don't know we don't know" (Rumsfeld 2002).

The manner in which RISK is assessed and mitigated is very different than how UNCERTAINTY is assessed and mitigated. In many cases potential operational friction points which meet the requirements of Uncertainty are misunderstood then calculated and handled as if it is a Risk.

Distinguishing between situations of risk, where all options, consequences, and probabilities are known, and situations of uncertainty, where they are not, is operationally critical. Probability theory and statistics are the best tools for deciding under risk but not under uncertainty, which characterizes most relevant problems that humans have to solve. Uncertainty requires simple heuristics that are robust rather than optimal - think of the mind as an adaptive toolbox and introduce the descriptive study of heuristics, their building blocks, and the core capacities they exploit. Just think of it like this, how do we assign a probability to something unpredictable? Risk briefs much better than uncertainty...but is rarely accurate.

FINAL THOUGHTS FOR PART I

We always attempt to decrease the amount of complexity of a task that is to be used under suboptimal conditions - which is a good guiding principle during technique development BUT remember complexity is "a friend with benefits". Some folks are very comfortable working within complexity, chaos, and / or ambiguity - some may say certain folks are "*master's of chaos*". For those groups who continually train with increased complexity / chaos - because of their understanding of nonlinear behavior - should input complexity, where advantageous, into their TTP development to keep any potential opponent on edge, scared, uncertain, or distracted.

Throttle the chaos up to a threshold your team is comfortable with - but throws any adversary over or beyond their threshold. **Exploit** the shit out of this...**engineer** this mindfully into your TTP's to **distort your adversary's reality**, **buy some time**, **or just override opponents OODA loop**. Unlike traditional civilian models of verticality where rescues seem capable of being timed with a calendar...in most VUCA-T² environments, speed becomes your security, your safety, and if we are talking rescue...it can keep your casualty(s) scene departure towards an MTF within a therapeutic window.

If your vertical TTP's & rigging techniques don't align (speed/pace) with your team/organization's "on target" operational flow / pace... fix that - Special Operations TTP's do not mirror traditional methodologies!

There is no one "way" to rig for access or rescue. <u>The "way" changes</u> based on the operational threats, experience level, constraints and assets on hand. <u>The environment plays a critical role</u> in the way we rig or rescue at any given time (and usually has the last word), on any given mission - we must create our "best practice" in realtime, while engaging the unpredictable emerging variables, facilitating enactment and sense-making.

The term **"best practice"** has <u>unfortunately</u> found its way into the response world - where it doesn't belong. Yes, we follow forged principles, but applying predesignated best practices is not a "thing". A "best practice" <u>can occur in a hospital, or where there is no shortage of diagnostic equipment & time</u> - which we are not afforded. A best practice is closely tied to a ranking on an epistemic scale (hopefully containing some level of epistemic quality & accountability). To implement a best practice or even EBM, <u>you must know</u> all the potential risks, where all options, consequences, and probabilities are known (not a thing in real world response).

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To know these things <u>requires diagnostics</u>. In medicine, prior to executing a "best practice" not only do you need to identify the pathology but also identify all the comorbidities or *other* pathologies which could conflict or negatively impact the best practice (ie. Other disease processes, preexisting illness, medications, etc). To identify the pathology or rule-out conflicting processes in patient care, tools like X-rays, blood draws, CT scans, MRI's, ultrasounds, detailed patient hx / exams, and time (trending) are utilized - then a best practice is implemented. We use forged principles and continually call audibles based on a multitude of emerging variables, some referenced below. Lastly - don't confuse a common practice as a "best practice" whether ridiculous or innovative.

"HATERS ARE LIKE CRICKETS: THEY CHIRP ALL FUCKING DAY AND WHEN YOU WALK BY THEM THEY SHUT THE FUCK UP" ~ Issac Frazier (FD Gangster) - Into the Job Presentation



In an article titled *Tying Up a Few Loose Ends* from 2010, John McKently, who has a vast background in SAR and sits on numerous committees to include NFPA 1983, discusses Safety Factors under the heading "Misconception No. 4". (*Note - this was written prior to the change in NFPA 1983 language transitioning from NFPA "L" rated equipment to NFPA "T" rated equipment*).

"One of the more controversial issues in rope rescue concerns safety factors. A question you should ask is, "what is the safety factor to which we should try to construct our systems?" Further, how was that number determined? Is it even possible?

"We recommend that as a part of rope-rescue training, a detailed analysis be conducted of the systems used. Examine the force that is on each piece of equipment, <u>both during normal operations and when there is a failure</u>. That analysis must include more than the minimum breaking strength of each piece of hardware. <u>It should consider force multipliers</u>, such as the angle of the rope through pulleys as they are loaded, and the loads placed on individual components as systems are modified during the course of the rescue evolution. It also should consider "what ifs," such as when a litter is caught on an obstruction and the haul team fails to stop in time.

There is no perfect or standard answer. For example, some agencies use higher safety factors for training then for rescues. The reasoning is that they have all the time necessary for redundancy and the fact that the systems will be subjected to repetitive loading, as they are used throughout the training day. They might use NFPA G-rated equipment for training or urban rescue operations, and L-rated gear for operations in wilderness areas where carrying heavier rope and hardware might not be an option. That might reduce the safety factor to some degree, but still would allow a perfectly safe rescue operation.

Industrial rigging equipment usually is designed with a 5:1 safety factor. That also is a ratio that many mountain rescue teams use for their systems. Many fire agencies state that they use a 10:1 ratio. <u>Those agencies that say they use a 15:1 ratio should re-check their analysis</u>, since that figure rarely is possible. Consider that the NFPA 1983 performance requirement for a general-use, 12.5 mm (H-inch) rope tops out at 15 times the design requirement — without any knots.

The safety factor is important when selecting <u>the systems to be used by your agency</u> and <u>in evaluating each individual rope-rescue</u> <u>operation</u>, but safety does not stop there. Remember that a higher number might not guarantee a safer rescue operation when knots are not tied correctly, anchor selection is poor or edge protection is missing and a rope is cut. The human element is just as critical as the technical.

Rope-rescue education developed as a grassroots discipline. Instructors learned from other instructors, some of whom also were rescuers. Much was disseminated by word of mouth, and catchy "rules" thought up by one instructor became industry standards a few years later. As the discipline developed with the testing of equipment and procedures, and the emergence of industry seminars where the leading experts would evaluate what we were teaching, it was determined that some of the so-called truisms were not supported by either rope-rescue science or field experience."

NFPA has never stated a SSSF that end-users must adhere - ever, not in 1983, 1006, or 1670. Way back "in the day", 1983 did mention what an estimate for a 1 and 2 person load should be, but removed that verbiage...yet some insisted on performing some simple division to create a false 15:1 SSSF. Ponder this - Engineering disciplines incorporate safety factors within their system design employing many concepts & considerations (which continually evolve) which many in the rope / vertical realm don't acknowledge or appreciate. In some instances, it could be viewed that some *recommended safety factors directly correlate to the level of idiot an organization or manufacturer believes the interfacing end-user's to be - in other instances these numbers don't mean what we think & give a false sense of security. To illustrate, examine these SF's;*

- NASA Shuttle program for all ground tools & equipment = 4:1
- Human Space Flight = 1.4:1
- Commercial Aircraft Industry = 1.5:1
- Cables in Elevators = 11:1

These examples are to illustrate & peak interest into the complexity of engineering factors of safety. The next page lists some of the considerations & their interactions to calculate a ratio which is still often misinterpreted. This is NOT presented to compare rope systems to aerospace or elevator systems.

The 11:1 SF for elevator cables is needed due to the manufacturing company's lack of confidence in society to adhere to their maximum capacity recommendations. Elevator companies <u>do not</u> place a control officer outside of every elevator in the world to ensure proper compliance of weight load. For the most part the aero-space industry is comprised of folks who understand *system dynamics, context-specific engineering, process interaction, material science, and the critical balance between weight, lift, and fuel consumption.* This industry also has multiple layers of compliance control and redundant safety measures based on their thorough understanding of the intricacies of operation.

Safety factors within engineering can be related to weight / force to failure, to weight / force to stress, or statutory items in design codes (cranes, pressure vessels, etc). For reference, the following shows *Typical Overall Equipment & General Recommendations for Applications* Factors of Safety (FOS);

Applications	Factor of Safety - FOS -	Equipment	Factor of Safety - FOS -
For use with highly reliable materials where loading and environmental conditions are not severe and where weight	1.3 - 1.5	Aircraft components	1.5 - 2.5
		Boilers	3.5 - 6
For use with reliable materials where loading and	and the	Bolts	8.5
environmental conditions are not severe	1.5 - 2	Cast-iron wheels	20
For use with ordinary materials where loading and	2-25	Engine components	6 - 8
environmental conditions are not severe	2 2.0	Heavy duty shafting	10 - 12
For use with less tried and for brittle materials where loading and environmental conditions are not severe	2.5 - 3	Lifting equipment - hooks	8 - 9
For use with materials where properties are not severe		Pressure vessels	3.5 - 6
where loading and environmental conditions are not severe, or where reliable materials are used under difficult	3 - 4	Turbine components - static	6 - 8
and environmental conditions		Turbine components - rotating	2 - 3
Racia / Equinadational Englinearing Co	acidorationa	Spring, large heavy-duty	4.5
basic / foundational Engineering Col	nsiaeranioris Ic	Structural steel work in buildings	4 - 6
which the factor of safety depend	S.	Structural steel work in bridges	5 - 7
· Actual load		Wire ropes	8 - 9
· Workina load 🛛 🖉 🗸 🤜		The Engineerin	ng Toolbox
		Many state that we mirror engin	neering principles & practice
· Material type	~ ←	when calculating the SSSF's of	our systems or state in ou
• Material density	F	belowBut when looked throu	or our systems will not g gh the lens of reality, we ar
 Environmental condition 		playing make believe or more acc When comparing the considerati	curately LARPing as engineer ions influencing safety factor
· Component / Process Interaction		between Engineering & Rope I	Rescue - the enormous gap

SSSF Considerations Commonly Taught for Rope Rescue

- Component strengths (MBS)
- % of total force of component given rigging configuration
 - This is context specific to systems in motion - IE Haul System - or in the case of multipoint anchor systems.
- Total load weight / force

At this point the MBS (or % of force on component) is divided by the total weight of load. Whatever component has the lowest number - then becomes the safety factor.

> In reality - this is just a skewed portion of only a small piece of the total picture - leading to misestimation & misunderstanding.

"In present design and engineering practice, it is customary to use allowable stress as specified by recognized industry standards or authorities as applicable rather than to use an arbitrary factor of safety. One reason for this is that the factor of safety is misleading, in that it implies a greater degree of safety than may actually exists. For example, a factor of safety multiple of 4 does not mean that a component or assembly application can carry a load four times as great as that for which it was designed. It should also be clearly understood that, even though each part of a machine may be designed with the same factor of safety, the machine as a whole does not have that factor of safety. In the event that one part is stressed beyond the proportional limit, or particularly the yield point, the load or stress distribution may be completely changed throughout the entire machine or structure, and it's ability to function at a rated load may be changed, even though no part has failed or ruptured." Engineers Edge



"Everybody's a gangster until a gangster Walks in the room." - A Gangster Performing operational rescue requires a thorough understanding of system design & behavior (nonlinear interaction of components) to adapt to less than optimal environmental assets & conditions. This allows practitioners the capability to conduct real-time risk assessment, adjusting the SF dynamically during rescue - adhering to an acceptable factor of safety based on the specific operational context and threat level. Many times the elevated or even exaggerated safety factors found in various disciplines of rescue take into account potential inappropriate rigging, shock load, and user error. These issues can be eliminated by altering system design, technique selection, edge transition options, and the key interdependence of processes within any given vertical system.

Most vertical systems we engineer contain exponential factors, this is due to their innate <u>nonlinearity</u> which follows <u>Power - Law (Pareto)</u> <u>characteristics</u> vs a linear Gaussian framework. The <u>obvious example</u> would be the exploitation friction whether on a DCD or removing force on a sketchy hasty anchor for an emergency egress. This is estimated and practiced using the Capstan / Belt Friction Equation. A small change of adding an angle and/or coefficient of friction produces an exponential change to the output (the radian angle(s) & CoF are the exponents to Euler's Constant). If we used the traditional technique used in rope rescue textbooks and state level rope technician courses, many of the anchors used in semi-advanced level recreational canyoneering every day would give your system safety factor a negative ratio. When we teach people how to optimize less than optimal anchors for time constrained emergency vertical egress, in some cases if we looked solely at the anchor "strength" it would be less than our body weight, but fortunately vertical rigging is nonlinear, and as stated earlier does not meet or follow the rules of reductionism or superposition. Tom Evans gives a great diagram of how he was taught to evaluate / calculate SSSF (below) and <u>here</u> is another example showing how SSSF's are taught / explained. Compare / contrast this method with pictures of various anchors we have used in training or while canyoneering - what would the linear reductionistic method of determining a SSSF be for our anchors? *Spoiler Alert...*Some would actually be a negative SSSF.



In this case - what is often taught , the SSSF (during haul & reset) would be 11.6:1 - with the knotted rope being the weakest component (but it is actually the prusik...)

APPENDIX & BIBLIOGRAPHY:

Appendix 1

CONTEXTUAL SIGNIFICANCE:

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ce a particular casualty, put i context, and then determine ie problems such that we get ble outcomefor both the man

how to solve the prol the best possible ou and the mission. CAPT Frank Butler

THE EMERGENCE + OPERATIONAL NEED FOR TCCC / TECC MA CORRELATION TO OPERATIONAL RESCUE + CLIMBING

BACKGROUND INFO: EARLY TCCC - 1996 -

Tactical Management of Urban Warfare Casualties in Special Operations (Butler) Military Medicine, 165, Suppl. 1, 2000

"Medical training for Special Operations forces (SOF) corpsmen and medics is currently based on the principles taught in the Advanced Trauma Life Support (ATLS) course.' The ATLS guidelines provide a standardized, systematic approach to the management of trauma patients that has proven very successful when used in the setting of civilian hospital emergency departments, but the efficacy of at least some of these measures in the prehospital setting has been questioned.

Even less certain is the appropriateness of extrapolating ATLS guidelines without modification to the battlefield: some of the shortcomings of ATLS in the combat environment have been addressed by military medical authors."

> **Tactical Combat Casualty Care in Special Operations** MILITARY MEDICINE, 161, Suppl:3, 1996

ATLS

2000)

Operations (July

Special

TCCC in

Butler Lecture Notes:

- Standardized approach to trauma care First taught in 1978
- Sponsored by ACS
- Revised every 4 years
- Widely accepted in the United States
- The standard of care in civilian hospitals

The Problem

ATLS was not designed to be used in the combat environment.

ATLS (

- Not intended for combat medics
- Assumes hospital diagnostic and therapeutic equipment is available
- No tactical context

Tactical Context

- Incoming fire
- Darkness
- Environmental factors
- Casualty transportation problems Delays to definitive care
- Command decisions

Tactical Combat Casualty Care

Good medicine can sometimes be bad tactics. Bad tactics can get everyone killed and/or cause the mission to fail. Casualty scenarios in Special Operations usually entail both a medical problem and a tactical problem. We want the best possible outcome for both the man and the mission. "I would like to give you a little insight into the origin of these workshops. In the Special Operations world, if we need a new weapon, we don't go down to the local department store and look in the sporting goods section for a rifle. When we need a new boat for maritime operations, we don't go down to the marina and buy a fishing boat. For many years, however, we were using trauma management guidelines taken directly from the civilian sector without evaluating their suitability for the SOF tactical combat environment.

In 1993, we began a research project to re-evaluate our pre-hospital combat trauma management strategies. This effort resulted in the paper "Tactical Combat Casualty Care in Special Operations" that was published in Military Medicine in 1996.' This project was very much a SOF community effort: many of the physicians, corpsmen, medics, and pararescuemen in the audience today contributed to the development of the combat trauma protocol that was published.

> I want you to be able to close your eyes and smell the aviationfuel mixed with the thirdworld stench of human waste, charcoal, and rottenfruit. I want you to smell the stink of sweat and blood mixed with gunpowder and burning tires. I want you to be able to hear the roar of helicopters overhead, mixed with the distinctive sound of AK-47 rounds and the whoosh of rocket-propelled grenades as they go past. I want you to hear the deafening echo of continuous gunfire along narrow, confined streets mixed with the screams of "Medic" and "I'm hit" from the dying and wounded. **2LT** Robert Mabru

We have to train people how to think, not just what to thin \tilde{k} . General Peter Schoomaker Commander-in-Chief U.S. Special Operations Command



PHTLS: MILITARY VERSION. 6TH EDITION [NOV. 2006]

In combat settings, however, mitigating factors such as hostile fire, darkness, resource limitations, prolonged evacuation times, unique battlefield casualty transportation issues, command and tactical decisions affecting healthcare, extreme environments, and provider experience levels pose constraints vastly different from non-tactical settings. Military medics must recognize the differences these tactical factors will create in the provision of trauma care in combat. They should be provided with appropriate training in tactical pre-hospital trauma care, and must know when to apply it. The guidelines for Tactical Combat Casualty Care (TCCC) presented in the following chapters are intended to meet this need.

Appendix 2

CONTEXTUAL SIGNIFICANCE:

THE EMERGENCE + OPERATIONAL NEED FOR TCCC / TECC MA CORRELATION TO OPERATIONAL RESCUE + CLIMBING

BACKGROUND INFO: TECC - ONCE AGAIN...CONTEXT

Civilian special operations teams (SWAT), began adopting TCCC early (but slowly due to varied beliefs amongst regional medical directors nationwide). The broad acceptance was due to knowing "something" needed to change (from traditional prehospital medicine), but not exactly sure "what" or "why". Members of COTCCC began conversations with their peers (also COTCCC members), questioning if simply accepting & integrating TCCC "as-is" for civilian application was the best idea or even valid... TC3 had become "evidence-based" and the evidence was based off of military / combat KPP's, wounding parameters, and constraints - which may not be the same for civilian incidents. Two groups were actively investigating this at the time, a group from Boston / Charlotte (*Callaway & McKay*) and a group from Washington DC - Georgetown (*Smith & Shapiro*). These two groups converged, invited a broad spectrum participants from civilian response disciplines with DoD advisors, and convened at George Washington University Hospital for the first working group / CTECC meeting in Washington DC in 2011 (Callaway et al 2011).

During these initial meetings and guideline evolutions, the obvious contextual differences were identified and highlighted (see chart)

Figure 1: Characteristics that distinguish civilian from military high threat prehospital environments.

- Scope of practice and liability: Federal and civilian medical responders must practice under State and local scope of practice and protocols, and are subject to both negligence and liability that the military provider is often not.
- Patient population to include geriatrics and pediatrics: TCCC data and research was heavily based off of an 18-30 year old population, not all age groups as represented in civilian operations. TCCC was written primary to address the wounded combatant and does not address high threat care for innocent non-combatants. Generally shorter distances and greater resources available for evacuation to definitive care.
- Differences in barriers to evacuation and care: Despite the threat of dynamic terrorist attacks, secondary attacks and armed resistance to evacuation is far less common in the civilian setting.
- Baseline health of the population: The TCCC combatant population is relatively healthy and physically fit without the high incidence of chronic medical illness that exists in the civilian population.
- Wounding patterns: Although the weapons are similar between military and civilian scenarios, the wounding patterns differ given the prevalence of and differences in protective ballistic gear, as well as the use of and strength of improvised explosive devices in the military setting.
- Chronic medication use in the injured: TCCC does not account for or address the effects of chronic medication use, such as beta- blockers and anti-coagulants.
- Special populations: Special populations (e.g. pregnant or physically disabled) are prevalent in the civilian setting and the required differences in their care are relevant in domestic counter- terrorism and anti- terrorism response.

fied and highlighted (see chart) And The former in the fo

The George Washington University Syndicate dropped some research papers in a few key peer-reviewed journals. These articles unapologetically showed that those who thought TCCC & TECC differed only in language or tried to justify TCCC utilization in civilian responses (especially active shooter events), may require specialized extrication tools to negotiate their head past the bend between their sigmoid colon and rectum. Once again, context is everything. Something different was needed for civilian responders when encountering mass shooting incidents, although TCCC was used as a stop-gap, the context of TCCC (combat) differed from the nuance and subtle found in civilian incidents (*figure 2*). These papers authored by Physicians & Paramedics from GW showed us that the gap was larger than we first thought.

Figure 2: MILITARY	CIVILIAN
All of the military data consists of healthy fighting aged personnel - predominately male	Civilian data ranges from children to elderly victims with multiple variables including obesity, medications, and other health ailments.
The majority of the military data consists of individuals wearing full personal protection equipment (PPE) - consisting of Level IV body armor & helmet	On the civilian side, we do not send our children to school nor do we go to the mall or movies with our family wearing body armor
The distance of the shooter from the victim on average from data = 25m - 35m (85' - 115')	Data from civilian mass shootings shows the proximity & distance from shooter much closer (i.e. classroom / office), resulting in a much higher incident of 'center mass' & head injuries with a lower potential survival rate
Over 60% of injuries utilized for data sets were from ground level improvised explosive devices (IED's)	Nearly all civilian data was a result of firearms, primarily hand guns



A FEW OF THE PRİMARY PRİNCİPLES & TOOLS:

Appendix 3

For use as filters (removing blindspots when evaluating or creating TTP's or systems...

These foundational principles & tools prep the landscape for operational design innovation by removing blind spots, appreciating salient cues / weak signals, avoiding linear civilian models / concepts, and dismissing putting theories into practice but rather creating theories from practice. We use these (and others depending on task) for creating systems, equipment, and TTP's. The following design principles have been selected due to their operational validation & contextual relevance when maneuvering within complexity / nonlinearity.

cue 2022	Critical Tools & Concepts for Design Thinking / Systems Behavior Integration: HRO Antifragile Framing / Reframing Wicked Problems Agile	A Few Guiding Principles / Filters for Innovation Perform fast things fast and slow things slow Move as fast <u>as you can</u> and as slow as you <u>have to</u> Moving fast saves lives - Speed is your security, Speed becomes your safety in VUCA-T ² environments.	Thx T.C. You always add words of wisdom
© Element Res	UX / UI Design Integration Operational Entropy & Scale- Free Networks Multi-Scale Analysis & Basic Error Reduction Strategies * Multi-Scale Requisite Variety * Requisite Diversity * Requisite Diversity	Apply & Consider impact to threat mitigation. <u>3 forms of operational</u> threats: Behavioral (internal & external), Physical, & Physiological.	Cross-reference handout for

Unlike the bastardized version of this principle, ["Slow is smooth - Smooth is fast"] - this promotes an ever-improving & evolving operational truth - we should never be content with our speed, efficiency, or "mastery" of any It pushes the operator to continually skill. reframe every negligible process / variable which influences & interfaces with the skill execution. Operationally hacking the entire system by rethinking packaging, order of accessibility, cheats, deliberate heuristics, UI/UX, enabling constraints, etc. Although it states "move as fast as you can & as slow as you have to" describing the requirement to continually become more expeditious & proficient- the word "slow" can be reframed to "mindful". Certain processes or phases of a skill don't necessarily have to be chronologically slower than that which is "fast", but do need to be identified & have mindful heuristics inputted prior to putting scalpel to neck, pulling the trigger, cranking off a charge, or making an edge transition.

40



BIBLIOGRAPHY

Bar-Yam, Y. (2004). Multiscale Variety in Complex Systems. Complexity, vol 9, 37-45.

Berthod, O. & Müeller-Seitz, G. (2017). Making Sense in Pitch Darkness: An Exploration of the Sociomateriality of Sensemaking in Crises. Journal of Management Inquiry

Butler, FK. (2000). "Tactical Combat Casualty Care in Special Operations". July 2000. PowerPoint presentation.

Butler FK. Hagmann J, Butler EG: Tactical combat casualty care in special operations. Military Med 1996: 161 (Suppl): 3-16.

Butler FK. Hagmann J, Richards DT: Tactical Management of Urban Warfare Casualties in Special Operations. Military Medicine 2000: 165 (Suppl) : 2-48.

Callaway, DW; Smith, ER; Shapiro, G; Cain, JS; McKay, SD; Mabry, RL. (2011). The Committee for Tactical Emergency Care (C-TECC): Evolution and Application of TCCC Guidelines to Civilian High Threat Medicine. JSOM. 2011; Vol. 11, Ed. 2: 94-99

Callaway DW; Smith ER; Cain J; Shapiro G; Burnett WT; McKay SD; and Mabry R. (2011) Tactical Emergency Casualty Care (TECC): Guidelines for the Provision of Prehospital Trauma Care in High Threat Environments. JSOM. 2011; Vol. 11, Ed. 3: 104-122

Ceder1956. (2016, April 17). Rescue 911 - NY Double Roof Rescue (Video). Retrieved from YouTube: <u>https://www.youtube.com/watch?</u> <u>v+JiLzWiAqrcg</u>

Domitrovich, J; Umphries, T; Myers, R; and Heaton, C. (Sept. 2015). Lessons Learned Review: Firefighter Pinned Beneath Burning Log, Is This What "Inherently Dangerous" Looks Like?

Evans, T. & Stavens, A. (2011). Empirically Derived Breaking Strengths for Basket Hitches & Wrap Three Pull Two Webbing Anchors. Proceedings of the International Technical Rescue Symposium, Fort Collins, Colorado, November 3-6, 2011.

Evans, T., Stavens, A., & McConaughey, S. (2012). Causal Mechanisms of Webbing Anchor Interface Failure and Failure Modes, International Technical Rescue Symposium, Seattle, Washington, November 1-3, 2012.

Evans, T. (2013). Empirical Observation of Anchor Failure Points in Old and Retired Webbing. International Technical Rescue Symposium, Albuquerque, New Mexico, November 7-10, 2013

Evans, T. (2015). Evidence-Based Decision-Making for Rope Rescue. SARCON Talk. SAR3, http://sarrr.weebly.com/

Evans, T. (2016). A Review of Knot Strength Testing. SAR3, http://sarrr.weebly.com/

BIBLIOGRAPHY

Fratus, M. (2020, May 18). *The Most Daring Rooftop Rope Rescue in FDNY History*. Retrieved from Coffee or Die: https://coffeeordie.com/fdny-rooftop-rope-rescue/

Ivanov, P.C., et al., Stochastic feedback and the regulation of biological rhythms. EPL (Europhysics Letters), 1998. 43(4): p. 363.

Jung, J. H., Pan, N., & Kang, T. J. (2008). Generalized capstan problem: Bending rigidity, nonlinear friction, and extensibility effect. *Tribology International*, 41: 524-534.

Tejada-Flores, L. (1967). Games Climbers Play. Ascent Magazine, 1: 23-25.

Mauthner, K. (2014) Moving Beyond 10:1 SSSF. ITRS 2014 Conference Presentation.

McKay, S.D. and Galdes, R. (2019). Operational Rescue within Special Operations Forces. Presentation, Ft. Bragg

McKay, S.D., et al (2021). Refining Operational Vertical Mobility Part 1 of 3. Journal of High Threat & Austere Medicine

McKay S. Johnston J. Callaway D. (2012) Redefining Technical Rescue and Casualty Care for SOF: Part 1. Journal for Special Operations Medicine Winter 2012; 86 - 93

Mobus, G., & Kalton, M. (2015). Principles of System Science. New York: Springer Science + Business Media.

Murphy, J., & Webb, B. (2013). Benghazi: The Definitive Report. New York, NY: HarperCollins Publishers Inc.

NFPA1006. (2017). NFPA 1006, Standard for Technical Rescue Personnel Professional Qualifications. Quincy: National Fire Protection Association.

NFPA1407. (2015). NFPA 1407, Standard for Training Fire Service Rapid Intervention Crews. Quincy: National Fire Protection Association.

NFPA1983. (2017). NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services, 2017 ed. Quincy: National Fire Protection Association.

Rumsfeld, D. (2002, February 12). Department of Defense News Briefing. News Briefing.

Smith RE, Callaway DW. Tactical Emergency Casualty Care: The need for & evolution of civilian high threat guidelines. JEMS, Law Officer, Fire Rescue, and Fire Engineering. Editorial Supplement: When Time Matters Most: Care at the Active Shooter & High Threat Incidents. 2014; 10-15

BIBLIOGRAPHY

Smith, RE, Shapiro, G, and Sarani, B. (2016). The profile of wounding in civilian public mass shooting fatalities. Trauma Acute Care Surg Volume 81, Number 1.

Smith, RE, Shapiro, G, and Sarani, B. (2018). Fatal Wounding Pattern and Causes of Potentially Preventable Death Following the Pulse Night Club Shooting Event. PREHOSPITAL EMERGENCY CARE 2018; Early Online: 1-7

Smith, RE, Sarani, B, and Shapiro, G, Gondek, S, Rivas, L, Ju, T, Robinson, B, Estroff, J, Fudenberg, J, Amdur, R, and Mitchell, R. (2019). Incidence and Cause of Potentially Preventable Death after Civilian Public Mass Shootings in the US. Journal of the American College of Surgeons Sept 2019 - Volume 229 - Issue 3 - p 244-251.

Taleb, N. (2007). The Black Swan: The Impact of the Highly Improbable. Random House Publishing Group

Taleb, N. (2012). Antifragile, Things That Gain From Disorder. Random House Publishing Group

van Stralen, D., McKay, S., Williams, G. T., & Mercer, T. A. (2018). *Tactical Improvisation: After-* Action / Comprehensive Analysis of the Active Shooter Incident Response by the San Bernardino City Fire Department December 2, 2015. San Bernardino: San Bernardino County Fire Protection District.

van Stralen, D., McKay, S., Mercer, T.A. (2020 July). Flight Decks and Isolettes: High Reliability Organizing (HRO) as Pragmatic Leadership Principles during Pandemic COVID-19. Neonatology Today, <u>www.neonatologytoday.net</u> July 2020

van Stralen, D., McKay, S., Mercer, T.A. (2020 August). Pragmatic Leadership Practices in Dangerous Contexts: High Reliability Organizing (HRO) for Pandemic COVID-19. Neonatology Today, <u>www.neonatologytoday.net</u> August, 2020

van Stralen, D., McKay, S., Hart, C.A., Mercer, T.A. (2022 May). Implementation of High Reliability Organizing (HRO): The Inherent Vice of Stress, Fear, and Threat. Neonatology Today, <u>www.neonatologytoday.net</u> May, 2022

van Stralen, D., McKay, S., Hart, C.A., Mercer, T.A. (2022 June). Implementation of High Reliability Organizing (HRO): The Inherent Vice Characteristics of Stress, Fear, and Threat. Neonatology Today, <u>www.neonatologytoday.net</u> June, 2022

West, B. J. (2006). Where Medicine Went Wrong, Rediscovering the Path to Compexity. World Scientific Publishing Co.

West, B. J. (2013). Fractal Physiology and Chaos in Medicine (2nd Edition). Hackensack: World Scientific Publishing Co.

West, B. J., & Scafetta, N. (2010). Disrupted Networks, From Physics to Climate Change. World Scientific Publishing Co.

