SMA White Paper

What Do Others Think and How Do We Know What They Are Thinking?

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Preface

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Determining methods to better understand critical population groups is essential to all aspects of military planning. Operations are essentially approaches toward modifying the environment of relevant actors such that their perceptions of that environment (the information they act upon) lead them to behave in ways that are favorable to desired outcomes. As such, military intelligence and planning analysts need to focus on developing an empathetic understanding of others. The contributors in this white paper provide recommendations for planning methodologies, technological approaches, and required expertise to that end.

Questions they address include:

- How do we find and influence the right people to achieve strategic goals?
- Which behaviors are critical to overall success?
- How do we understand perceptions about governance and worldviews within their own cultural settings?
- What are the benefits and analytic pitfalls of self-reporting methodologies? How can self-reported data be compared—and combined—with findings from other sources?
- What methods are available to understand strategic populations?

Addressing these questions requires direct and indirect approaches and highlights the need for combining multiple approaches and data sources. With the proper framework, it is possible to not only measure changes in behavior and the associated knowledge and beliefs, but also whether the influence mechanism used is having any impact.

The contributors also highlight several requirements to achieve these outcomes:

- Technology suites to detect and exert influence are of paramount importance in a world where kinetic and non-kinetic effects interact to produce outcomes.
- The ability to detect and analyze stories in progress, forecast their effects, formulate and enact alternate stories in a human-in-the-loop fashion, and assess the behavioral impact of their counter-narrative strategy.
- The ability to measure impact based on in-depth understanding of knowledge, attitudes, beliefs, intentions, and behaviors of a population.
- Adoption of an “outside-in” mindset, which makes the audience’s decision-making process the focus of the influence strategy.

In this context, the development of a comprehensive educational and training system that allows the Joint Force to have a better appreciation of the people they seek to persuade is needed. Such a system

will provide tangible processes through which we can more clearly evaluate the effectiveness of various approaches. These capabilities allow planners and operators to detect, analyze, and understand adversary information operations, and provide "human-in-the-loop" tools to assist in developing counter-narratives to influence the behavior of the audience. Using technology to understand foreign environments requires a fusion of multi-vector sources. Researchers can improve their approaches to understanding foreign populations by combining social media with other data sources. Thus, while the inherent limitations of social media data—including its self-selective nature—mean they offer no panacea, they do enable more detailed exploration of the sociotechnical space. In this context, surveys remain critical. Advances in analytics tools and techniques have driven innovation in survey research.

In sum, achieving real competitive advantage for the United States in understanding audiences requires triangulating across data sources, implementing technologically innovative solutions grounded in cognitive insights, and iterative testing and improvement in the field—which together provides a platform to realize strategic objectives.

Executive Summary

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This white paper deals with broad topic of assessing options to gain better understanding of the subjective world of populations we need to interface and relate to. How can we reliably anticipate behavior patterns? Our challenge is gaining the most accurate and useful information for commanders and other agencies for planning purposes. Who are the right people to try to influence to achieve strategic goals (individuals and/or groups). Which behaviors are we targeting? Why do people display those particular behaviors? Finally, how do we coordinate operations to drive the desired behaviors? We cannot rely entirely on social media (we must blend it with other intelligence), even though it can be an important contributor. This White Paper is intended to provide recommendations for planning methodologies, technological approaches, and required expertise.

The articles are grouped in five parts:

- **Part I**: Operational Perspectives
- **Part II**: How Reliable Are Self-Reporting and Polling Data: A Biopsychosocial Perspective
- **Part III**: Advantages, Limitations, and Pitfalls of Social Media
- **Part IV**: Meta-Opinions: The Link Between Polling and Social Media
- **Part V**: Discussion of Alternative Options

In the opening article in Part I entitled "Lies, Damned Lies, and Assessments," Mr. Bob Jones (SOCOM) makes the case that we have built a powerful strategic assessment enterprise dedicated to the pursuit of precision. We have not, however, put equal effort into updating our understanding of the problems we seek to measure. He makes the case that we should focus more on the accuracy of our assessments, not how we metric, but ensure that we are measuring the right thing. The rapidly changing strategic environment does not mean we need to abandon our tried-and-true theories and approaches to war completely. Instead, we need to expand to include non-conventional theories and data points in which we can use to measure our successes or failures. He goes on to conclude by stating that the world is changing faster than governance can keep up. The net result for the U.S. is that the major power playbook we inherited from those who found themselves in this role before us has become obsolete. This does not mean it is impossible to be a great power or to lead a rules-based world order. What it means is that power has shifted, and the game has changed. We need a new playbook.

In his article titled "Empathy: The (Missing) Foundation of Effective Operational Art," COL Scott K. Thomson (OUSDP) argues that the strategic failures that have frustrated senior leaders among the Joint Force stem from a lack of human understanding as it applies to operational art. Strategy, he asserts, is essentially a plan to persuade relevant actors toward specific behaviors that support U.S. national interests. Therefore, military intelligence and planning must focus on developing an empathetic understanding of others, and that operations are essentially approaches toward modifying the environment of relevant actors such that their perceptions of their environment—the information they act upon—lead them to behave in ways that we desire. Such an approach would

help to ensure that tactical execution remains linked to strategic goals and would therefore dramatically improve the Joint Force's contributions to strategic outcomes. COL Thomson suggests that doctrine is the decisive point in operationalizing empathy. When doctrine properly accounts for empathy, both the military educational system and training approaches will develop the culture of the Joint Force such that they have a better appreciation for the people they seek to persuade and will provide them with tangible processes through which they can more clearly think.

In an article entitled "Building a House on the Rock (of Good Analysis)," Dr. Spencer Meredith III (NDU) makes the point that the perception that the U.S. is failing to understand operational environments, specifically its human aspects, makes the elusive search for what goes on inside people's heads all the more pressing, while keeping it equally frustrated. He goes on to say that that methodology does in fact exist to get what we need, and while it can be difficult, it is also imminently doable with good analysis. He focuses on the topic of governance in all its dimensions. He makes the case that we need some methodological approach to getting at people's perceptions about governance because we know cognitive motivations shape behaviors towards governance. He points to all the pitfalls in such investigations and recommends a healthy dose of humility.

In a following article entitled "Effects-Based Psychological Operations Measures of Effectiveness: Measuring Change and Impact," LTC (Dr.) Greg Seese (JHU-APL), LTC (Dr.) Rafael Linera (USASOC), and Mr. Erinn McQuagge (Northrop Grumman) focus on current trends and methodologies in developing a comprehensive assessment and evaluation plan for behavior-focused Psychological Operations (PSYOP) programs. They state the mission of PSYOP is to influence behavior. Behavioral change is at the root of the PSYOP mission. Although concerned with the mental processes, it is the observable modification of behavior that determines mission success**.** Therefore, influence efforts must have clearly defined and measurable behavior-focused goals and objectives. They go on to state that planning and evaluating the effectiveness of a PSYOP program can be a daunting task, but if measurable goals and objectives are developed, measure of effectiveness (MOE) questions are relatively straight forward to write. Properly crafted MOE's are much easier to integrate into a supported unit's intelligence collection plan and lend credence to the credibility of influence programs. They conclude by stating that the pragmatic framework presented demonstrates that it is possible to not only measure changes in behavior and the associated knowledge and beliefs, but also whether the program is having any impact.

In the closing article of Part I entitled "Coordinating Operations to Influence Behaviors in the OE," Ms. Tricia DeGennaro and Mr. Randy Munch both with TRADOC G2 Operational Environment Center, argue that integrating information operations (IO) and physical operations at the strategic, operational, and tactical planning levels is critical for achieving long-term military objectives. IO is a comprehensive effort to understand and maneuver in the human and cognitive domains. They go on to state that planning and executing operations without thinking about "human emotions, responses, or actions" will not likely result in any kind of repeatable success. They conclude by stating that planners must match IO to populations based on actual understanding of the people and their motivations in order to achieve desired effects.

In the opening article of Part II, Dr. Diane DiEuliis (NDU) and Dr. James Giordano (Georgetown University Medical Center) present "Biological Embodiment, Social Embeddedness, and the Importance of Communication," in which they describe how the capacity to communicate retro- and prospection, emotional state, and intent have enabled humans considerable prowess in optimizing psychological aspects of social interactions. Given that consciousness and first-person phenomenal experience are transparent only to self, communication of certain features of cognitive states (e.g. implicit emotion; intent; etc.), that is, "self-disclosure" can be vital to human social engagement. Self-

disclosure is defined as the act of sharing personal information with others. In the context of forging relationships, people share information about their thoughts, feelings, and aspirations, and it has been estimated that self-disclosure constitutes approximately 30-40 % of the information that is shared by a person on any given day. DiEuliis and Giordano posit that self-disclosure entails neurocognitive mechanisms of decision-making and reward and that social media can be a force-multiplier for self-disclosure. They conclude by stating that a more complete understanding of neuro-cognitive mechanisms involved in self-disclosure may be important to developing new ways of fostering interpersonal communication using social media and other interactive platforms.

In the following article, entitled "Knowing the Terrain: Explicit and Implicit Measures of the Population," Dr. Ian McCulloh (JHU) and Ms. Laurie McCulloh (Fielding) state that common questions asked by military planners include: what are people actually reporting when they self-report? Can self-report data be trusted? How should self-reported data be compared with findings from the Intelligence Community? What methods are available for understanding strategic populations? They provide a review of explicit and implicit methods to measure peoples' thoughts. Explicit methods are well-suited for measuring knowledge, attitudes, and beliefs, especially when questions are objective and not introspective, overly personal, or culturally taboo. Implicit methods provide a strong alternative to explicit methods in these circumstances. Advances in portable neural imaging make implicit methods a viable alternative for military planners. Given the focus of efforts that dominate current military operations and those of the foreseeable future, understanding population-centric knowledge, attitudes, beliefs, intentions, and behaviors (KABIB) is of increasing importance. They go on to state that threats to validity can be mitigated with multiple sources of data, multiple approaches to measurement, and with investment in qualified experts to design, conduct, and analyze research. Implicit measures provide a compelling alternative to explicit measures for understanding difficult to measure variables such as attitude and behavioral intention.

In an article entitled "Remote Behavioral Assessment: Political Psychology Methods," Dr. Jason Spitaletta (JHU-APL) discusses political psychology methods in support of remote behavioral assessments. These approaches, largely developed in clinical and later, political psychology have long been used by U.S. intelligence agencies. He presents various approaches such as: trait/motivational, cognitive, personological, and psychodynamic approaches. He concludes by stating that these approaches typically emerge from political psychology and are generally applied toward foreign leaders. However, with the even-increasing availability of personal data on the Internet these same approaches may be applied to average individuals.

In the next article entitled "The Neuroscience, Psychology and Practice of Target Audience Self-Report," Dr. Nick Wright (Univ. of Birmingham, UK) draws policy insights from diverse bodies of evidence including neuroscience, psychology, and practice to address key questions raised by this white paper: What can humans self-report? And how reliable is it? First, from n*euroscience* he describes the neural machinery underlying *metacognition* ("thinking about thinking"), which sets limits to self-report and suggests enhancements to self-report methods. For example, measuring *confidence* in self-reports may identify individuals more likely to change their minds, and it reflects a critical quantity in Grey Zone conflicts. Second, from c*lassic psychology* he highlights work mapping the gap between attitudes and behaviors. Third, from *historical cases* he describes public opinion driving inadvertent escalation between states. Fourth, he describes practical ways to *measure the impact of influence* in target populations. Finally, he summarizes *implications for policy and practice*, in particular for Grey Zone confrontations and the scientific basis of the Joint Concept for Operating in the Information Environment (JCOIE). These issues are key for any effective influence strategy. He makes the point that influence efforts must be tailored to the audience to maximize intended effect.

Organizations should adopt an "outside-in" mindset, which makes the audience's decision-making process the focus of the influence strategy.

In the opening article of Part III, entitled "Digital Participation Roles of the Global Jihad: Social Media's Role in Bringing Together Vulnerable Individuals and VEO Content," Dr. Margaret Hall, Dr. Gina Ligon, and Ms. Clara Braun from the University of Nebraska-Omaha state that Violent Extremist Organizations (VEOs) have posed security challenges for decades. However, in the modern era, with the advent of more lethal weapons, global mobility, and improved communication methods (e.g., open social media), the span and impact of these groups grows from regional to worldwide via their online brand. With the advent of participatory internet technologies and the promulgation of open and free internet architectures, less technical infrastructure is required for smaller or resource-poor organizations to communicate and conduct operations. Yet despite its prominent place in public discourse, a basic understanding of how digital media content influences individuals to participate in propagating VEO content is lacking. They propose investigating the pathway to extremist beliefs and behaviors from the perspective of the digital participation lifecycle, considering the transition from viewing to actively participation in content dissemination. Whereas traditional analyses would suggest Creators should be the focus of disruption activities, their analysis suggests that there is an entire pathway of participation with VEO content. At each stage of participation, there are entry (and exit) points which can effectively stop the flow of content and information dissemination. Escalating behaviors along with their qualifying activities help practitioners and researchers more accurately classify the differences between Lurkers and those who more actively create malevolent content.

In an article entitled "The Next Frontier: Moving Beyond Social Media into Sociotechnical Space," Dr. Laura Steckman (MITRE) makes the point that using technology to understand foreign environments requires a fusion of multi-vector publicly available data sources. Researchers, whether government or academic, can improve their approaches to understanding foreign populations by combining social media with other data sources. Combining multiple data sources is the next major milestone in understanding populations, as such research moves beyond social media to encompass larger, more robust sociotechnical spaces (i.e., spaces that are simultaneously social/sociological and technical/technological, such as cyberspace when it involves human interactions). Thus, while noting limitations inherent within social media data, including the self-selective nature of the medium, she notes an opportunity to explore sociotechnical space in greater detail.

In the opening article of Part IV, "Encouraging and Assessing the Validity of Answers to Questions about Radicalization: The Use of Meta-opinions," Dr. Clark McCauley (Bryn Mawr College), Dr. Sophia Moskalenko (Bryn Mawr College), and Dr. Tom McCauley (University of Rochester) recognize that interview and poll respondents may lie in answering questions about radicalization: to avoid detection by security services, to minimize their responsibility for damaging and illegal behaviors, or to project a more socially acceptable persona to the researchers—or even to themselves! The biased direction of these misrepresentations makes them a greater threat to a survey than the more random perturbations that result from misunderstanding the question or making up an answer to avoid looking ignorant. They advance ways to encourage truthful responses to questions about radicalization, as well as ways to assess the truthfulness of answers obtained. They highlight the usefulness of comparing personal opinion with meta-opinion—opinion about the opinions of others. They conclude by highlighting the link between meta-opinions and opinions posted on social media: both indicate the power of social norms.

In an article entitled "The Continued Relevance of Survey Research," Mr. Dan Foy and Mr. Chris Stewart (Gallup) underscore just how important surveys remains for the modern democratic process. They highlight many settings where survey research remains the best, and at times, only

method for reaching all segments of a population. They go on to highlight the role advances in analytics tools and techniques have in driving innovation in survey research. Such innovations will help ensure survey research will remain essential for the measurement of public opinion for the foreseeable future.

In the opening article in Part V entitled "Stealing History," Drs. Linda Durnell and Garry Hare (Fielding) make the point that terrorism thrives in nations or regions with weak institutions often accompanied by high levels of corruption and unemployment. In these situations, the tools to steal history include fear and terror accompanied by the systemic destruction of the past. Cultural and religious symbols and icons are blown to rubble in hopes that destroying the past will eradicate cultural memory, identity and heritage. One tool of the fundamentalist—the terrorist—is the systematic destruction of cultural and religious icons, as if destroying mosques and landmarks will destroy cultural history and group identity. Immersive media is one tool in visually restoring sacred sites with the objective of triggering an emotional reaction to what used to be, fostering long-term memory both for those who experienced the intact structure and for those whose only first-hand experience is little more than rubble. Through immersion such as virtual reality (VR) or real-time augmented reality (AR), visual memory can be enhanced not only by visualizing but experiencing media.

In an article entitled "Groupthink: Training New Technologies to See That Humans Don't All Think Alike," Dr. Gwyneth Sutherlin (Geographic Services) discusses methodological and technological alternatives to conventional collection and analysis methods. She stresses the need to develop a means to sense and analyze cultural variation and recommends developing a collection and analysis method that is sensitive to these variations. She argues that we need to assess the very foundation of the technologies and methods we rely on; i.e. strip them down to the assumptions from which they are built and examine if they are serving their purpose. Are they sensitive to cultural variation, to cognitive variation? Can these technologies and methods expose differences in how other cultures think and help us navigate across them more successfully? If not, how do we evolve our technology to meet the needs described in this paper? She identifies a method for capturing the shift in narrative that offers a means to identify cultural variation at a conceptual level and add this nuance to technical capabilities.

In an article entitled "The Internet of Things (IoT) and the Art of Mapping a Population's Thinking, Behavior, and Influencers," Mr. Mark Polyak (Ipsos), Mr. David Ellis (Joint Special Operations University), and Dr. Katie Ziemer (Ipsos) make several observations:

1. Effective utilization of Internet of Things requires an approach grounded in a theory of identity and a clear concept of the type of logical reasoning needed to meet analytical needs.

2. The Logic of Appropriateness provides a conceptual linkage between interests, thinking, behavior and identity.

3. Algorithm-based analysis is insufficient to make full use of the data available in the IoT; rather, it requires the lens of the three types of logical reasoning, generically described as crowdsourcing, detective work, and designing the future.

A disruptive technology like the IoT could exacerbate the challenges analysts face in the information environment, but only if they rely on algorithmic trend analysis and a crowdsourcing lens of reasoning. The rules of engagement with the IoT necessitate research and analysis on the motivations behind and implications of received data for the social construction of reality. Otherwise, the content

of the data will lie inert among the noise, and socio-cultural indicators will be lost. When viewed through the perspective of the Logic of Appropriateness, the data can be more richly interpreted to proactively assess the information environment for I&W and greater strategic awareness.

In an article entitled "The Impact of the Internet of Things (IoT) and Blockchains on Future Warfare," Mr. Howard Simkin (USASOC) describes the impact of the Internet of Things (IoT) and blockchain technology on future warfare. He begins with a following problem statement: Faced by increasingly capable adversaries in an era of exponential technological change, what are the probable impacts of the Internet of Things (IoT) and blockchains on future warfare. He goes on to suggest that the IoT will provide a rich source of data for the Joint Force and DoD as they cooperate with our allies and partners, compete with our adversaries, or engage in conflict with our enemies in the physical, virtual, and cognitive domains. Friendly IoT data must be secured with a combination of blockchain technology, changes in hardware, or by building applications with security as a primary consideration. Because of sheer volume, AI must be capable of analyzing, curating, and using that data to plan, develop, and execute courses of action. AI must also be capable of discerning adversary attempts to disrupt or corrupt IoT data. It should also be capable of responding to such attempts. Failure to take these steps will inevitably degrade the Joint Force's operational capabilities. Blockchain technology presents a means to increase trust in data, including that from sensors, devices, or digital transactions. As such, it offers real opportunities to help secure the IoT. It is not a panacea, but it does seem to offer a means to significantly reduce risk in a number of JCAs.

In the closing article entitled "Narrative Technology to Detect and Defeat Adversary Ideological Influence," Dr. Bill Casebeer (LMI) states that developing technology suites to detect and exert influence is of paramount importance in a world where kinetic and non-kinetic effects interact to produce final outcomes. He discusses the development of a comprehensive technology suite to allow the U.S. and its Allies and partners to detect and disrupt radicalization processes in multiple media. These capabilities will allow the planners and operators to detect, analyze, and understand adversary information operations, and provide "human-in-the-loop" tools to assist in developing counter-narratives to influence the behavior of the audience in ways which will prevent them from being exploited by malignant violent non-state actors. He reminds the reader that operators need to be able to detect and analyze stories in progress, forecast their effects, formulate and enact alternate stories in a human-in-the-loop fashion, and assess the behavioral impact of their counter-narrative strategy. The suite of enabling technologies he proposes builds off well-established technologies and incorporates novel physiologic and neurobiological sensors so as to provide a unique in the world "human-in-the-narrative-loop" counter-radicalization information operations test bed.

Part I: Operational Perspectives

Lies, Damned Lies, and Assessments

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The young soldier beamed with pride as the Drill Instructor informed him that he had shot a perfect score, putting all 40 rounds into the bullseye. Unfortunately, the sergeant went on to explain, he had been aiming at the wrong target. So, while his precision was among the best in the class, his accuracy was the very worst. In recent years, the joint force finds itself in a situation not unlike that of our tragic young soldier. We have built a powerful strategic assessment enterprise dedicated to the pursuit of precision. However, we have not—though we know we are operating in a rapidly evolving strategic environment—put equal effort into updating our understanding of the problems we seek to measure. For example, nearly every coalition commander over the past generation has predicted that victory in Afghanistan is nearly at hand. Currently in Syria and Iraq, commanders are claiming victory based on a military defeat of Daesh, measured in the area of ground liberated, equipment destroyed, and numbers of casualties inflicted. Victory still eludes us in Afghanistan, and time will tell if our approach in Iraq and Syria yields the stability we seek. These have not been intentional efforts to deceive; we have simply been shooting at and reading the wrong target.

Once we get the questions right, the answers become easier. Or, said another way, once we get to a better understanding of political *instability*, the better one will be at assessing and fostering political *stability*. The good news is that there is a growing awareness for the importance of population perceptions of the governance affecting their lives. The bad news is that we have yet to re-contextualize how we think about political instability in the emerging strategic environment. The end result has been a fixation on attempting to assess the capabilities of threats, the attractiveness of ideologies, and the effectiveness of governments. We obsess over improving our precision, but we ignore our problem with accuracy. We are attempting to measure and do the wrong things better—but show little inclination to evolve in our understanding of the problems we are working so diligently to resolve. Shifting one's focus from symptoms (threats) to problems (governance); and from the *effectiveness* of how government performs, to the *goodness* of how governance is perceived, will improve accuracy and offer a truer measure of political stability.

One reality we need to come to grips with is that political stability is not simply the absence of instability. The volatility of a system is critical aspect that must be taken into consideration. After all, a system may be naturally stable, requiring little countervailing energy to sustain equilibrium; or it may be *artificially* stable, demanding tremendous amounts of countervailing energy to sustain a stable state. The more artificial the stability is, the more volatile it is as well, and the more security forces necessary to sustain stability. A prison is one example of artificial stability; another is Iraq at the time President Obama made the decision to drawdown US military presence. A simple, face-value metric of artificial stability within a state is to note the size, visibility, and character of security forces and determine if their primary purpose for action is to protect the government from the population. The more visible, the more militaristic, the more focused on protecting the government, the more artificial the political stability. The removal of U.S. military forces from Iraq enabled that system to quickly devolve to its natural state. Daesh did not cause the energy for instability there, but they were quick to exploit it to their advantage. If we had been thinking about the problem differently, we may well have recognized how provocative the U.S. solution for governance in Iraq was, and offered the Sunni Arab population of Iraq and Syria a more viable path to natural stability. Perhaps next time.

Unfortunately, natural vs. artificial is not a distinction we typically make when talking about political stability, or military stability operations. If we learn nothing else from the Arab Spring or the rise of the Islamic State, an artificially stable society with high volatility can quickly devolve into high order instability. What seems a "Black Swan" in the context of effective government, is completely foreseeable, treatable, and avoidable in the context of goodness. This is why the focus here is not on *how* to measure, as we already have a wealth of approaches designed to measure and assess with adequate precision. The focus is on *what* to measure, as it is our accuracy that is proven wanting.

Shifting Power, an Evolving Environment, and a Changing Mission

As captured in the 2015 USSOCOM *Strategic Appreciation*[1] document, signed by then commander, General Joseph Votel, the most significant dynamic affecting political stability in the current strategic environment is one of rapidly shifting power, slowly adjusting laws and policies, distribution of sovereign privilege, and evolution of governance. There is a growing gap between the necessity and expectation for governmental evolution, and the ability of all aspects of governance to adjust. It is within that gap of governance *evolution* that grows the greater likelihood for population *revolution*. If stability operations frame success as preventing or stopping revolution, rather than creating time and space for evolution, then one is attacking and assessing the symptoms, rather than the problem. Not only is one engaging the wrong target, the population at the root of the matter are most likely huddled behind it. The energy for revolution resides in how that population feels about the governance affecting their lives. Threat-focused warfare responses, guided by war theory, invariably makes that energy worse. It is long past time to stop confusing tactical successes against revolutionary organizations for strategic progress in resolving the energy for revolution.

This is not a condemnation of war where war is due. Our war theory is sound, and wholly appropriate for political conflicts between states. Render unto Clausewitz, the things that are Clausewitz's.[2] Between states, the energy for instability is primarily a function of states who are both rising in power and seeking to enhance their distribution of sovereign privilege to corresponding levels by any means necessary (China); or declining states who currently possess a power advantage over their neighbors and who see opportunity to enhance their sovereign privilege before that window of opportunity slams shut (Russia). This is not really something one needs to measure, as the degree of

[1] United States Special Operations Command. (2015). Strategic Appreciation: Finding Balance in a Shifting World. Washington, D. C. The foundational document for the USSOCOM Strategic Planning Process. This effort intentionally avoided focusing on particular trends or threats, and sought a holistic understanding of the environment. The Strategic Appreciation looks at the nature of the strategic operating environment, and how the evolving character is impacting political conflict both between and within distinct systems of governance. Retrieved from https://drive.google.com/drive/u/0/folders/0BzrcfrqF8zFVUXMydGUydWgzeVU

[2] Clausewitz, C. V. (1984). On War (M. Howard and P. Paret, Trans.). Princeton: Princeton University. On War is recognized as the leading strategic guide on the theory of war. Argued here is that while On War remains as viable today as when it was first published, what is becoming increasingly clear is that we have inappropriately applied Clausewitz to political conflict internal to a single system of governance (revolutionary conflict) simply because it often shares similar characteristics, and because state power applying war theory has historically been able to suppress the symptoms of these problems. However, as relative power shifts toward populations from governments, it is becoming increasingly clear that internal revolutionary conflict - be it in latent, non-violent, or violent form - is more accurately thought of as a form of illegal democracy. Conducting warfare against revolution can still suppress symptoms temporarily, but is reactive, symptomatic and typically results in making the true problems in the governmental-population relationship worse. Current efforts to defeat ISIL in Iraq, and the Taliban in Afghanistan are modern examples involving the United States.

aggressive, illegal "gray zone" activity applied to the goal of increasing sovereign privilege is metric enough. And while individual activities may seem ambiguous, the overall dynamic is anything but.

The effects of rapidly shifting power are natural and create a potential energy for political conflict. While one leader may be more inclined to adopt an aggressive approach than another, the potential is there. This potential energy that creates revisionist actors. Whether that energy remains latent, or manifests in some mix of legal or illegal competition, or rises to warfare, is a leadership choice. It is easy to forget that only a century ago it was a powerful young United States making the status quo keepers of the world order nervous as we flexed our own revisionist muscles. The industrial age served to shift power between actors and fueled tremendous change to the world order.

The current era is marked by an unprecedented speed, scope and scale of shifting power. This is straining the bureaucracies of statecraft designed for a Cold War, pre-globalized world that no longer exists. While disconcerting to the West, the resultant competition and conflict is less an assault on the rules-based world order, and more a clear metric that the order is overdue for a significant overhaul. The military mission in all of this is to deter and prepare for war, and also to create time and space for civil authorities to tackle the hard work of upgrading the world order to better reflect the emerging balance of power. Reformation of the world order is the primary task. To focus solely, or even excessively, on deterrence alone is likely to result in the very wars we hope to prevent.

Within states is where the real work of measuring needs to occur. Keep your Clausewitz handy, but make some room on your shelf for more eclectic works from the likes of Madison, Maslow, and Mao. While the physical character of internal conflict is often indistinguishable from the external variety, it is the nature of the relationships between the parties that makes it a different dynamic altogether. These are not examples of *irregular warfare*, as doctrine tells us to believe. These are better understood fundamentally as exercises in *illegal democracy*.[3] The effects of shifting power from governments to populations is exposing the folly of thinking of these types of conflicts in the context of war theory and applying tactics derived from centuries of colonial policing and Cold War containment. Suppressing symptoms to sustain governments is no longer good enough and is in fact highly provocative. It is this provocation that fuels what we have come to think of as *transnational terrorism* and the rise of this new breed of non-state wager of political warfare we brand simplistically as *violent extremist organizations.* The nature of war has not changed, but the changes in the strategic environment have exposed our historic error in lumping internal political conflict in with the external variety.

Strategy as a Function of Nature, Tactics as a Function of Character

Understanding how people are unique is critical to the framing of sound tactics. However, it is in understanding how people are the same that one finds the framework for good strategy. As one studies internal, population-based conflicts over time and across cultures, a common core of

[3] Jones, R. C. (2014). Strategy - A Mix of Broad Guidance and Deep Understanding [PowerPoint Slides]. USSOCOM J5 Strategy, Plans, and Policy. From a presentation to the Joint Special Operations Forces Senior Enlisted Academy. Postulating that the nature of internal revolutionary insurgency is more closely related to the nature of democracy than to the nature of war. Democracy and Revolution both being political in primary purpose, population-based, and internal to a single system of governance. The sole fundamental difference being that democracy is legal, and revolution is illegal. The creation and implementation of trusted, certain, legal and effective mechanisms across the entire population being the most essential task in resolving revolutionary insurgency. What is revolution in more autocratic societies, is a simple exercise in democracy among more empowered populations.

grievances emerges. Governments are quick to fix blame for instability on factors beyond their control, such as food prices, drought, youth bulges, and malign actors employing radical ideologies. These are all important tactical factors to understand as they will shape the character of the conflict. The nature of the conflict, however, is rooted in human nature, and there are five broad perceptions of governance that are surprisingly common to internal political instability. These provide the framework for our assessment. All of these must be assessed through the unique lenses of the populations in question.

1. **Popular Legitimacy.** Do people perceive the governance affecting their lives as having a right to do so?

2. **Cultural Appropriateness.** Do people perceive that the governance affecting their lives is doing so in a manner deemed appropriate in the context of their culture?

3. **Justice.** Not rule of law, but how do people *feel* about the rule of law as it is applied to them?

4. **Dignity/Respect.** Do people perceive themselves to be treated by governance equally to similarly situated populations?

5. **Empowerment.** Do people perceive themselves to have trusted, certain, legal and effective ways to address grievance and shape governance in the context of their cultural expectations,

What is perceived as good or bad across all of these perceptions varies tremendously by culture. But the importance of these perceptions of governance for purpose of political stability are critical everywhere and among all cultures. The key to an assessment—that is both accurate *and* precise—is to seek information about the right things, while resisting the urge to prejudge in the context of our own values, or perceptions of what is good or bad.

A Simple Framework for Strategic Assessment

There are many layers to this challenge of measuring how others think, not least of those is our tendency to think within the context of the Westphalian system we know and seek to preserve. To assume that others value or desire the same things in the same ways deemed important in the U.S. is the highest form of hubris. Expectations of governance vary widely, shaped by the history, culture, and geography of every location. Every effort must be made to capture the perceptions of the population one hopes to understand through their own eyes, unclouded by our bias and preconceptions. No society is "ungoverned;" few want or need to be "fixed;" and self-determination of governance is the ultimate expression of democracy for any society, regardless of what form of government they might pick, or who might emerge to lead them.

No population is a monolith. In reality there are dozens of powerful identities that populations form around. Individuals typically belong to several of these powerful identities, and each individual has their own system of priorities as to which identities they value most. When conditions for political instability grow, it is because identities perceived as being at risk to government action elevate above one's identity as being a member of the body that government governs. We tend to call this process "radicalization," but more often than not, it is the government that has radicalized the individual or population, and not some malign actor armed with a powerful narrative. Narrative is much more a tool of exploitation, than causation. As Mao reportedly noted, "I saw a parade, and leapt in front."

So, the task at hand is to identify where the potential energy for these "parades" of political instability are forming and to understand what perceptions of governance are creating that energy. Then, depending on our interests and objectives, put in place measures to simply monitor; or assist in reducing the energy; or co-opt the energy to our own purpose; or disrupt the efforts of others who would use that energy to purposes counter to our interests. Ultimately, there is either opportunity or threat in this energy, it all depends on who gets there first and how they approach the situation.

Understanding the identity-based populations relevant to the issue being assessed is incredibly important, as is appreciating how those populations are distributed and networked around the globe. Ultimately what we need to assess is how these populations feel, and who they blame for the poor governance affecting their lives. This governance can be foreign or domestic, formal or informal. We also want to appreciate who is competing for influence with these populations, and where we stand in that competition. Too often we think of influence as a verb, in the context of how we can get others to think in ways we wish them to think. Increasingly we must think of influence as a noun, in the context of how we can improve how others think of us, our partners, and our allies. Currently, we find ourselves too often the creator and/or protector of poor governance. By transitioning to being a facilitator of good governance, our influence will grow.

So, once an interest or issue of policy or governance is identified, one can build an assessment that will identify where potential population-based challenges are likely to come and guide a program of engagement designed to reduce the likelihood of conflict. (Important to note here is that, based upon this assessment, the smartest next step will often be to make significant modifications to both desired outcomes and the methods one seeks to achieve those outcomes, in order to reduce the provocative aspects of the endeavor.)

Step One: determine which identity-based populations are critical to the issue in question. A good start for determining critical identities are the following three criteria:

1. An identity so important that possessors would be willing to kill or die for it.

2. Possessors of this identity perceive the population formed around this identity to either be at tremendous risk, or benefit, of governmental action

3. Possessor of this identity perceives no trusted, certain, or effective legal means available to them as to mitigate this risk or secure this benefit.

Step Two: identify what systems of governance, relative to this issue/interest, are impacting each relevant identity-based population.

Step Three: for each identity-based population, assess by multiple means how they feel about each of the five perceptions for each of the systems of governance impacting them on this issue/interest. Avoid the urge to be too heavily tied to data, gonkulated out to five decimal points. This is a subjective assessment of how people feel, and who they blame. Many viable methods exist to gather these perceptions. A simple stoplight chart of red-amber-green assessment for each perception is adequate. For any particular system of governance, populations perceive good governance and are within the proverbial *circle of trust*, and therefore naturally stable/resilient; or, they perceive poor governance and are outside the circle of trust and either actively unstable or artificially stable. Stability operations are about understanding and managing this circle of trust (see Figure 1).

That's it. Once this picture is painted, it should shape the policies for what it is we hope to secure or achieve; it should shape the whole-of-government campaign design for how we hope to achieve our goals; and it should drive the design of day-to-day operations.

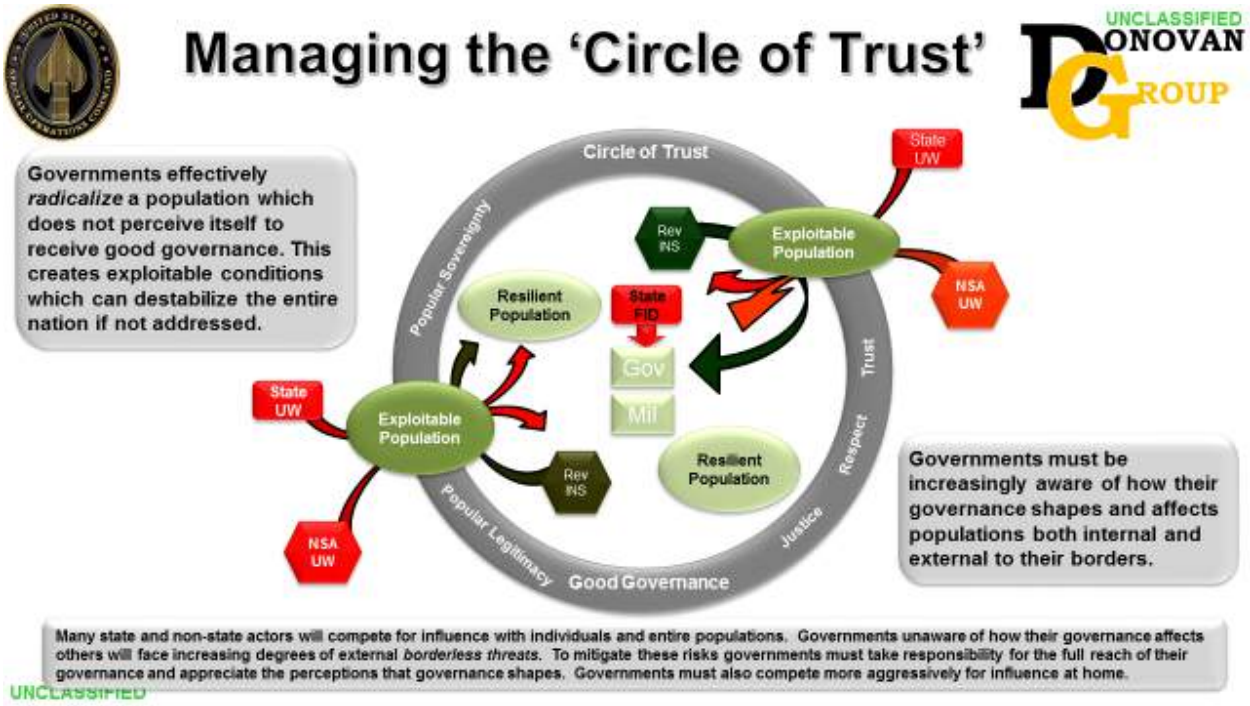

Figure 1. Managing the Circle of Trust

When success is believed to be a combination of defeating threats and building effectiveness, it drives a logic and campaign approach that is often completely counterproductive to shaping these perceptions in positive directions. It also deludes us into adopting polices that are impossible by design, and then becoming trapped in an endless cycle of infeasible operations attempting to make the impossible work. This is what puts us into the Thucydides trap[4] of "Fear, Honor, Interest." We exaggerate our interests and our fears to rationalize why we must be in some place and attempting some action; and then when it is clearly failing under the weight of its impossible nature, we worry that the impact to our honor will be so great that we can't change course or withdraw. This in turn leads us to exaggerate even more the fears and interests that brought us here to begin with. The perspectives and process offered here helps policy leaders to break that cycle.

When success is believed to be a facilitation of goodness, one realizes that the broad categories of security force capacity and military assistance; democracy and governmental institution building; and development and infrastructure; are not ends unto themselves that add up to "effectiveness." Better we think of these as lines of operation through which we conduct carefully crafted activities designed and implemented in ways most likely to move negative perceptions in positive directions. For example, 9 times out of 10, actions to capture or kill an individual branded as a high value target do little to advance our strategic goals. Under this paradigm, knowing where a high value target is

[4] The precarious opportunities of danger when a rising power threatens a ruling power. Ruling powers *fear* challenges to their status, tend to exaggerate *interests* to justify reacting violently on those fears, and once embroiled in a futile effort to impose their will, often are unable to extricate themselves for concerns of *honor*.

presents an opportunity to craft an operation focused on improving specific perceptions of specific populations. At the end of the operation, the "enemy" may well elude capture. But, if in the pursuit of this individual, we are able to reinforce desired perceptions among critical population—that their government has the right to be in charge of them and that our role there is proper; that governance is acting in ways that make sense to them; that they receive justice and are treated with respect and dignity; and that if they have concerns with any of this, that they are empowered to address their concerns in ways that are trusted, certain, effective and legal—then we moved the ball forward. That is strategy. That is strategic. That is the contest we are in today.

Conclusion

The world is changing faster than governance can keep up. The net result for the U.S. is that the major power playbook we inherited from those who found themselves in this role before us has become obsolete. This does not mean it is impossible to be a great power or to lead a rules-based world order. What it means is that power has shifted, and the game has changed. We need a new playbook.

Empathy: The (Missing) Foundation of Effective Operational Art

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If the Joint Force is to routinely achieve durable and desirable strategic outcomes stemming from military operations, an understanding of what relevant others think—what this article refers to as "empathy"—is indispensable. Any solution leading to those outcomes must incorporate empathy into the knowledge base and culture of the Joint Force and make empathy a procedural planning imperative. Recognition of the vital importance of empathy is nothing new as an aspect of military art and science. Joint leaders steeped in military theory can easily recount quotes from theorists such as Sun Tzu, Machiavelli, or Clausewitz dealing on the topic of "knowing the enemy." Yet, service cultures and joint planning procedures lack anything other than superficial treatment of empathy. Coherent treatment of empathy is nearly impossible to find in the doctrine that guides the thinking of commanders and staffs in the conduct of military operations.

Consequently, the joint force has only surface-level understanding of empathy. Even when leaders do appreciate the topic, they and their staffs may lack the tools to incorporate it into the existing planning system described in joint doctrine. This planning system has multiple interlocking processes, including adaptive planning and execution (APEX), operational design, joint intelligence preparation of the environment (JIPOE), the joint planning process (JPP), and targeting. Collectively, joint doctrine implies these processes when it refers to "operational art."

Joint Publication 1, Doctrine for the Armed Forces of the United States, defines operational art as "the cognitive approach by commanders and staffs—supported by their skill, knowledge, experience, creativity, and judgment—to develop strategies, campaigns, and operations to organize and employ military forces by integrating ends, ways, and means" (Department of Defense, 2017, p. I-8). Thus, operational art is the way commanders and their staffs develop their approaches to the problems they must solve using the resources they possess or can access.

To understand the necessary inclusion of empathy into operational art, one must explore three general questions. First, what is empathy and why is it so important to military operations? Next, why does the Joint Force fail to see the importance of empathy? Finally, where is doctrine deficient, and how can doctrine writers imbue empathy into operational art?

Understanding Empathy

Dictionary definitions aside, empathy is the ability to stand in the shoes of another; to understand the world as other people or groups of people see it. The vital task here is to get inside the head of those people who matter to outcomes at all levels of strategy and war (to include competition short of armed conflict). The Joint Force must ensure that their tactical operations remain linked to strategic outcomes. Commanders must avoid wasting time, blood, and treasure on operations, that while tactically successful, make no strategic contribution. These commanders must plan their operations to move these relevant actors toward the ends of strategy. This understanding is primarily possible when one sees the world through the eyes of another, either on an individual level or on a social level.

In other words, the Joint Force must think of the world in terms of human behavior. It must understand strategy as a plan to persuade others to behave in ways that accord with U.S. national interests. In this context, one must focus on information as the interpretive lens through which others see the world. When a Joint Force commander understands how he or she wants relevant actors to see, think about, and react to their environment, they can synchronize tactical actions based on the story they want their operations to tell; or more accurately, the story they want relevant actors to perceive. Understanding this, "information," is revealed as the element of national power and the component of military power that is capable of synchronizing tactical actions so that they generate desired strategic effects.

To clarify, the reason that information is such an important consideration is that people behave based upon the information they observe in their environment. In system theorist Jamshid Gharajedaghi's description of sociocultural systems, he refers to this characteristic of complex adaptive systems as being "information-bonded," and it is perhaps one of the most important aspects that military education fails to highlight when training its operational planners (2011, p. 59-60).

This approach brings the ambiguity of "information" into focus. The Joint Force must think of "information" as the totality of sensory inputs that relevant actors use to guide their behaviors, whether in the form of observed military actions, culture, history, resources, loyalties, interests, or fear. Empathy causes the Joint Force to focus on information not as it matters to them, but as it matters to the relevant actors they hope to persuade. This empathy-based approach moves the Joint Force away from transactional, activity-based planning toward the outcome-based planning it claims to value but struggles to execute successfully.

Intellectual Barriers to Empathy

Why is it that this argument is sometimes anathema to the culture of Joint Force leaders? The answer is that, just like any other persuasive argument, it is filtered through a series of paradigms that do not easily allow its acceptance. If one exposes those filters, they generate less resistance, and the need to change operational art becomes more readily apparent.

First, leaders are taught to think of strategy primarily through an ends-way-means construct. While that construct is perfectly valid, it also tends to steer the "ends" away from the fact that strategic success or failure is almost exclusively defined by what people are doing—in other words, behavior. Rather, "ends" focuses on vague conditions, not the specific behaviors that produce the ends. As noted before, strategy is an approach to cause relevant actors to behave in accordance with national interests.

Second, when the military speaks of power, it thinks in terms of lethality. Equating the amount of destructiveness the Joint Force can bring to bear with power is understandable. It works if one thinks of physics but not of politics. This conception of power always counts in battle, but often not in strategy. In the political sense, power is the ability to achieve one's strategy, which again, is defined through the behaviors of relevant actors.

Third, most leaders can quote *Joint Publication 1*, where it states "The ultimate purpose of the US Armed Forces is to fight and win the Nation's wars" (2017, p. I-13). A similar number ignore what they should consider to be a more important sentence. Namely, that "The US employs the military instrument of national power at home and abroad in support of its national security goals" (2017, I-13). Fighting wars is, for all intents and purposes, the exclusive purview of the Joint Force, but it is not its sole purpose. The higher purpose of the joint force is, in conjunction with other instruments

of power, to achieve strategic outcomes in accordance with national interests and political direction. Since strategic outcomes are evaluated by the behavior of relevant actors, the Joint Force has no allowance to ignore the behavioral effects of its operations.

Once the Joint Force makes these thoughts explicit, the inherent link between information, power, and strategy becomes apparent and pertinent. The Joint Force will also accept that if international relations is a misnomer for "efforts to persuade," then its mandate is larger than warfighting (important as that is). Taken together, this logic clearly shows that empathy must be foundational to effective operational art.

Operationalizing Empathy

The average output of a system tells something about what that actual design of that system is. The actual output of that system may or may not differ from the system's designers intended. If one routinely achieves desired outputs, then they are using a well-designed system. However, if one is less than satisfied with the average outputs of a given system, then their system is deficient.

For the Joint Force, one can describe the systemic output as the strategic outcomes operations generate. Capabilities are of course important to these outcomes and receive due attention by senior leaders. Strategic outcomes as systemic outputs, though, are determined less by capabilities and more by the outputs of planning—the way planners and commanders understood the problems related to their mission and chose to apply their available resources to solve those problem. And here is the problem with joint doctrine. When one reads the doctrinal manuals—the manuals used to educate and train the force—they focus too intently on battle and easily discard strategic purpose. Current doctrine seems to unintentionally allow the Joint Force to focus on tactics devoid of strategy.

To be fair, joint doctrine frequently refers to information, culture, legitimacy, and other factors of empathy—it just fails to do so in a useful way. Further, while joint doctrine must evolve, it must also retain clear and thorough treatment of battle—to do otherwise would be unthinkable. Ultimately, joint doctrine must provide the force with some philosophical underpinning of why empathy is important, how to develop it, and finally, how to leverage it.

No single joint doctrinal publication is the key to producing this understanding. The doctrinal changes the Joint Force requires to operationalize empathy span a number of manuals, but the primary area of focus should be intelligence analysis and operational planning.[5]

Developing operational approaches begins with operational design as described in Chapter 4 of *Joint Publication 5-0, Joint Planning* (2017, p. IV-1 – IV-42). Operational design is meant to help commanders understand the problems they face and to develop appropriate operational approaches to solving those problems. When the military adopted design methodology, it did so to discard linear thinking that had proved inappropriate for solving problems related to counterinsurgency, and to encourage systemic understanding of complex problems.

Unfortunately, the version of design adopted may have discarded too many rules and ignored the value of a few consistently useful questions. War is political, as is competition short of armed conflict.

[5] This article does not recommend specific APEX changes, as the formats specified in APEX should be quickly adapted to reflect changes in doctrine. Neither does this article address targeting, which is not well-suited to the time and intelligence requirements of influence operations.

All forms of international relations involves people, so empathy for relevant actors must always be a planning consideration. The questions operational design should answer specifically, but does not, are:

- Which actors define strategic outcomes?
- What behaviors by these relevant actors are inhibiting desired strategic outcomes?
- What behaviors by these actors would lead to strategic success?

Second, the JIPOE process as described in *Joint Publication 2-01.3, Joint Intelligence Preparation of the Environment*, leans in the right direction. Step 3 of JIPOE is to "Evaluate the Adversary and Other Relevant Actors," and step 4 is to "Determine Adversary and Other Relevant Actor Courses of Action" (2014, p. IV-1 – V-11). The overall structure of the process is sound, but treatment of sociocultural factors is vague and provides little use to the intelligence community in terms of understanding the behaviors of relevant actors. What JIPOE must do for the commander is to ***provide a process*** for developing an understanding of the consequential behaviors of relevant actors. This is, again, a heavy analytical lift, as each intersection of relevant actors and a desired behavior is a separate analysis. JIPOE outputs are inputs for the JPP, and therefore, heavily influence the operational approaches commanders choose.

Finally, the Joint Force must redesign JPP (as described in *JP 5-0* (2017, V-1 – V-62)) to incorporate these JIPOE outputs that describe the drivers of the behavior of relevant actors and maintain a constant linkage with the logics of change stemming from empathetic understanding. Course of action development (step 3 of JPP) must directly focus on environmental manipulation by the Joint Force (and other partners) that commanders believe will drive the desired behavioral changes by relevant actors. Finally, course of action analysis and wargaming (step 4 of the JPP) must enable staffs to analyze whether their planned actions stand to change the behaviors of relevant actors in the desired way. These sorts of changes should also serve to simply the process of campaign evaluation.

Much of what is described above is tied to the specific tools and visual representations that staffs use, but that doctrine infrequently provides. These tools are usually digital products passed on from staff officer to staff officer in the form of spreadsheets and slide presentations. For example, synchronization matrix formats are not specified in doctrine, but are fairly uniform across the force, and rarely address the topic of empathy in any way other than an inclusion of information operations, public affairs, and other capabilities. These matrices describe Joint Force actions, but usually fail to capture the observations and reactions of relevant actors—in other words, they rarely consider the effects of operations on people. Therefore, the existing methodology routinely risks losing the linkages between tactics and strategic outcomes. Doctrinal changes designed to operationalize empathy would have the best chance of success if they provided specific examples of tools that staffs could adopt and modify as needed.

In the final evaluation, the needed adjustments to operational art to account for empathy are small in number, but significant in impact. Even if the higher purpose of the Joint Force is to achieve strategic outcomes as contained in political direction, the Joint Force must remain prepared to fight. Changes to operational art must survive this screening criteria, then—that joint doctrine still enable the joint force to act more decisively than potential enemies. Perhaps this leads to separate and complimentary planning process. This remains to be seen. However, the Joint Force does not have the luxury to remain willfully dismissive of strategy. The Joint Force must ensure that planning

processes remain rooted in the aim to achieve the strategic dictates, and this requires an understanding of the ways in which others see their world.

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Building a House on the Rock (of Good Analysis)…

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The goal is clear – we need to know what vulnerable populations think and feel about everything from their governments and external actors, to the links between them, and any threats they pose, so we can know what to do about them. Stating the obvious here is no earth-shaking revelation. Nor does it seem surprising to juxtapose the obviousness of the need with the gravity of not meeting it. The perception that the US is failing to understand operational environments, specifically its human aspects, makes the elusive search for what goes on inside people's heads all the more pressing, while keeping it equally frustrated.

The common message is that in-house and interagency processes either miss the mark—despite some really concerted efforts—or even worse, offer little more than smoke and mirrors masking an otherwise inflexible bureaucratic culture bent on blindness. What if neither is true though? What if instead, the problems lie at the same "how we do it" level as in traditional academic research designed to answer real world questions with answers found in the real world? The good news is that methodology does in fact exist to get what we need, and while it can be really hard, it is also imminently doable with good analysis. The following brief introduction of the topic offers such a view. It lays some of the foundations for the following White Paper assessments, while fostering dialogue between scholars and practitioners grounded in sound research, and its application to complex security environments.

The first place to look is governance because it is the common reference point within and between societies. It serves as both the subject matter about which we people's views, and the thing we want to influence. Variations exist in the ways and means of governance across different state-society relationships, but the ends of governance remain the reference point for one simple reason—power. Some have it, others want it, and the vast majority are oblivious to it unless it directly touches their lives. Comparative politics examines those phenomena and the variations that exist across cultures and countries. Yet, it also finds enough similarities to offer core categories for comparison.

The foundations for governance are 1) the capacity to do stuff, 2) autonomy in decisions, and 3) legitimacy supporting both. That last factor often stands as the poster child for the conundrum of the human domain: who has it, who wants it, does it impact the general populace and if so how? Yet this one variable need not be such a mystery. The same basic processes for analyzing power dynamics apply to legitimacy, autonomy, and capacity because they all are measures of power itself. Whether discussing the traditional concepts of hard power (capabilities measured as tangible resources) or soft power (the "squishier" influence), power drives the system. As a result, governance is the key connection for structure (the systems that constrain and create opportunities) and agency (individuals and groups who operate within, either in support of or opposition to, those structures).

What that means for our efforts here is that we need some methodological approach to getting at people's *perceptions about governance* because we know cognitive motivations shape *behaviors towards governance*. We also know that the reverse holds true, that behavior shapes beliefs. It also reveals the often "unthinking" nature of what goes in the world, in that cognition is often "lazy". People rely as much on habit as heuristics; both short cut the thinking-acting equation and make behavior a critical element in its own right in the Influence enterprise.

The challenge comes in that while we can observe behavior to an extent (based on access and timing), we are left with indirect measures of thinking and feeling at best. Caveats certainly arise from decades of social science and humanities research, as much as from centuries of philosophical treatises and historical accounts, all bent on tackling the human nature-human society connection. More recently, and building on those earlier foundations, the promising work done on cognitive mapping offers tantalizing glimpses of the "gray matter." Yet these too have methodological hurdles built into them, just like reading Clausewitz or Sun Tzu for application to the Gray Zone today. Both are fraught with abstraction from reality. Just as distance from the "incarnational" nature of past writings creates gaps between our setting in life and the ancients we plumb for wisdom, getting the people we want to study into the lab creates insurmountable problems in the aggregate. The masses as a whole will not sit down to chat, even though we need such broad data for truly effective indicators and warnings. Even going smaller scale for "samples" of the population or key leaders presents challenges because we cannot find all those who would want and need to talk with us. If we could, there is also no perfect firewall against people's instrumental speech – telling us something other than what we actually need to hear. Worse still, the artificiality of experimentation presents challenges when we try to generalize otherwise accurate results outwards to the fuzzy world at large.

Rather than throw up our hands though, the contributors to this White Paper understand the problem and the pressing need to solve it. At the same time, there should be a healthy dose of humility when it comes to producing those solutions. Herein lies the real rub for efforts such as this White Paper in particular, but even more so for the entire Influence enterprise. The interagency focus on human aspects is as necessary as it is challenging, but we also face a problem of our own making. Our adversaries rely on much simpler approaches, which in turn rely on much simpler paradigms. For them, the goal of power is clear, the means to get it even clearer because Russia, China, Iran, North Korea, and VEOs share commonalties to governance. All share the drive to increase power through capacity and autonomy, and critically, by using legitimacy as merely a tool for both. The US and Western paradigm is noticeably trickier because legitimacy is a goal in its own right, in addition to being a means to greater governance effectiveness.

This reality tells us two basic truths, one methodological and the other philosophical, and both reside at the heart of this project. First, the identification of commonalities between us and our adversaries shows key points of traction, for both analysis of strategic strengths and vulnerabilities, and application down range at the tactical and operational level. Second, the differences between us become even more important because the nature of a Democratic Great Power like the US is as much about rights as responsibilities. These translate to everything from civil liberties to responsive governance. The different paradigm presented by our adversaries should be clearly highlighted when messaging into new narrative landscapes, or inoculating populations from hostile information operations on the horizon or already there. The following are starting points for assisting those efforts, recognizing that each is a spectrum rather than an absolute variable.

Measures of governance require both comparability and uniqueness:

- Capacity, autonomy, and legitimacy can be used at both state and society levels to give a lay of the land in terms of what governance actually does (capacity), the level of interference from external actors and internal factions (autonomy), and the spectrum of how populations tacitly accept it, all the way to overtly support or oppose those factors (legitimacy).

- They also give a lens through which to categorize values and the norms of behavior they engender as reference points.

These categories identify the kinds of perceptions/views people can have about the factors of governance.

For the DPRK, this might look like asking defectors' perceptions on the following:

Governance Stability	***Number of Challenges***	***Strength of Challenge***	***Direction of Challenge (for or against status quo)***
Capacity			
Infrastructure: prison camps, information dominance, "starving population" dependence on state	*Few. If any, localized/individual*	*Weak*	*Against*
Civ-Mil relations	*Few, "purges" reinforce system*	*Weak*	*De facto For regime*
Financials	*Numerous*	*Many state "shadow" alternatives = Weak*	*De facto For regime*
Autonomy			
Domestic vs. International legal authority	*Numerous from external threat centered on US*	*High*	*Against*
Center-periphery power distribution	*Few*	*Weak*	*For – localized corruption works for regime*
Legitimacy			
Tacit – non-action	*Many - communalized personal failures*	*Weak*	*Against*
Overt – action	*Few if any, defections as rare examples*	*Weak*	*Against*

Table 1. Examples of DPRK defectors' perceptions on topics related to Capacity, Autonomy, and Legitimacy

The result is a baseline for knowing where to start asking the relevant questions. Without it, efforts to "prove" intentions and perceptions run the risk of becoming yet another example of methodological fantasy land.

Effects-Based Psychological Operations Measures of Effectiveness: Measuring Change and Impact

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This paper focuses on current trends and methodologies in developing a comprehensive assessment and evaluation plan for behavior-focused Psychological Operations (PSYOP) programs. It outlines a pragmatic approach that takes into consideration the need for not only reactive but proactive real-time influence efforts that target problem behaviors and problem conditions as they unfold, viewing them as fluid and dynamic rather than static and unchanging. This updated methodology expands upon the traditional approach by focusing on precise end-states and the detailed psychological effects required to achieve them. This also facilitates the development of adaptive interventions that can be altered in response to rapidly changing situations to maximize the effectiveness of the influence effort, and address the increasing need to be flexible at the strategic, operational, and tactical level.

The mission of PSYOP is to influence the behavior of foreign target audiences (TAs) to support U.S. national objectives. PSYOP accomplish this by conveying selected information and/or advising on actions that influence the emotions, motives, objective reasoning, and ultimately the behavior of foreign audiences. Behavioral change is at the root of the PSYOP mission. Although concerned with the mental processes of the TA, it is the observable modification of TA behavior that determines the mission success of PSYOP. Therefore, influence efforts must have clearly defined and measurable behavior-focused goals and objectives.

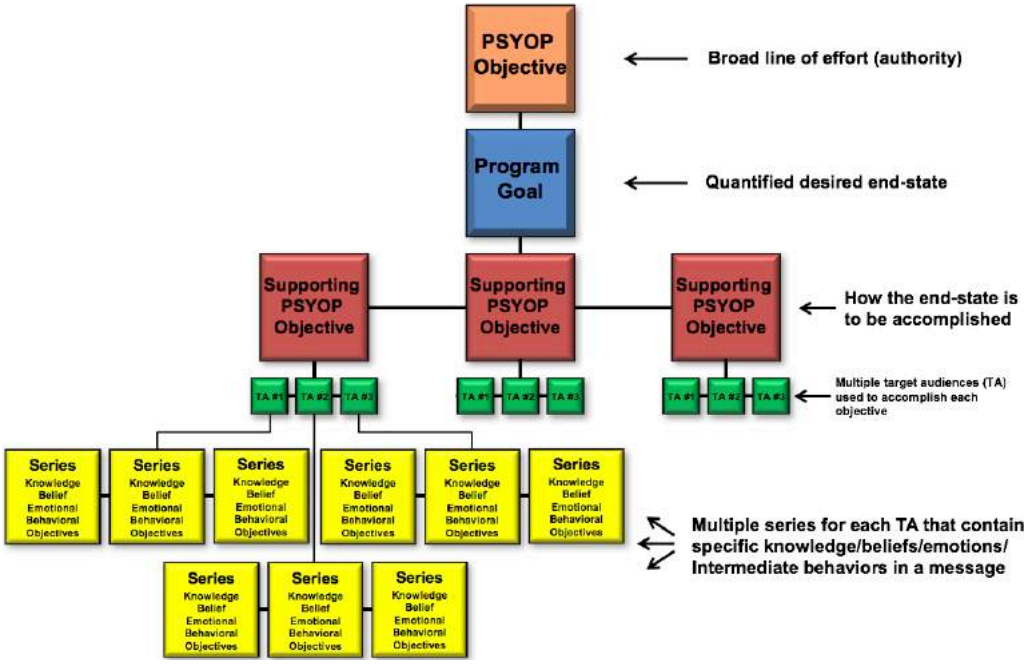

Figure 2. Comprehensive Goal/Objective Framework

The PSYOP assessment and evaluation framework presented here consists of measurable program goals, supporting objectives, and series level message objectives that when properly nested provide detailed measures of effectiveness (MOE) to evaluate behavior change and its impact. Furthermore, this model demonstrates how to plan effects-based PSYOP programs that target the specific changes in knowledge, attitudes (and the underlying beliefs and emotions), and intermediate behaviors at the PSYOP series level that are required to bring about the desired behavior change.

Psychological Operation Objectives

At the top of the framework are the Psychological Operations Objectives (POs). Doctrinally, a PO is a general statement of measurable response that reflects the desired behavioral change of foreign TAs (Special Text, 2014). However, this is a legacy definition as POs are no longer measurable responses but rather broad lines of effort used as *approval authorities* that grant permission and allocate funds and resources to conduct PSYOP. This has resulted in a need for a new metric to measure the *impact*[6] that a PSYOP program is having against the problem sets identified during planning. To mitigate this, PSYOP Program Goals can be developed as a new metric between the POs and the SPOs.

Program Goals were developed for select programs and field tested in Iraq.

Program Goals

A PSYOP program goal is a statement of measurable response or impact that reflects the desired behavior change, and describes future expected outcomes or states. Program goals are written as measurable changes in behavior or as behavioral 'end states' that reflect the *impact* the program is intended to have. They focus on the *ends* rather than the *ways* and/or *means*, and are developed based upon a detailed analysis of specific quantified problems at the local/tactical, regional, and strategic levels.[7] Thus the *program goals* are solutions to the identified problems (or micro problems).

PSYOP Program Goals provide commanders with a rapid-response mechanism (tool) nested underneath existing authorities (i.e., policy, statutory, budgetary, and execute (Graphic Training Aid [GTA], 2017)), and permissions that lends itself to crisis-response and contingency operations in near to real time. Inserting Program Goals between POs and Supporting PSYOP Objectives (SPOs) bridges the gap left by broad and vague PSYOP Objectives acting as approval authority limits rather than as a useful metric.

The format of Program Goals can vary based upon the specific needs identified during planning. Goals can be 'directional' and reflect an increase or decrease of a targeted behavior, or they can be very 'situation specific' and be a concise statement of what the TA is to do or not to do and are useful when supporting short-term operations. Program Goals may also include a targeted decision maker and the specific influence technique being utilized as well. Including the technique can be useful in articulating to supported leaders what PSYOP is proposing to do as well. It may also be desirable in some situations to include end-states to Program Goals such as time quantifiers (e.g. "…by July 2018")

[6] Impact is the measurable effect the PSYOP program is having in regards to the problem behavior/situation identified during mission analysis.

[7] "Ends are defined as the strategic outcomes or end states desired. Ways are defined as the methods, tactics, and procedures, practices, and strategies to achieve the ends. Means are defined as the resources required to achieve the ends, such as troops, weapons systems, money, political will, and time." (JP- 3-13/NWP 3-13): http://mglaich.blogspot.com/2010/07/ends-ways-means.html

or as a change in percentage (e.g. "…by 25%/50%/75%") that will indicate when final program success has been achieved. The final consideration in the writing of detailed Program Goals is ensuring that adequate baseline information is available, and that quantifiable information can be obtained on at least a semi-regular basis so trends can be tracked and changes in behavior can be measured over time. Furthermore, detailed monitoring also allows adaptations to be made to messaging as needed to maximize the overall effort or react to changing conditions.

Directional Program Goal examples[8]:

- Increase the # of illegal weapons, drugs, insurgents, and kidnap victims found during clearing/search operations.
- Increase the # of communities who rise up/rebel and force out insurgents.
- Decrease the # of civilian injuries and deaths resulting from combat operations.
- Increase the # enlistees into the National Army from 500 a month to 700 a month by December 2015.
- Decrease the # of IED's emplaced along US travelled routes.
- Decrease the # of people in attendance at radical/extremist schools/mosques.
- Increase the # of insurgents who participate in the reconciliation program.
- Increase the # of small businesses to foster economic stability.
- Decrease the # of Facebook groups that tolerate violent extremist comments by 25%

Notes:

A. Format for directional program goals are as follows… Increase/decrease # of, amount of, ratio of, etc. Time quantifiers may also be added but should be done so with caution. (e.g. from 500 a month to 700 a month by December.)
B. While the Program goals are behavioral objectives, they can also be attitudinal objectives by measuring the specific attitude towards the behaviors with polls, surveys, and focus groups. Just be aware of 100+ years of social/behavioral science peer reviewed research that clearly documents a weak relationship between general attitudes and behavior.

Situation Specific Program Goal Examples:

- Cause the withdraw of extremist or adversary forces from the city.
- Cause moderators to close the accounts of extremists of online forums x, y, and z.
- Cause the Council of the Revolution to vote "yes" on Women Right's reforms.
- Cause a popular uprising in City X against an occupying power.
- Cause tribal leaders to reject the presence of extremists and foreign invaders on their land.
- Cause parliament members to reverse their decision on topic A.
- Cause the president of a multinational corporation to choose an alternative route for a pipeline.
- Cause civilians to flee the city before its liberation to reduce innocent injuries and deaths.
- Cause a dictator to order the release of political prisoners.
- Cause the shutdown of extremist accounts by applying pressure on forum moderators
- Cause a university President to shut down extremist groups on campus.
- Cause civilians to evacuate the city before the liberation begins.
- Cause tribal leaders to embrace the federal governments' reconciliation program.

Notes:

[8] These goals support a commander's targeting efforts and are not solely done by PSYOP messaging, but rather in coordination with other command activities.

A. Situation specific programs goals were tested stating the word *cause* as its action verb; however, this is not meant to insinuate that the PSYOP effort is the sole reason for the outcome. *Cause* can be replaced with the words *influence* or *persuade* if using *cause* becomes an issue.
B. For more detailed objectives, contact the authors directly.

Supporting PSYOP Objectives

In addition to measuring program impact, the specific behavioral responses each target audience (TA) is to engage in are written as Supporting PSYOP Objectives (SPOs). Unlike programs goals that focus on the *ends*, SPOs focus on the *ways*. Developing well-written SPOs is the critical step in the planning process that will enable commanders to evaluate progress, manage resources, and make adjustments to the plan as needed. Well-written SPOs target specific, measurable, and observable behavior.[9] *Specific* refers to criteria such as the setting, frequency and intensity of the behavior; *measurable* means it can be counted; *observable* means it can be seen or heard. Without clearly defined SPOs, it will be difficult to develop the metrics or baseline data needed for measuring change, and in the worst case, the entire PSYOP plan may be ineffective or unmanageable (Seese & Smith, 2008). In developing measurable SPOs, planners must understand that *behavior* means a specific, observable action. Terms such as participation, support, or violence are far too broad, and they must be broken down into their underlying behaviors. SPOs are written using a "subject – verb – object" structure. The subject is always TA. TAs are not specified in the SPO because often multiple TAs must be targeted to accomplish the desired behavioral change.

Supporting PSYOP Objectives examples:

- TA surrenders to coalition forces.
- TA joins the guerilla resistance movement.
- TA reports human trafficking recruitment attempts.
- TA evacuates the area using recommended travel routes.
- TA attends secular educational institutions.
- TA stays in designated safe areas until told by authorities it safe to leave.
- TA votes in local and federal elections.
- TA applies for a microloan.

Note: Just like the Program goals, while SPO's are behavioral objectives, they can also be attitudinal objectives by measuring the specific attitude towards the behaviors with polls, surveys, and focus groups to gather further insight into them.

While the PSYOP program goals were developed to solve or prevent the identified or anticipated problems behaviors and conditions (Ends), SPOs are the specific behavioral responses desired from each TA to accomplish a given program goal (Ways). The following examples illustrate the linkage between the two.

Program Goal A: Increase the # of legitimate businesses to foster economic stability.
- **SPO 1:** TA registers businesses with the appropriate government agency.
- **SPO 2:** TA applies for small business micro loan.
- **SPO 3:** TA uses local currency for purchases and transactions.

[9] A list of 198 non-violent specific behaviors identified by Gene Sharp is available online at the Albert Einstein Institution website, an organization whose purpose is to advance the worldwide study and strategic use of nonviolent action in conflict. Sharp, G. (1973). 198 methods of nonviolent action. *The politics of nonviolent action*. Retrieved at: http://www.aeinstein.org/wp-content/uploads/2014/12/198-Methods.pdf

- **SPO 4:** TA reports illegal economic activity to authorities.
- **SPO 5:** TA arrests black market operators and smugglers.
- **SPO 6:** TA stages public protests against black markets.
- **SPO 7:** TA attends local jobs fair.
- **SPO 8:** TA setups job fairs in various neighborhoods.

Program Goal B: Increase the # of voter turn-out for federal elections.
- **SPO 1:** TA registers to vote at UN voting sites.
- **SPO 2:** TA nominates political candidates for local elections.
- **SPO 3:** TA joins a political party.

Program Goal C: Decrease the # of civilian injuries and deaths resulting from combat operations.
- **SPO 1:** TA stays in their homes during combat operations.
- **SPO 2:** TA complies with coalition troops during cordon searches.
- **SPO 3:** TA travels only along designed routes.
- **SPO 4:** TA obeys local curfew statutes.

Program Goal D: Cause Supreme Council leaders to order the release of political prisoners.
- **SPO 1:** TA protests against the arrests of opposition party members.
- **SPO 2:** TA publically condemns the supreme council for arresting political rivals.
- **SPO 3:** TA makes financial contribution to the opposition party.
- **SPO 4:** TA publishes/posts reports of government abuses and corruption.

Program Goals and Supporting PSYOP Objectives (SPOs)

Program Goals are developed after a detailed analysis of the current or anticipated situation focusing on the problem behaviors, problems conditions, and associated master narratives that impede the supported unit commander (or Ambassador) achieving his key tasks and objectives. The identified problems are obstacles that need to be mitigated or overcome and are reflected by the execution of information and influence operations when dealing with real-time problem sets. The Program Goals facilitate exploration of the problem set—already done during PO Program development—yet updating it to current evolving situations. Program Goals—after revising and identifying more defined problem sets specific to a situation—can then lead to other SPOs that can lend themselves to rapid prototyping of Series and Product Development, as well as proper identification and (then) collection of impact indicators and MOEs. SPOs, in this case, should not be limited in numbers. In other words, similar to military deception (MILDEC) Goals and Objectives, durations of such efforts are between short and mid-term; thus, not lending themselves for multiple use or recurrent use necessarily. In other words, such problem sets as identified in the PG, followed by the creation of tailored SPOs, Series and Product Development don't have to be restricted to current norms of 'lifespans' (e.g., having same SPO for years). This provides ground commanders and ambassadors the opportunity to be agile in anticipating situations but also respond in an expedited way that allows proper planning to take place, as well as the identification of assessments to measure success and adjust in real time.

Series Level Objectives

In addition to measurable goals and objectives, comprehensive strategies need to be identified for each PSYOP series. A series consists of all the products and actions concurrently developed in support of a SPO. To facilitate this, additional objectives tailored for each series can be developed. This then lends itself to even more detailed and refined measures of effectiveness. While the Program Goals are the *ends*, and the SPOs are the *ways*, series level objectives complete the equation and are the *means* (Figure 3). A PSYOP series can have any combination of behavioral, knowledge, belief, and emotional objectives (see Figure 4 for examples). A behavioral objective is what the TA is to do or not do, a knowledge objective is what the TA needs to know, a belief objective is what the TA needs to believe (Kotler & Lee, 2011), and an emotional objective is what the TA needs to feel (Seese & Haven, 2015). Behavioral, knowledge, belief, and emotional objectives provide direction for developing strategies during series development. A behavioral objective is written similar to the program objectives as it is a specific, measurable, and observable behavior. It describes the action or intermediate action (behaviors can be shaped over time through a series of intermediate behaviors) a TA is to take to finally achieve the desired behavior change. It is directly measured by observing a change in a TA's behavior over time in response to exposure to the series. Knowledge objectives are the information and facts the TA is to know in regards to the desired behavior (statistics, facts, and other information the TA would find motivating or important), and belief objectives are the associated attitudes, values, and beliefs (what the TA needs to believe). Emotional objectives are the feelings a TA needs to experience (to provoke/elicit a reaction) in relation to a specific theme or message. People tend to be deeply affected by the emotional state they are left with after seeing, reading, or hearing something. These are the feelings a person has at the end or climax of a narrative that motivates, energizes, or even inspires them to do something. To ultimately influence attitudes and behavior a narrative must gain the attention of a TA. In order to garner and hold ***attention***, the narrative must ***engage*** them. Engagement becomes the essential gateway to influence (Haven, 2014), and good narratives effectively engage and hold attention. Engagement has a mandatory ***emotional*** component. Seese and Haven's (2015) paper, "The Neuroscience of Influential Strategic Narratives and Storylines" lays out a structural model that represents the elements and techniques used to establish and to manipulate reader/viewer engagement.

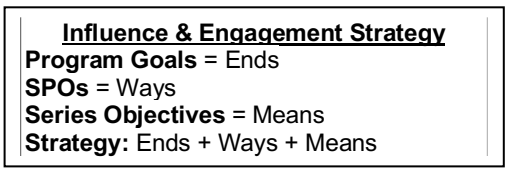

Figure 3. PSYOP Goals, SPOs & Series Objectives adaptation to Ends-Ways-Means construct.

Unlike behavior that can be directly measured, knowledge, beliefs, and emotions are indirectly measured through the use of polls, surveys, and interviews/focus groups, and are an excellent source of qualitative data. In addition, recent advances in neuroscience technology such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), galvanic skin response (GSR), and eye tracking and facial expression analysis permits real-time measurement of a respondent's cognitive load, motivation, arousal, attention, and emotional response. As neuroimaging technologies and methods continue to improve and become more mobile over time, PSYOP professionals can pretest their narratives, themes, and messaging utilizing neuro and bio feedback in real-time. This serves as a way to collect and analyze respondent's cognitive load, motivation, arousal, attention and emotional response to PSYOP products. This also lowers/mitigate risks, attains better persuasive lines of argumentation, resulting in better predictions of desired effects/outcomes. Similar factors used in surveys, polling or interviews (e.g., culture and demographics) also have to be considered to properly attain a representative sample when using such methodology (Martin, Otwell, Seese, Stangle, & Linera; 2016).

Series level message objectives examples:

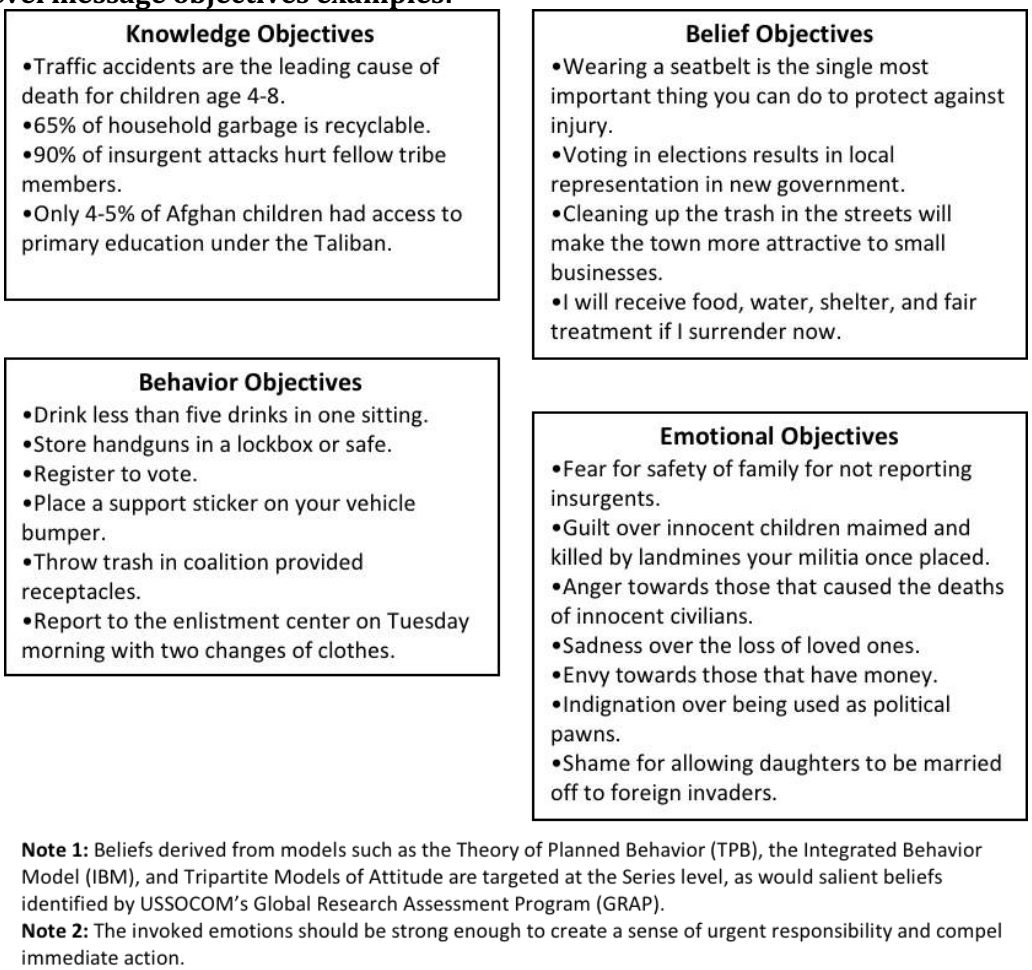

Figure 4. Series level message objective examples

A PSYOP series may consist of any combination of the four types of objectives. Some products may just be informational in nature and only require knowledge objectives, while others may raise awareness of an issue and require both knowledge and beliefs. Products that are meant to direct behavior (compliance gaining) and those meant to influence a change in attitude and behavior would likely require all four. Furthermore, series level objectives can be used to guide the precision development of narratives, specific themes and messages, and can help facilitate the design of survey instruments to be used for pre and post-testing of individual products.

Series objectives were first field tested at the Joint Information Support Task Force in Qatar in 2014 (JLLIS, 2014) as a way to improve message level MOE and provide objectives for pre and post-testing of products and the methodology was presented during a conference at the North Atlantic Treaty Organization (NATO) Center of Excellence in Ankara, Turkey (Seese, 2014). This methodology was further refined and used during the 2016 International Communication & Negotiation Simulations Project (ICONs) narrative simulation that validated their effectiveness by demonstrating that series objectives effectively facilitated the delegation of messaging approval authority for real-time social media messaging within pre-approved themes by providing precise left and right limits for narrative development (Linera, Seese, Canna, & Rhem, 2016).

Academic rigor and theory in the PSYOP process

Essential to the effectiveness of a PSYOP program is the development of interventions based on sound attitude and behavior change models such as Theory of Planned Behavior (Fishbein, & Ajzen, 2010), Tripartite Model of Attitudes (Rosenberg & Hovland, 1966), and Social Judgment Theory (Sherif, Sherif, & Hovland, 1980) to name just a few. It's during phase 3 (Series Development) of the PSYOP process where attitude and behavior change models are utilized to guide the development and staging of the SPOs and series level objectives that become the overall strategy. An excellent resource for this is Dr. Icek Ajzen's (2006) paper "Behavioral interventions based on the Theory of Planned Behavior: Brief description of the theory of planned behavior."

Measures of Effectiveness

Measures of Effectiveness (MOE) are easy to craft when goals and objectives are well written. MOE are written as questions and initially developed during planning, refined during target audience analysis, and further refined during series development. The answers to the MOE questions collected on a periodic basis, form trends that can be analyzed in relation to the dissemination of messages. The analysis of these trends gives insight into the impact a particular PSYOP series and program is having. The following illustrates a program goal, a supporting PSYOP objective, and series objectives with their associated MOE questions. The metrics were refined to include both quantitative and qualitative information by including more specific dimensions of behavior, such as setting, frequency, and intensity. The setting could include the city, town, or area. The frequency would describe how often a behavior occurs. The intensity measures the consequences or severity of the behavior.

PSYOP Program Goal: Decrease the # of injuries and deaths resulting from mines and unexploded ordnance (UXOs).
MOE: How many people were injured and killed last month from mines and UXOs, where at, and what were the ages and gender?

Supporting PSYOP Objective: TA reports the location of landmines and UXOs to local authorities.
MOE: How many people reported the location of landmines and UXOs in the Brčko Municipality last month, where at, and through what means (phone, in person, text)?

Knowledge Objective: Text (SMS) landmine/UXO locations to 1-800-blowdup.
Knowledge MOE: What percentage of Teenage Bosnia Serbs polled know the # to report mines/UXOs?

Belief Objective: Reporting landmines/UXOs will keep me and my friends safe.
Belief MOE: What percentage of Teenage Bosnian Serbs polled believe that reporting mines will keep them safe?

Emotional Objectives: (tied into specific theme of loss of friends**)** Sadness over loss of friends/fearful or angry over threat of being injured or killed
Emotional MOE: What percentage of Teenage Bosnian Serbs report being sad, fearful, and/or angry.

Behavior Objective: Teenage Bosnian Serbs text the location of landmines/UXOs to local authorities.
Behavior MOE: How many teenage Bosnian Serbs texted the location of landmines/UXOs in the Brčko Municipality last month, and how many reports turned out to be credible?

Establishing a Relation Between the PSYOP Series and MOE

Utilizing an academically sound methodology to establish a relationship between the dissemination of a PSYOP series and changes in behavior is paramount and lends both credence and credibility to PSYOP efforts. Linking the series and MOE impact indicators is the most effective means because it individually evaluates the effectiveness of each SPO. Additionally, this facilitates a comparison between the series for the return on investment. Establishing a connection between the series and Program Goal or PO is feasible, but more complex due to competing SPOs and other variables that influence the outcome.

Using a truncated academic research methodology (Treadwell, 2013) achieves defendable results without a serious investment in additional training. Determining effectiveness can be minimized into six steps:

1. Define the research question and hypothesis
2. Collect baseline data. What is occurring before any PSYOP?
3. Collect data to support the hypothesis (H_1)
4. Collect data that refutes the hypothesis (H_0)
5. Analyze the data
6. Determine which conclusion is best supported

Step one defines the research (a clear question about the relationship between the PSYOP series and the MOE). It ensures clarity about the process and serves as a guidepost. From the example above, the research question would look like

"Did series X cause the TA to register businesses with the appropriate government agency (Program Goal A, SPO 1 from above)?

Formulate a hypothesis (statement that the research intends to test, abbreviated "H_1") from the research question. A hypothesis for PSYOP tends towards the following format: "series" caused "target audience" to "SPO." For the research question above:

> H_1 = "Series X caused the TA to register businesses with the appropriate government agency."

After establishing the research question and hypothesis, collect historic data on the MOE (discussed above in detail) used to measure the SPO. It's ideal to have at least a year's worth of data to have a baseline to account for seasonal changes and determine the norm before intervening with PSYOP; however, it understood that this is not always possible. In the example, how many businesses normally register with the appropriate government agency before the series began?

Next, collect data that supports the hypothesis (H_1). Primarily, it will be quantitative, in this case the amount of businesses registering; however qualitative examples like case studies and interviews are equally significant as they add context to numerical data.

Correlation, a relationship between two variables, is required before establishing causation (one causes the other to occur). Without it, there is no causal linkage possible between the PSYOP series and the MOE. Plot the MOE on the Y-axis and the cumulative amount of PSYOP on the X-axis (see Figure 5). Due to repetition of the message being a key factor in the TA's behavioral change, plotting cumulative investment is good method to present the data. To keep the X-axis metric uniform, while a series use different media (e.g. radio, TV, newsprint, etc.) use funding costs. Other measures can be used, but dollars spent produces accurate results without extensive investment in research time.

Note changes in the effects after a period of time. Before the series begins, there is no external influence on the TA and their MOE is stable. After the series begins, there should be an increasing amount of MOE (correlation line) and then a leveling off (saturation point). A sloping line indicates a correlation between the PSYOP series and the MOE. At this point, the observation could be random coincidence. Qualitative data can add context to the numbers, especially large surveys, interviews, and case studies. With qualitative data, the researcher can establish knowledge and beliefs within the TA, note any changes, and determine why those changes occurred. If the changes occurred because of the PSYOP series, it becomes evidence to support the hypothesis.

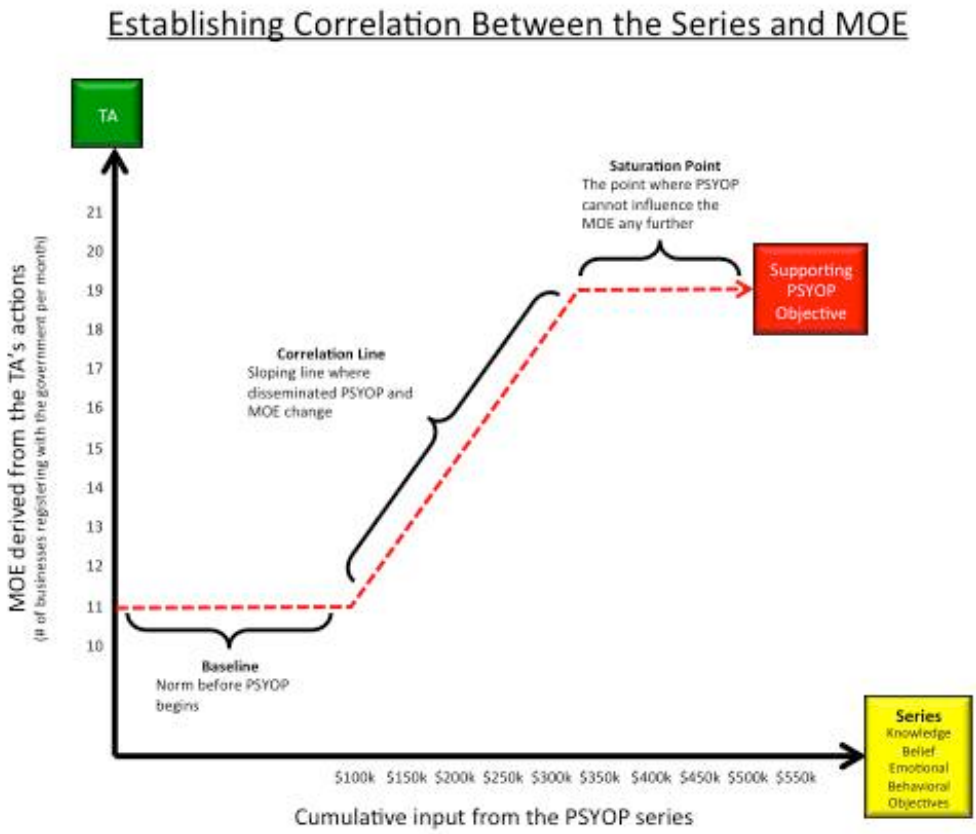

Figure 5. Establishing the Correlation. Between the Series and MOE

Once there is a correlation between the series and the MOE, establish causation- proving that the series and effects are more than two random events in the same space. The standard technique is to test the opposite of your hypothesis, or the "null hypothesis" (H_0 for short). Whereas previously, data was collected to support the hypothesis, now it is collected to refute it.

H_0 = "Series X did not cause the TA to register businesses with the appropriate government agency."

Testing the null reduces confirmation bias by allowing data that does not support the hypothesis and determines if there are other variables that contribute to the MOE. If during the process of testing the null hypothesis is supported by evidence, then the original hypothesis may be disproven (i.e. the series was ineffective and/or other variables influenced the outcome). However, if there is no evidence to support the null hypothesis and other variables are ruled out (e.g. seasonal changes, major political/ economic policies, etc.), the original hypothesis stands as the best outcome.

With the data collected on the original hypothesis and the null, begin analyzing and interpreting the data. An easy scenario is when either the hypothesis or null has overwhelming evidence to support it; one stands out over the other. Difficulty arises when there is competing evidence for both, requiring a rigorous analysis to reach a conclusion. Qualitative data is essential here as it can add context to numbers and explain why the TA took certain actions. Address the null first to analyze where other variables influenced the MOE and by how much. Remember that the null states that Series X did not cause the MOE; meaning that other variables could have caused it or that there was no observable effects. Once their effects are accounted for, the remaining effects may provide evidence to support that the original hypothesis was at least partially influential on the MOE. In the example, assume that major political changes improved the economy, creating more businesses for the TA to register overall. But the series increased the knowledge about the registration process and a belief that business owners should register with government agencies.

Conclusions are almost never absolute; they are often the most likely or best-supported statement. Acknowledging the shortcomings up front in the conclusion lends a degree of credence as opposed to burying it, which draws into question other parts of the research. In the case of business registration, political policy changes and Series X influenced the MOE in tandem. The conclusion should look similar to the example below:

> Conclusion = "While major political changes improved the economy, thus creating more business opportunities, Series X had significant influence on the TA registering their businesses with the appropriate government agency."

Here is a defendable conclusion that can withstand outside scrutiny. It is not absolute, which only requires a small amount of evidence to the contrary to be refuted. Rather it acknowledges other variables, thus competing evidence will not disprove the entire conclusion and opens it to later refinement as new evidence become available.

Summary

In conclusion, planning and evaluating the effectiveness of a PSYOP program can be a daunting task, but if measurable goals and objectives are developed, MOE questions are relatively straight forward to write. Properly crafted MOE's are much easier to integrate into a supported unit's intelligence collection plan, and lend credence to the credibility of influence programs.

Measuring the effectiveness of influence efforts requires detailed problem analysis to quantify specific behavioral problem sets and to identify the enablers (i.e. conditions, who is doing what, where, how, etc.). The goal is to gain a better understanding of the problem so precise solutions (both preventions and interventions) can be developed for implementation. Program goals that are measurable end-states help assess the impact the program is intended to have, while supporting

PSYOP objectives focus on the measurable ways to attain them. Series level objectives take into account the psychological effects required to provide the comprehensive strategies necessary to achieve the goals and objectives by focusing on the knowledge, beliefs, emotions, and intermediate behaviors required for each of the identified target audiences.

The pragmatic framework presented here demonstrates that it is possible to not only measure changes in behavior and the associated knowledge and beliefs, but also whether the program is having any impact on the problem itself. Furthermore, the methodology provided here not only adds academic rigor to the existing doctrine, it takes it to the next level and changes how PSYOP Soldiers think about planning and the capability they can leverage and bring to the 21st century fight.

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Coordinating Operations to Influence Behaviors in the OE

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> We face an ever more lethal and disruptive battlefield, combined across domains, and conducted at increasing speed and reach—from close combat, throughout overseas theaters, and reaching to our homeland. Some competitors and adversaries seek to optimize their targeting of our battle networks and operational concepts, while also using other areas of competition short of open warfare to achieve their ends (e.g., information warfare, ambiguous or denied proxy operations, and subversion). These trends, if unaddressed, will challenge our ability to deter aggression.
>
> --The National Defense Strategy of the United States, 2018

Integrating information operations (IO) and physical operations at the strategic, operational, and tactical planning levels is critical for achieving long-term military objectives. IO is a comprehensive effort to understand and maneuver in the human and cognitive domains. In 2014, the Strategic Landpower Task force members came to the conclusion that "time and again the U.S. has undertaken to engage in conflict without fully considering the physical, cultural, and social environments that comprise what some have called the 'human domain.'"[10] As stated in the quote above, the U.S. National Defense Strategy demands that we address not only lethal threats, but also competition short of open warfare, because our adversaries are using such capabilities to challenge our ability to deter aggression. Further, it is the human will that determines the final outcome of war.

Developing and maintaining understanding of human emotions, responses, or actions can lead to success or failure in the midst of rising competition between State influences. It is hard to imagine planning and executing a successful campaign to influence or alter behavior when we have not invested sufficient time and energy to develop a true understanding of people and their motivations in order to match information operations with desired effects in a given operational environment (OE).

The Joint Staff's latest doctrine and concepts focus on applying a combined cognitive and physical approach to succeed in future campaigns. By following logical lines of effort among joint doctrine JP 2-01.3 *Joint Intelligence Preparation of the Operational Environment*, the *Joint Concept for Human Aspects of Military Operations* (JC-HAMO) and *the Joint Concept for Operating in the Information Environment* (JCOIE), the staff realize that these references focus on identifying key individuals, populations, and events in order to inform the commander's decision making, understand and influence behaviors, and shape the environment in operations across the spectrum of conflict.

Leveraging the informational aspects of military activities is being captured more purposefully in much of the emerging doctrine. The military tends to plan and conduct military operations and campaigns the way we have for decades, but as our understanding of the character of war deepens, our plans must change due to rapid technological and information changes in the operational environment.

[10] Strategic Landpower Task Force White Paper, *Winning the Clash of Wills*, 2014

Recent joint doctrine and concepts move the joint force closer to building information into "operational art to design operations that deliberately leverage the informational aspects of military activities to achieve enduring strategic outcomes."[11] The soon-to-be-released JCOIE describes informational power as "…the ability to leverage information to shape perceptions and attitudes that drive desired behavior and the course of events."[12] The central idea of this concept is to leverage information to influence the perceptions and behavior of relevant actors in theater.

By influencing these relevant actors, the Joint force can focus its efforts on creating desired end-state conditions throughout the entire operational environment (OE). Developing understanding of relevant actors and their belief system related to their narratives, perceptions of their environment, and deep knowledge of identity, culture and history, often involves an effort that takes uninterrupted and unrelenting investment.

The gap that remains, as the Joint Force recognizes the need to more fully understand and engage with these relevant actors during the planning and execution phases, is the paucity of training to replicate and deliver the right measure of non-lethal elements, perceptions and attitudes thus shaping desired behaviors of relevant actors.

The JCOIE is directly linked to the JC-HAMO, a concept that looks at populations and peoples more systematically. JC-HAMO lists four main objectives (1) identify the range of relevant actors and their associated social, cultural, political, economic, and organizational networks; (2) evaluate relevant actor behavior in context; (3) anticipate relevant actor decision making: and (4) influence[13] the will and decisions of relevant actors.[14] These four imperatives are focused on relevant "human" actors—friendly, neutral, and threatening ones.

Importance of Relevant Actors

The clearest link between the JCOIE, the JC-HAMO, and JP 2-01.3 is their emphasis on the concept of relevant actors, which are essentially the high value targets within the *human domain*.[15] So why are relevant actors so important? JP 2-01.3 describes relevant actors as those actors in "friendly, neutral, and threat networks that could delay, degrade, or prevent the joint force from accomplishing its mission," and those "actors that could *help* the joint force mission."[16] Identifying the relevancy of actors goes much farther than solely targeting them with force. Devoting time and energy to understand key leaders, groups, and individuals will help influence once these human factors are understood and interpreted. Developing this understanding and replicating this level of depth in training, education and leader development is important because the future Joint Force will need to identify, evaluate, and influence relevant actors to succeed in future campaigns. The exact phrase from JC-HAMO is that there is "…a critical and enduring challenge in warfare—the need to understand

[11] *Joint Concept for Operating in the Information Environment* (JCOIE), to be released.
[12] *Joint Concept for Operating in the Information Environment* (JCOIE), to be released
[13] Influence defined as the act or power to produce a desired outcome on a target audience or entity.
[14] *Joint Concept for Human Aspects of Military Operations* (JC-HAMO)
[15] Joint Publication 3-60, dated 31 Jan 13, pages vii and viii states, "The emphasis of targeting is on identifying resources (targets) the enemy can least afford to lose or that provide him with the greatest advantage (high-value target [HVT]), then further identifying the subset of those targets which must be acquired and engaged to achieve friendly success (high-payoff target [HPT])."
[16] JP 2-01.3, page I-22.

relevant actors' motivations and the underpinnings of their *will*. The concept recognizes that war is fundamentally and primarily a human endeavor."[17]

This need to identify and engage relevant actors as part of the JIPOE process represents an expansion of previous thinking. Historically, adversarial actors demanded the majority of attention during planning and operations. Now planners must train and practice to devote increased attention to "relevant actors" that exist in friendly and neutral networks, no longer merely focusing on threat or adversarial actors.

Although the JCOIE and JC-HAMO are aligned in focusing on the concept of relevant actors, JP 2-01.3 advocates a more comprehensive view than the joint concepts. For example, it explains the need to understand not only the concept of relevant actors, but also the concept of key nodes. Key nodes are directly related to [network and system] functionality.

Key nodes are essentially the high pay-off targets of the human domain.[18] They exist in every major system and subsystem and are critical to the functioning of their associated systems. For example, a hydroelectric plant could be the key node in a metropolitan area's power grid (a subsystem of the infrastructure system). Some may become decisive points for military operations since, when acted upon, they could allow the JFC to gain a marked advantage over the adversary or otherwise to contribute materially to achieving success. Weakening or eliminating a key node should cause its related group of nodes and links to function less effectively or not at all, while strengthening the key node could enhance the performance of the subsystem and larger system. Key nodes often are linked to, or resident in, multiple systems.[19]

Key nodes within host nation friendly, neutral, and threat networks include those human network nodes that are critical to the functioning of their associated systems. These key nodes are humans, and development of a plan to gather, store, retrieve, and incorporate these human factors into course of action development and decision-making will provide opportunity for the joint, intergovernmental, and multinational (JIM) communities to more effectively influence the functioning of host nation systems. This dynamic, described in the JIPOE process, must be applied when implementing the JCOIE and JC-HAMO. It is an important reason that the JC-HAMO imperatives "complement and depend on the JIPOE process."[20]

A Good IO Campaign Influences Actors and Behaviors

> "When the public believes the mission will succeed, then the public is willing to continue supporting the mission, even as costs mount. When the public thinks victory is not likely, even small costs will be highly corrosive"
>
> -Christopher F. Gelpi, Peter D. Feaver and Jason Reifler[21]

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[17] JC-HAMO

[18] Joint Publication 3-60, dated 31 Jan 13, pages vii and viii states, "The emphasis of targeting is on identifying resources (targets) the enemy can least afford to lose or that provide him with the greatest advantage (high-value target [HVT]), then further identifying the subset of those targets which must be acquired and engaged to achieve friendly success (high-payoff target [HPT])."

[19] Ibid, page III-46.

[20] JC-HAMO

[21] Christopher F. Gelpi, Peter D. Feaver and Jason Reifler, "Success Matters: Casualty Sensitivity and the War in Iraq," International Security, 30:3.

War is the battle of wills.[22] This statement has been made by many military leaders and it will certainly be made again. The idea, as Carl von Clausewitz reminds us, is to "…compel our enemy to do our will (or) what we desire." Sun Tzu, author of *The Art of War*, says "…to subdue the enemy without fighting is the acme of skill." In today's OE, where the character of war is changing and all domains matter, human will, lies in the human and cognitive domain. It is there where the win comes—without fighting. Instead, an IO campaign must be strategic, used creatively and holistically to influence, modify, or change another's behavior. This is much easier said than done. Think of influencing a relative let alone an unknown adversary far away. How then, do we determine how these nodes think, behave, or react?

Behaviors are social, meaning that these behaviors are learned, most notably, from interaction with other people in various situations. Behaviors are also responses of an individual or group to an action, environment, person, or stimulus.[23] For example, when you greet someone, your behavior may be different with a child than with an adult. You may negotiate with confident, proud behavior or meek behavior depending on how you learned to interact. You may be influenced by negotiating with men or with women depending on your belief system. So how do you get more confident? You learn about the art of negotiation and you practice different approaches, maneuvers if you will, to get to yes.

It is always difficult to understand how people think or why they react or behave in a certain manner or in particular situations. Further, if a behavior or belief is ingrained, how do you find another way to influence it because changes to those embedded belief systems are difficult to influence. Military planning involves, historically, deciding how we want to fight an adversary. A well planned and executed IO campaign includes plans for non-lethal maneuvers when dealing with a potential adversary. By definition, any act—be it diplomatic, informational, military, or economic—is an intervention into that country's affairs and disturbs its societal systems. Military commanders should consider the reasons why actors behave toward any intervention whether it be through leaflets or bombs.

An intervention of any kind will solicit a behavioral reaction, especially when that intervention is initiated from an outside source. Military interventions often evoke fear, misperception, and suspicion. Therefore, it is essential to understand how humans in the OE may behave in order to achieve desired effects through influence activities. Humans react through emotion and are often difficult to predict, however, if you understand underlying belief or narratives, many reactions can be predicted. For example, most experts on the Middle East saw the Arab spring as inevitable due to the increasing youth population, minimal economic opportunities and various other social factors that existed in these societies, but to their dismay, U.S. federal leadership was seemingly caught by surprise. Had they understood the complexity of the OE in these nations, uprisings and demonstrations may have been incorporated as likely activities in standing plans and orders. This planning would have supported a more effective and coordinated response." future threats.

In influence operations, it is human behavior that we seek to affect. The information environment impacts all domains. In the spectrum of diplomatic, informational, military and economic (DIME) planning, the "M" is the often the primary focus of military commanders while the "I" or information variables are often viewed as secondary or tertiary in importance. This perspective inhibits the ability of staff elements to understand relevant actors and populations in the human domain. On an

[22] Will is defined here as determination, willpower, strength of character, resolution, resolve, resoluteness, single-mindedness, purposefulness, drive, commitment, dedication, doggedness, tenacity, tenaciousness, staying power.
[23] http://www.businessdictionary.com/definition/behavior.html

international security scale, dangerous conditions occur when the response from the people and populations is unexpected. For instance, the burning of a Koran in Florida sparked outrage in Afghanistan putting many Americans, civilians, military and allied partners, in country at risk. If U.S. IO planning could become as proficient as its combat planning, Americans would know how to react or potentially avoid situations like this all together. If we study the "I" in DIME and practiced incorporating these elements into our plans and activities, the ability to spot IE indicators would inform our actions. This response would allow teams to better influence friendly, neutral, and threat relevant actors and key nodes within human networks through both kinetic and non-kinetic operations. Better IO planning will assist commanders in decision-making to produce desired outcomes instead of unwanted effects.

Many assume that another's behavioral responses will align with their own, but this assumption is often false. Behaviors and reactions to influence activities depend on the geopolitical relationships among countries, a person's culture, religion, upbringing, family circumstances – rich/poor; abusive/coddled - and their narratives. Narratives impact how people interpret their environment, identity, culture and history. To understand and not assume how someone may respond, a wealth of information about culture, histories, social networks, and beliefs must be studied and digested as well as the nuances of how societies evolved. Much of this information is available, and once identified, information can be collected to fill gaps and improve understanding. One challenge, then, is to find and use that information to understand the reasons behind a belief or behavior so that engagement, influence, collaboration, and assessment all feed into planning and engagement activities.

More importantly, when working on influence and information operations, your learned values or behaviors must be clearly understood so that bias does not cloud the ability for mission success. It will rely on you leaving your own thinking at the door and putting yourself in the shoes of that relevant actor. By embracing their thoughts and beliefs, it is much easier understand how to influence behaviors in the OE.

Coordinating Operations

> "For almost a minute the two of us were locked in a battle of wills that had no possible winner, only a different order of losing." -- Mira Grant, Author

The National Defense Strategy points to nations that use all elements of US foreign policy to veto authority over nations in competition other than war.[24] The U.S. must not stand idly by. These new doctrinal references and concepts must be embraced by the Joint Force. IO planning is generally staff-driven, not command-driven. Instead, IO generally done piece meal through IO, MISO, and CA teams. It is overseen by the J/G-9 in a parallel planning process that may or may not be integrated by the information operations cell.

Planning for information operations should be command-driven and included in the central development of operational art, operational design, and the joint planning process because in future operational environments, non-combat operations will generally have an equal or greater impact on achieving enduring strategic objectives than will combat operations. The Joint Force must be responsible for conducting full spectrum non-combat operations with the same level of competence as combat operations; however, this cannot be accomplished when non-combat operations are

[24] Summary of the 2018 National Defense Strategy of the United States of American: Sharpening the American Military's Competitive Edge, p. 1.

excluded from the full attention of the commander during development of operational art and design. By studying current and emerging doctrine as well as joint force concepts, US Army TRADOC's Networking Engagement Team (NET) is working with various government, academic and civilian partners to develop a mission focused course in order to teach the warfighter how to complement the physical with the information side of planning.

This is not about hearts and minds, it is about clearly understanding how the non-combat interactions and relationships affect the strategic outcome of the commander's intent, incorporate it in planning and give implementation tools to those on the ground. The Decade of War Study highlighted this point by stating that in both Iraq and Afghanistan forces failed, "to recognize, acknowledge, and accurately define the operational environment led to a mismatch between forces, capabilities, missions, and goals." The U.S. continues to operate in both theaters with many of the same human challenges. The lesson has not been learned. JC-HAMO stresses that based on the centrality of *human will* in achieving lasting objectives, U.S. forces must learn to *influence* the will and decisions of all *relevant actors*.

Therefore, it is clear that thoroughly integrating information operations and physical operations at the strategic, operational and tactical planning levels is critical for achieving long-term goals and objectives for success.

Part II: How Reliable Are Self-Reporting and Polling Data? A Biopsychosocial Perspective

Neurocognitive Mechanisms of Self-Disclosure

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Biological Embodiment, Social Embeddedness, and the Importance of Communication

Humans are biologically embodied (i.e. exist in a physiologic form) and socially embedded (i.e. function within ecologies via psychological interactions with others). As "social animals," humans engage tools (of information/knowledge, language, and various instruments) to foster cooperation (and some level of competition) in order to both augment favorable aspects of their biology, and to compensate for those biological characteristics that have rendered vulnerabilities to survival and flourishing (Benedikter & Giordano, 2011; Giordano & Benedikter, 2012). The capacity to communicate retro- and prospection, emotional state, and intent have enabled humans considerable prowess in optimizing psychological aspects of social interactions. Given that consciousness and first-person phenomenal experience are transparent only to self, communication of certain features of cognitive states (e.g. implicit emotion; intent; etc.), that is, "self-disclosure" can be vital to human social engagement.

Self-disclosure is defined as the act of sharing personal information with others. In the context of forging relationships, people share information about their thoughts, feelings, and aspirations, and it has been estimated that self-disclosure constitutes approximately 30-40 % of the information that is shared by a person on any given day (Landis & Burtt, 1924; Dunbar, Marriott & Duncan, 1997). Informational sharing is also based upon and requires the ability for perceiving particular social environments and understanding the nature and extent of self-disclosure that is appropriate for given social contexts and situations (e.g. with kin; intimate friends; strangers; small or large groups).

Self-Disclosure Entails Neurocognitive Mechanisms of Decision-Making and Reward

Having information about oneself, deciding to reveal, what to reveal, to whom, and to forecast potential reactions to disclosure, entails complex decision-making processes. These involve brain networks that function in self-referential cognition that evaluate relative risk, threat, and reward (Northoff et al., 2006). These entail substrates of executive action and working memory, inclusive of thalamic and sensory cortical regions (operative in sensory integration); the anterior and medial cingulate cortex (that function in expectation, and perception of aversiveness); the cuneus and precuneus (which are involved in valuation responses); prefrontal cortical networks (which are engaged in rational cognition), and septo-hippocampal tracts of the limbic system (operative in memory and emotional arousal (for overview see: DiEuliis & Giordano, 2017). As well, decision-making engages reinforcement and reward mechanisms subserved in part by dopaminergic networks of the ventro-tegmental/mesolimbic regions. Of particular interest is that recent functional neuroimaging studies have shown that acts of self-disclosure involve activity of these sub-cortical reward pathways, including the nucleus accumbens and ventral tegmental area (Savine & Braver, 2010; Tamir & Mitchell, 2012). These same brain nodes and networks are involved in reward responses to other stimuli (e.g. food, money, sex), suggesting that acts of self-disclosure engage mechanisms of subcortical and cortical reinforcement, and can be strongly influential to human behavior.

Moreover, it is important to note that while self-disclosure involves communicating information to others (i.e. an altruistic action), processes of reinforcement and reward tend to referential to first-person consequences of the action—in this case, the expression and transfer of information (i.e.an egoistic component (Avram et al., 2014)). Here, some form of situational and/or relational reciprocity becomes relevant: in communicating self-referential information, the communicator characteristically is placed in a position of relative vulnerability (i.e. cognitive exposure), and tends to usually express only that information that will render relative positive gain. If the relationship is one of trust, such perceived gains may be in maintaining confidentiality, and/or in reciprocity of action (such as shared communication or deeds). Thus, a person may consider how sharing information about themselves will make them feel and whether there is anything they can gain or lose from sharing. A person may also assess how the person they are communicating with may react to their self-revelations. In face-to-face interactions, there is an observational context related to emotions and physiological reactions, including observations of facial expression, tone of voice (i.e. prosody), posture, timing, and intensity of the dialog.

Social Media Can Be a Force-Multiplier for Self-Disclosure

However, the advent of remote forms of communication has been influential to patterns of human interaction. Currently, social media have provided facile and capable platforms through which to advance communicative engagement, inclusive of self-disclosure. In general, social media advances the scale of self-disclosure exponentially; whereas face-to-face self-disclosure may represent ~30-40% of interpersonal communication, it has been estimated that social media may increase this amount to ~80% (Thompson, 2008). Furthermore, social media (like other forms of remote communication; e.g. telephone conversation) may obviate the content/context intimacy of face-to-face disclosure. This added feature of relative anonymity (and diminished risk of retribution) makes social media platforms even more viable for overt interpersonal expression (Xiao et al., 2016).

This "force multiplying" capability of social media is directly related to the capacity to engage the reward system of the brain that has been linked to self-disclosure: when using social media, individual users prepare, then share information in the form of texts and images (frequently "selfies"). A recent neuroimaging study of adolescent social media users revealed high levels of activity in reward networks of the brain when subjects were self-disclosing personal information on the social media platform, *Instagram*. This study also suggested a reinforcing/reward role for peer approval in fostering self-disclosure (Moisala et al., 2016). Neuro-cognitive responses to social media interactions are similar to those evoked by face-to-face communications of positive self-disclosure: of interest in this regard are studies that have shown increased release of the neuropeptide oxytocin, associated with trust and positive bonding/interactions, during positive social media interactions, as well as decreases in the stress related hormone, cortisol (Alexander, 2015).

However, it is also important to note that certain patterns of social media use may interfere with, or reduce the capacity for multi-task activity, with both diminished cognitive control and increased susceptibility to distraction by irrelevant environmental stimuli (Rothbart & Posner, 2015; Savine & Braver, 2010), with greatest effect observed in children and early adolescents (Ophir, Nass, & Wagner, 2009; Moisala et al., 2016; Fahsen-Paetau, Kohls, & Giordano, 2018). Thus, it appears that both the pattern(s) and extent of social media use may be important to differentially activate neuro-cognitive mechanisms operative in reinforcement/reward and control that function in and focus and/or distraction. If, and when coupled to decisional processing, engaging such effects may induce distinct susceptibilities to self-disclosure.

Finally, studies of the brain during social media interactions can reveal important understanding of how individuals navigate social relationships; individuals who do not have a tightly-knit network of friends tend to experience a higher degree of network reorganization in the brain in response to social exclusion. These findings may suggest differences among individuals in how much they consider the views of others, and how they approach social relationships (Schmälzle et al., 2017).

Opportunities for the Future

Furthering an understanding of neuro-cognitive mechanisms involved in self-disclosure may be important to developing new ways of fostering interpersonal communication using social media and other interactive platforms (see, for example, Scholz et al., 2017). Tools, tactics and strategies for influencing the facility, extent, and type of self-disclosing communication could be employed together with particular narratives in health promotional programs, as well as information support operations of humanitarian, or military value. Additional studies aimed at identifying key features of both evocative stimuli and individual and group responses will be instrumental to such progress.

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Knowing the Terrain: Explicit and Implicit Measures of the Population

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Introduction

Modern warfare is experiencing a profound and significant change, characterized by the power, speed, volume, digitization, and low cost of information. This information affects people ranging from friendly, neutral, to adversary populations, comprising both state and non-state actors. The resulting strategic environment offers a space where political warfare is of increasing importance. According to General Votel et al. (2016), "political warfare is played out in that space between diplomacy and open warfare, where traditional statecraft is inadequate or ineffective and large-scale conventional military options are not suitable or deemed inappropriate for a variety of reasons." Military operations in this peace-conflict continuum are often referred to as "Gray Zone" operations. Votel et al. (2016) further state that these operations are "population-centric engagement that seeks to influence, to persuade, even to co-opt." Given the focus of these efforts that dominate current military operations and those of the foreseeable future, understanding population-centric knowledge, attitudes, beliefs, intentions, and behaviors (KABIB) is of increasing importance.

Political warfare and gray zone operations should rely on persuasion. Persuasion is the intentional, successful change of mental state, where people have free will. Coercion and use of force eliminates the perception of free will, which negates the effect of persuasion, which ensures effective long-term change. Gray Zone operations must target the population's KABIB variables. These variables must be measured using an appropriate, valid, reliable, and scientific method.

The modern military commander has more tools and capabilities to understand and monitor the operational environment than ever before. Intelligence and strategic understanding has transitioned from a time of information scarcity, where effort was needed to acquire data, to a time of information superabundance, where effort is needed to discard less relevant data. Commanders must therefore use the right data to answer their information requirements. For population-centric operations, which are increasingly common, commanders must measure KABIB attributes of various populations.

There are two general approaches for measuring population KABIB attributes, explicit and implicit. Explicit methods directly ask the respondent for their judgment of an attitude object. These methods measure conscious, intentional, easy-to-report features, and usually consist of direct questions, surveys, or polls. Implicit methods measure unconscious, involuntary, and often unknown features and usually consist of physiological or behavioral observation and measurement. This paper will discuss some of the strengths and limitations of explicit measures of KABIB and when their use is appropriate. Strengths and limitations of implicit measures are also discussed, with a particular emphasis on recent advances in neuroscience.

Explicit Population Measures

Explicit measurements of population are commonly used in support of diplomatic and military operations. Methods may range from general population surveys commissioned by the Department of State or tactically developed surveys to support measures of effectiveness in a military information

support operations (MISO) campaign or series. Civil affairs forces will poll indigenous populations to better address civil-military operations and concerns. Human terrain teams were used throughout Afghanistan and Iraq, providing a more scientific and anthropological approach. Still other units have commissioned defense contractors to conduct atmospherics, respondent driven sampling of elite and hard to reach populations, and even open source research on the internet. A common question raised is the veracity, or trustworthiness of explicit population measures. The key shortcoming is that the explicit measure only provides an estimate of the respondent's attitude. It fails to provide insight into the beliefs that may lie behind the attitude (O'Keefe, 2016).

While many may question the validity of data that is self-reported by human subjects, there is a strong track record of success. Perhaps the strongest support of explicit, self-reported data is that it reports what no one else knows (Baldwin, 2000). For example, if a commander is interested in the attitude (affect or liking) among villagers toward the presence of military forces in their town, these data are not recorded in some online archive. The data resides within the hearts and minds of the villagers, so you must go to the villagers to acquire the data.

There is perhaps a greater danger in relying on observed behavior to implicitly measure attitude. There are many factors that contribute to behavior change and attitude is only one. We may, for example, observe a reduction in tobacco smoking by young adults either through a reduction in cigarette sales or physical observation at local dining establishments. Attributing attitudinal cause, however, is more difficult. Is the observed reduction due to new laws prohibiting smoking inside? Is it due to more effective warning labels on tobacco products, or the effectiveness of public service announcements? Perhaps it is due to the increased use and popular acceptance of vaping or marijuana use. The most effective measure of attitude towards tobacco in this case is likely an opinion poll. Understanding the source of behavior change is important for sustaining and exploiting gains in our notional smoking cessation example.

Self-reported data can be highly accurate. Objective evidence of the accuracy of explicit measures is found in several application areas. Okura et al. (2004) found greater than 90% accuracy for self-reported data when people were reporting medical history. In their study, they compared patient reports of major medical events with the medical records held by their health care provider. Del Boca and Darkes (2003) found reliable self-report for alcohol consumption. There exists a large body of research that supports the validity of self-report data for measuring delinquency and crime statistics (Hindelang et al., 1981; Sampson, 1985; Wyner, 1981; Hardt & Petersen-Hardt, 1977; Huizinga & Elliott, 1983).

There are many critics of explicit measurement of attitude (Allport, 1927; Dunning et al., 2005; Hindelang et al., 1979; Tourangeau & Smith, 1996; Wilson & Schooler, 1991; Nisbett & Wilson, 1977). Data collected from human subjects and archival data measure different domains, leading to discrepancy between the two sources. It is not clear that archival data is uniformly superior. Errors may exist in how data was entered, bias in collection, among other threats to validity. Some errors in self-report data have been attributed to cognitive limitations or the measurement of sensitive issues (Hindelang et al., 1979). Tourangeau & Smith (1996) argue that self-report data is not accurate for measuring the number of sexual partners or encounters in which subject have engaged. They suggest that the personal and sensitive nature of sexual relations may affect how truthful respondents are in reporting their data.

Explicit, self-reported measurement is more effective when questions ask concrete objective facts, such as the number of hospitalizations or incarcerations, subject age and marital status, or which political candidate they voted for in the last election. Questions requiring a subject to exercise

introspection are less effective (Wilson, 2002). Accuracy can also be affected by high automaticity (Mils & Hogan, 1978; Paulhus & Levitt, 1986). Other factors include anchoring effects, primacy and recency effects, and time pressure. Culturally taboo questions will also negatively affect the reliability of data.

Subjects may have varied motives when participating in studies or surveys. Their responses may be affected due to their self-perception (Robins & John, 1997). They may strive for consistent reporting, thereby obfuscating small or recent changes in attitude. Explicit instruments that measure performance (Johnson, 2004) often have bias. Many times, subject motives in non-response and the subsequent interpretation of meaning is biased (Tourangeau, 2004). Self-reporting in the context of face-to-face interviews generate additional problems such as the effects of self-consciousness, rapport, transference, and modeling. Focus groups further add pressures of social conformity (Asch, 1956; McCulloh, 2013). In most cases, the respondents will actually be unaware of their own bias and pressure to conform.

The design of explicit measurement instruments requires technical expertise in both measurement theory and cognitive psychology. Often times multiple items are used to assess an attitudinal construct and mathematical measures of internal consistency are used to verify accuracy and increase reliability. Poorly constructed composite measures, however, may obfuscate the real intent of questions. Indirect techniques use questions that do not directly address the attitude of interest, but rather measure the way in which a subject responds. For example, the Narcissistic Personality Inventory (NPI) (Raskin & Hall, 1981) uses questions about performance and other items to assess how subjects rate themselves relative to others. This approach indirectly measures their level of narcissism. Open ended questions can often reveal greater insight into attitudes and behaviors, but they must be hand-coded, which can lead to other forms of bias.

Responses also vary across different cultures and respondents may not interpret self-report questions as intended (Hamamura et al., 2006). Chen et al (1995) demonstrated a moderate bias and ambivalence in survey response. When conducting cross-cultural survey research, it is important to ensure accurate linguistic and cultural translation. For example, an instrument written in English must be translated into the target language and then back-translated by an independent interpreter to ascertain whether the back-translated and original instrument are consistent. Additional cognitive testing must be conducted in the target language to ensure that constructs hold similar meaning for the target population. Composite scales must be verified for internal consistency.

Explicit measures offer a powerful tool for understanding KABIB features within a population and they are critically important for strategic understanding. As military operations become increasingly population-centric, their effectiveness will highly depend upon the successful use of these methods. Measurement is a technical science, however, and should not be left to amateurs to develop and conduct. There are inherent strengths and limitations to any method and those overseeing population-centric measurement must be aware of these strengths and limitations in order to properly employ measurement instruments and make effective resource and risk management decisions.

Implicit Population Measures

Implicit measures of population estimate features that may be unconscious, sensitive, or in situations where explicit measures are problematic, such as requiring deep introspection or where a responder is unaware of their internal workings or is embarrassed by their beliefs. “Implicit measures are likely to be most attractive in circumstances in which one fears respondents may, for whatever reason,

distort their true attitudes. (O'Keefe, 2016, p.9). When implicit measures are being recorded, the respondent should not know what is being assessed. The measurement tools use indirect methods. Most of these methods rely on behavioral indicators, biometrics (sweat, heartbeat), or neuroscience approaches (brain activity). The most common approaches are perhaps eye tracking and pupilometry. Eye trackers can locate what specific features of content or stimulus that increase attention. When these stimuli are carefully designed, they provide insight into unconscious elements of attention. Pupilometry works with many eye trackers and provides insight into emotional responses to stimulus. Increasingly neural imaging systems can measure brain activity in various regions associated with different types of cognitive response. These methods provide major advances in both our understanding of human attitude and cognition as well as the ability to measure human response at the cognitive level. These methods form the core measurement tools of neural marketing companies that continually emerge.

There exist a wide range of neural measurement systems. A complete review of these systems is well beyond the scope of this paper. It is worth mentioning three potential systems, however, to explore tradeoffs in capability. Electroencephalography (EEG) measures electrical signals in the brain. The EEG has excellent temporal resolution, in that it detects brain activity within milliseconds of stimulus exposure, but it does not offer much information regarding which brain regions are active or what cognitive processes may be involved. It is therefore difficult to assess whether a subject is experiencing an emotional or rational response, for example. This limitation is often mitigated by combining it with other biometric tools such as eye trackers, heart rate monitors and other tools. Together EEG, eye-tracking, and biometrics provide a powerful system for implicit measurement of people.

A functional magnetic resonance imaging (fMRI) system measures brain activity based the electromagnetic properties of blood flow in the brain. When brain regions become active, they release chemicals known as neurotransmitters. These chemicals must be replaced for future potential activation. This can be observed by measuring the increased blood flow to brain regions that were recently active. This type of signal is referred to as blood-oxygen level dependent (BOLD) signals. While BOLD signals offer improved spatial resolution over EEG, they offer poor temporal resolution. This means that fMRI systems can locate specific brain regions involved in certain types of human cognition, but the observed signal may be delayed several seconds from the stimulus presentation. fMRI is a powerful tool that allows neuroscientists to understand how the brain processes information and interacts with other cognitive functions to affect attitude and behavior.

An unfortunate limitation of the fMRI is its large size and expense. fMRI systems lack portability and often affect ecological validity. Ecological validity refers to potential measurement bias occurring because the environment for experimentation differs so drastically from normal conditions under which people might experience stimuli. Functional near infrared spectroscopy (fNIRS) offers an improvement over the size, cost, and ecological validity issues. fNIRS measures BOLD signals based on optical properties instead of electromagnetic properties. An fNIRS system is often 5% of the cost of fMRI and newly miniaturized systems can fit in a coat pocket. The spatial resolution of fNIRS is not as good as fMRI and many inner brain regions, often associated with emotional response are inaccessible. fNIRS can, however, measure several key accessible regions with greater ecological validity.

There are disadvantages for using neural imaging systems for assessing implicit measures of KABIB features. This process is referred to as "reverse inference" (Poldrack, 2006). In traditional inference of brain activity, it may be assumed that a given stimulus only invokes a single neural process. Thus, observation of brain activity in a particular brain region is assumed to signal a psychological process

in response to that stimulus. The problem is that a stimulus might initiate multiple cognitive processes that interact in unusual, complex ways. Therefore, activation observed in a brain region associated with one particular cognitive process cannot prove that the cognitive process is active. That same brain region being observed may be used in a different process entirely.

A classic example of reverse inference was reported in the New York Times during the 2008 U.S. election season. Iacoboni et al. (2007) measured the neural response of subjects viewing political campaign speeches. They identify brain activity in regions associated with the limbic system, which is linked to emotion and affect. They argued that the brain activity allowed them to infer affective feelings that subjects held of candidates in the campaign messages. Aron et al. (2007) criticized the findings in the New York Times arguing that the Iacoboni findings were not peer reviewed and disagreed with the assertion that the brain activity could predict political party affinity on the grounds of reverse inference. Iacoboni did, in fact publish his findings (Kaplan et al, 2007), however, this public debate highlights potential criticisms of neural imaging application to implicit measurement of KABIB features.

There have been many scientific studies since the Iacoboni-Aron debate that support the use of neural imaging methods to implicitly measure neural processes associated with influence and persuasion (Berns & Moore, 2010; Falk, Berkman, & Lieberman, 2012; Falk, Berkman, Whalen, & Lieberman, 2011). A key factor that supports these findings is the inclusion of additional behavioral or physiological data to increase measurement validity, scientific validity, and external validity. Neural imaging has been demonstrated as an effective implicit measure predicting music purchase (Berns & Moore, 2010) and smoking cessation (Falk et al., 2011, 2012). The use of large and costly fMRI systems, however, continue to limit their wider application for measuring populations.

Recent advances in neural imaging technologies are opening new opportunities for practical, applied neural imaging in support of implicit population measurement. fNIRS provides a low cost, highly portable, and easy to use technology for measuring key brain regions associated with influence and persuasion (McCulloh, 2016; 2017). Matthew Lieberman has been able to replicate several fMRI studies in his lab at UCLA under a research grant provided by the U.S. Air Forces Office of Scientific Research (AFOSR) Trust and Influence program managed by Benjamin Knott. Recent work is currently being conducted in Amman, Jordan to evaluate the cross-cultural suitability of the technology. As this work continues, the possibility of military units using this or similar technology to measure population-centric variables becomes a reality.

Conclusion

As military conflicts are increasingly fought in the Gray Zone, population-centric warfare will become even more important than it is already. The Department of Defense must develop and maintain the capability to understand key KABIB attributes of strategic populations. These same methods must be applied to measuring the effectiveness of US operations. The U.S. has a critical gap in the necessary skills, technology, and capacity to measure population-centric variables. Military commanders often lack the experience with explicit and implicit measurement tools to understand mission critical issues or hold confidence in the findings presented by their staff.

This paper reviews the strengths and limitations of various approaches to explicit and implicit measurement of a population's KABIB variables. Direct surveys are valid and provide an important tool for understanding the populations. They offer a more direct measure to understand indigenous populations than institutionalized alternatives within the intelligence community. There are situations, however, when explicit measures may face threats to validity. These situations may

include sensitive topics such as religion or support to extremism. They may involve more difficult cognitive constructs such as narcissism, anomie, and locus of control.

Threats to validity can be mitigated with multiple sources of data, multiple approaches to measurement, and with investment in qualified experts to design, conduct, and analyze research. Implicit measures provide a compelling alternative to explicit measures for understanding difficult to measure variables such as attitude and behavioral intention. Advances in neuroscience technology make implicit methods increasingly accessible to military practitioners. Traditional intelligence also maintains a role in providing critical data to support understanding.

Commanders and their staff must utilize a mixture of data sources, measurement techniques, and analytic methodologies to meet modern challenges. They must invest in training and education for themselves and their staffs in order to properly consider the vast amount of data that is available. Certainly, they should never summarily reject measures, because they feel the method is universally flawed or because they do not understand how to properly use and interpret the data. If the US is to maintain dominance in the future, they must ensure planners are familiar with the proper employment of explicit and implicit measures in population-centric warfare.

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Remote Behavioral Assessment: Political Psychology Methods

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Introduction

Among the many approaches into understanding how a particular audience, in this case, an audience of one, thinks are remote behavioral assessments. These approaches, largely developed in clinical and later, political, psychology have long been used by US intelligence agencies. The first remote psychological profile of a foreign leader was led by the Office of Strategic Services' Walter C. Langer in collaboration with Henry A. Murray (Harvard Psychological Clinic), Ernst Kris (New School for Social Research), and Bertram D. Lawin (New York Psychoanalytic Institute). Their target was Adolph Hitler, and their report, *A Psychological Profile of Adolph Hitler: His Life and Legend*, was a vital piece of intelligence that supported Allied psychological warfare efforts and military deception operations. Murray also authored a separate piece that took the remote analysis a step further suggesting additional applications of the effort (Murray, 1943).

Since World War II, numerous academic and operational methods of assessing leaders have been devised and implemented. OSD-SMA has incorporated a number of these approaches into various White Papers in recent years including studies of Bashar al-Assad (Spitaletta, 2014a) and the Islamic State (Spitaletta, 2014b) while others suggest the incorporation of such methods into contemporary approaches to Military Information Support Operations (MISO) (Spitaletta, 2013; Spitaletta, 2016). The following paper provides a brief overview of some of those methods.

Trait/Motivational Approaches

Early psycholinguistic approaches to personality analysis date back to Walter Wientraub's work with clinical populations in the 1960s. Wientraub employed content analytic methods to identify syntactic structure in patient responses to ambiguous stimuli (given during projective assessments such as the Thematic Apperception Test or TAT) and clinical interviews and has applied these approaches to linguistic analyses for decades (1986). David Winter's (2003) motivational analysis of political behavior applied similar content analysis to code for need for achievement, power, and affiliation to determine a leader's interpersonal behavioral preferences (Immelman, 2005). In Margaret Hermann's trait analysis of leadership style, each trait is assessed through content analysis of the leader's public statements as well as other secondary sources of information. Although both prepared speeches and statements from interviews are considered, the latter is given preference because of its spontaneity. The data are collected from interviews and analyzed or content coded, and then a profile is developed. The profile is then compared with the baseline scores developed for the database of leader scores. One is considered to have high score on a trait if he or she is one standard deviation above the average score for all leaders.

Hermann's work exploits the stable patterns or personality traits vice the psychopathology model (Hermann, 1980). Hermann's method assesses leadership style as a function of 1) belief that one can influence or control what happens (self-efficacy); 2) need for power and influence; 3) conceptual complexity, or the ability to differentiate among things and people in one's environment (related but not identical to intelligence); 4) self-confidence or self-esteem; 4) the intensity with which a person holds an in-group bias; 5) general distrust of others; and 6) task versus relationship focus.

Since no single aspect dominates behavior, Hermann (1980) analyzes how combinations of these aspects lead to certain observable patterns of behavior. The combination of beliefs and need for power and influence often determines whether the leader will challenge or respect constraints. The combination of conceptual complexity and self-confidence determines how open a leader will be to new information and new ideas. The extent of their in-group bias and general distrust of others provides evidence concerning a leader's motivation, particularly whether the leader may coordinate or form coalitions with other groups. The leader's outlook about the world and its problems largely determines the confrontational attitude of the organization and may help predict whether groups will espouse violence. A leadership trait analysis was included in Cabayan and Wright's (2014) assessment of Bashar al-Assad.

Cognitive Approaches

Operational code analysis has transformed from a manual process to near-automated (with human in the loop) processes. Regardless of the means, cognitive approaches assume perception and beliefs are more easily inferred than personality given the availability of data sources (often transcripts of speeches, letters, or the personal communications of a particular leader). The integrative complexity approach to political personality assessment is an extension of operational code analysis in that it is more rooted in cognitive psychology and social cognition than in personality psychology (Immelman, 2005). Content analytical measures of integrative complexity can be applied to verbal (or written) materials to assess the extent to which the individual can differentiate and integrate multiple perspectives on a particular issue. Low integrative complexity correlates with cognitive rigidity, where the individual is either unable or unwilling to consider varying frames of reference (Simonton, 2006).

A variety of content analytic approaches, to include various methods to measure cognitive complexity, were employed in Cabayan and Wright's (2014) assessment of Bashar al-Assad. While the approaches did not necessarily identify identical findings, the areas of convergence proved sufficiently illuminating to provide unique insight into Assad's thinking and/or specific recommendations about how to deal with him. A similar approach was included in into Spitaletta's (2014b) comparative assessment of Zawahiri and Baghdadi, which helped quantify some of the differences in the two jihadist leader's approaches to public statements.

Personological Approaches

Another approach to remote leadership analysis is Theodore Millon's personological model. A clinical criticism of the aforementioned approaches is that they do not adequately incorporate disciplines of personality theory and psychodiagnostics (Immelman, 2005). Millon's theory of personality was the intellectual driver behind the DSM-IV Axis II personality disorder diagnostic criteria (which was remained largely intact in the DSM-V) as well as the Millon Clinical Multiaxial Inventory (MCMI), a widely used personality assessment. Millon divides the personality into functional and structural attributes. Functional attributes are the processing and modulating features of the personality such as behavior, cognitions and perceptions, and intrapsychic regulatory mechanisms. There are four functional attributes: expressive acts (observable behavior), interpersonal conduct (how individuals interact with others), cognitive style (perceptions, attention, information processing, organization of thoughts), and regulatory mechanism (unconscious processes to resolve needs, protect the ego, and mediate conflicts) (Immelman, 2005). Structural attributes are the enduring components of the personality that help define one's worldview. There are four structural attributes: self-image (perception of oneself/identity), object representations (interaction with memory and its influence on information processing), morphologic organization (structural strength and internal cohesion of

the mental system), and mood temperament (how one interacts with and processes emotion) (Immelman, 2005).

Psychodynamic Approaches

From Langer's team's initial work through today, remote psychodynamic assessments have been employed to determine "what makes a leader tick" (Langer et al, 1943). Psychoanalysis is based on the proposition that much of mental life is unconscious, that a person's psychological development is important for understanding their current state, and that psychological distress derives from unresolved intrapsychic conflict. Psychoanalytic studies of narcissism and paranoia have shed light on the personalities of some leaders (Victoroff, 2005). Those studies have contributed to both academic and operational applications of psychodynamic theories.

Post's (2010) integrated political personality is rooted in the objects relations school of psychodynamic theory. His approach entails: 1) a psychobiographical discussion to put the subject's life in the appropriate political context; 2) an analysis of the individual's personality using any number of remote assessment methods (many of which are discussed in this paper; 3) the subject's worldview, an attempt to describe the contemporary operating environment from the subject's perspective; 4) leadership style or how the subject goes about his or her duties; and 5) outlook, and intelligence-based approach to assessing how the subject is likely to behave in specific, operationally-relevant, circumstances (Post, 2010). Components of an integrated personality profile on Zawahiri included in Bos et al. (2013) study of the clandestine components of insurgencies, was incorporated into Spitaletta's (2014b) comparative assessment of Zawahiri and Baghdadi. Post's (2010) integrated political personality profiling method, while more laborious, allows for the incorporation of multiple remote assessment methods.

Conclusion

This brief paper presents a—by no means exhaustive—set of approaches to remote behavioral assessments of individuals. These approaches typically emerge from political psychology and are generally applied toward foreign leaders. However, with the even-increasing availability of personal data on the Internet, these same approaches may be applied to average individuals (Spitaletta, 2013). While there is some evidence that these approaches have operational utility at the macro (Post, 2010) and micro (Spitaletta, 2013) levels, further exploration of the subjective utility would be worthwhile. Political psychology researchers are regularly improving upon these and other remote behavioral assessment methods and publishing their work and leadership analysts within the US intelligence community are likely doing the same. Both scholars and practitioners could benefit from a comprehensive research effort identifying the effectiveness of remote assessment methods.

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The Neuroscience, Psychology and Practice of Target Audience Self-Report

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The military challenge of the Joint Concept for Operating in the Information Environment (JCOIE)[25] is how to "integrate physical and informational power to change or maintain the perceptions and attitudes that drive desired behaviors of relevant actors." That is, how to influence your target audience. I define influence as a means to affect an audience's behaviour, perceptions, or attitudes.[26] Influence can be achieved by deterrence, persuasion, 'nudge,' or the use of hard or soft power. A key feature of influence is that audiences can choose, which distinguishes influence from the direct effects of brute force that removes the ability to choose.[27] Measures of target audience derived from their "self-report" are central to this challenge in two ways.

Firstly, influence efforts must be tailored to the audience to maximise intended effect. Organisations should adopt an **outside-in** mindset, which makes the audience's decision-making process the focus of the influence strategy. To influence an Afghan farmer not to grow poppy, or if we seek to deter an adversary state, the influencer must consider that course of action and its alternatives from their perspective. This includes realistic, conscious, and unconscious as well as irrational motivations, such as fear, fairness, and identity. Self-report measures help us understand that calculus (Figure 6). Secondly, one must assess the impact of influence. Many methods are needed to measure the impact of influence – and self-report is central to many of them.

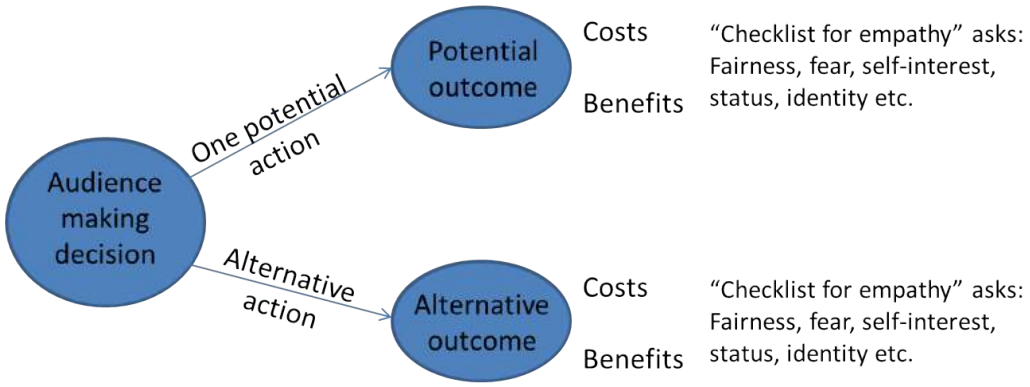

Figure 6. The Audience Decision Process (Wright, 2017)

In the following sections, I consider what humans can self-report—and how reliable those reports are—from the perspective of: (I) neuroscience; (II) classic psychology; (III) historical cases; and (IV) the practice of measuring impact. I finally (V) summarize policy implications. Throughout I note self-report measures' significance in Grey Zone confrontations—more than normal competition between

[25] U.S. Department of Defense, Draft v.080 Sept 1 2017, p. vi

[26] For more detailed discussion of influence, power and thinking "outside-in" see (Wright, 2017).

[27] Related to this distinction, e.g. (Schelling, 1966) p. xiv

states but less than traditionally thought of as war (Wright, 2017)—that centre on perception and influence.

(I) Metacognition: the neural machinery of self-report

First, I describe five central points from the latest neuroscience evidence.

(1) Human brains contain powerful machinery for self-report (Figure 7). Metacognition is the human capacity for "thinking about thinking" (Fleming et al., 2012a; Frith, 2012). Metacognition plays a central role in decision-making by facilitating the monitoring and control of behavior, and the communication of subjective beliefs to others (e.g., "How certain are you?"). This is critical in environments with absent or sporadic feedback, characteristic of many real-world scenarios. Metacognition can also be applied to the thought of others, in which case it is called mentalizing. Metacognition enables us to reflect on and justify our behaviour to others (see also Giordano and Dieuliis this volume).

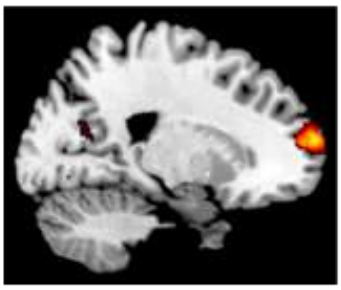

Figure 7. Convergent evidence supports a role for the orbito Prefrontal cortex in introspective accuracy.

(2) However, brain structure and function also limits metacognition. There is a limited degree to which "higher" parts of the brain can look into and boss around "lower" parts of the brain that can be critical for powerful motivations (Berridge, 2004). Indeed, classic evidence shows that even when humans freely choose to move their hand that the related brain activity *precedes* the conscious feeling of deciding to move it (Haggard, 2017).

(3) *So, metacognition matters, but what are the components of metacognition?* I discuss two important aspects.

The first is **introspective accuracy**: how easily one can distinguish between being right or wrong on a task. Convergent evidence from studies of brain structure (using MRI), brain function (using fMRI) and brain damaged patients have identified anterior prefrontal cortex as key for metacognitive computation (Figure 7) (Fleming et al., 2010, 2012b, 2014). Specifically, individuals with greater introspective accuracy had greater grey matter volume in this brain region (Fleming et al., 2010).

The second is one's level of **confidence** in a decision. When I was a doctor looking at chest X-rays, for example, I could decide whether or not there was evidence of a lung malignancy, and then I could decide how confident I was in that decision (i.e. "thinking about my thinking"). Recent work identified a brain network including striatum and frontal cortex involved in computing confidence (Fleming et al., 2012b; De Martino et al., 2013).

Assessing how confident an individual is about their self-reported judgements may be a force multiplier to increase the predictive power of self-report data in populations:

(i) Measuring confidence may improve polls' predictive accuracy. Strikingly, the outlying poll[28] correctly predicting Trump's election as President in the 2016 asked respondents to give probabilities, which captured the ambiguity of their choice.

[28] http://www.latimes.com/politics/la-na-pol-trump-polls-20161109-story.html

(ii) Ambiguity and low confidence in perceptions is key to Grey Zone activities (e.g. "little green men"). Indeed, the Russian "firehose of falsehood" approach seeks to reduce confidence in facts by deluging them with alternatives. When perceptual confidence is a key target of adversary influence campaigns, we should measure it.

(iii) Confidence provides a metric for how likely audience members are to change their mind. For example, the Obama 2012 election campaign big data analysis computed measures akin to confidence[29] – and asking about confidence will be useful in populations without such big data, and may be cheaper even in populations with it.

(4) Metacognition varies considerably between different individuals in populations. This can be captured in behavior and brain structure (Fleming et al., 2010; Wright et al., 2012).

(5) Whether key aspects of metacognition vary between cultures is poorly understood – and requires further research. Prior research in psychology has identified promising avenues for investigation. For instance, a number of studies have found that Chinese subjects are more overconfident than both their American and Japanese counterparts when reporting confidence in general knowledge (Yates et al., 1989, 1997, 1998). However, such early measures of confidence conflated performance, confidence and metacognitive accuracy (Fleming & Lau, 2014). This cross-cultural dimension is key. Indeed, the JCOIE stresses the significance of an audience's *worldview* that *"is a mental model of reality -- a framework of ideas and attitudes. The beliefs, values, narratives, and behaviors of a culture are derived from, and inform, the worldview of a relevant actor."* [30] But more basic and applied cross-cultural research is critical.

(II) Behavior-attitude gap: one factor shaping audience behavior

A second and largely separate body of evidence from psychology has also examined the relationship of attitudes (e.g. obtained via self-report) and behaviors. Such work shows that a number of different factors can shape audience behavior and decision making. Understanding these factors aids development of targeted influence approaches. Key examples include identity, age, education, attitudes, education, personality, and culture. Thus, for example, self-reported attitudes will only be one input driving behavior.

1. Attitudes influence behavior, but there is an important attitude-behavior gap: Attitudes are explicit or implicit evaluative judgements about an abstract or concrete object. Importantly, there is often a big gap between attitudes and actual behaviour (Ajzen, 1991). However, carefully using attitudinal data can help audience analysis and influence. In particular, attitudes better predict behaviour when they are strong, more confidently held, less internally inconsistent, less ambivalent and easier to recall (Glasman & Albarracín, 2006; Maio & Haddock, 2009). Unformed or ambiguous attitudes are more susceptible to influence. Such findings on confidence provide convergent evidence with those from neuroscience above. Again, this suggests that using these quantities may be a force multiplier in the acquisition of population data, and again they are key quantities in the Grey Zone.

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[29] Tufekci, Z. 'Beware the Smart Campaign' *New York Times* (online), November 16 2012. Available at http://www.nytimes.com/2012/11/17/opinion/beware-the-big-data-campaign.html?_r=1 [Accessed 31st March 2016); Beckett, L. Everything We Know (So Far) About Obama's Big Data Tactics in *Propublica* (online), November 29 2012. Available at http://www.propublica.org/article/everything-we-know-so-far-about-obamas-big-data-operation [Accessed 31 March 2016]

[30] U.S. Department of Defense, Draft v.080 Sept 1 2017, p. 16

(b) Attitudes can follow behaviours: Behaviour change can itself change attitudes (Maio & Haddock, 2009). As an example, changing energy consumption behaviour leads to continued energy efficient behaviour, even after the initial incentives have been removed (Pallak et al., 1980). Thus, the unidirectional account in the JCOIE may be augmented to include this additional tool.

(III) Historical cases and the significance of whole population attitudes

Considerable evidence suggests that public opinion, although not formally polled, helped drive inadvertent escalation before the two largest conflicts between European powers from 1815 and 1939. In both cases escalation between the states was in large part inadvertent, as would likely be the case between major powers today.

First was the Crimean war (1854-6) in which some 800,000 soldiers died. It was fought between Britain, France, and Turkey on one side versus Russia. None of the major powers wanted war, but prolonged escalation from 1852-4 led to conflict. A critical driver was British public opinion that drove key British decision-makers—many of whom including the Prime Minister and Foreign Secretary wished to avoid war—to a number of escalatory steps towards war.[31]

Second is the rise of Anglo-German antagonism in the decade and a half before 1914. Public opinion in both Britain and Germany crystallized into a profound dislike that again drove political realities within which key decision-makers on both sides had to operate.[32]

In neither case did we have modern techniques for monitoring public opinion – but for example we can now examine modern public opinion in multiple East Asian societies. The top panels of Figure 8 shows profound recent Japanese disfavor towards China and little change in more favourable ratings of the U.S. The bottom panels show Indonesian opinion more finely balanced between the U.S. and China. Subtle aspects of public opinion may be difficult to capture with self-report

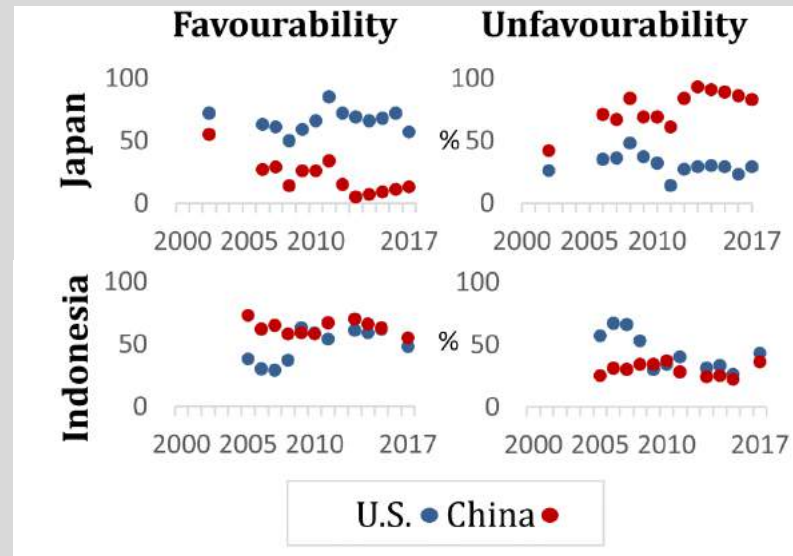

Figure 8. Self-reported opinions about the U.S. and China constrain decision-makers in key Asian states. Full question wording: "Please tell me if you have a very favorable, somewhat favorable, somewhat unfavorable or very unfavorable opinion of the United States/China." The plots combine "very favorable" and "somewhat favorable", as well as "very unfavorable" and "somewhat unfavorable." Data from Pew Research Center. http://www.pewglobal.org/database/indicator/1/group/7/ [Accessed: 06 February 2018]

[31] For general histories see e.g. (Rich, 1990; Baumgart, 1999; Figes, 2011). For a focus on British public opinion see (Martin, 1963).

[32] The contribution of public opinion is noted throughout this period in the seminal work on rising Anglo-German Antagonism (Kennedy, 1980). For a recent treatment of public or press opinion see pp. 226-39 in (Clark, 2013).

polls such as these, but they do capture brute political facts. Indeed, whilst many criticize polling for missing close calls, such as Brexit, actually polling often correctly predicts the big picture.[33] Grey Zone conflicts inherently occur at multiple levels including broad national scales like these down to local target audiences, in whom one may wish to plan or evaluate an influence campaign as the next section describes.

(IV) Measuring the Impact of Influence using self-report

Many methods are needed to measure the impact of influence.[34] Self-report is central to many methods – and reliability (e.g. across contexts) is a tough challenge for all methods regardless of whether they involve self-report. The choice of method depends on a number of factors including the specific influence strategy, the target audience and factors available to measure.

Qualitative and Quantitative methods: Self-report is central to both types of methods. Qualitative methods involve social research that does not rely on comparing quantities, for instance where quantitative surveys of populations do not permit detailed analysis of tastes or emotions, or of unknown unknowns. Methods include focus groups, ethnographies, interviews or case studies. These methods are often useful for "how" or "why" questions (King et al., 1994). Quantitative methods are the range of mathematical and statistical techniques used to analyse data. That is, they compare numbers.

Convergent methods: Stronger conclusions can often be made by using multiple, complementary methods. For example, a good case involves the real-world study of an intervention to promote reconciliation in Rwanda (Paluck, 2009). That study used the qualitative method of focus groups, the quantitative method of surveys to measure perceptions – and measured behaviour.

Measuring behavioural change: Measures often require clever acquisition, for example observing participants after an intervention when participants believe their behaviour is off the record as in the Rwandan example above.

Measuring attitudes and perceptions: Attitudes and perceptions can be identified using methods such as questionnaires. Caveats arise from the inconsistent relation of attitudes to behaviour, and well-known biases in various sampling methods.[35]

Measuring interventions against adaptive adversaries: Many important targets of influence cannot be evaluated in the more classical ways described above – and a key example is interventions against adversaries who learn and adapt. Consider the types of political reforms that were central to influence efforts and failures in Afghanistan and Iraq (Kleinfeld, 2015). Success in such political reforms often rests on amassing political support, overcoming repeated cycles of reform and counter-reform with adaptive adversaries and involves highly interdependent political variables that are hard to separate.

Multiple evaluations – beyond measuring one impact in one intervention: In the long-term it is critical that, where possible, key lessons and findings from an evaluation are available to other

[33] Many Brexit "poll-of-poll" trackers correctly called the broad result that the vote was very close, e.g. https://ig.ft.com/sites/brexit-polling/.

[34] This section draws on (Wright, 2017).

[35] (Paul et al., 2015) Chapter 9

practitioners and contribute to the accumulation of knowledge from across multiple projects. This arises for four reasons that affect reliability of self-report or non-self-report measures. First, findings may not replicate even in ideal conditions, and many sciences now face this "replication crisis" (Begley & Ellis, 2012). Second, test the intervention across contexts, as key contextual variables may render an intervention ineffective. Third, common sense changes to the intervention may radically alter its effectiveness, so new versions of interventions should be evaluated again when possible. Fourth, multiple influence strategies are often deployed simultaneously. Single evaluations struggle to tease apart multiple potential causal factors, which can be done by reviewing across multiple evaluations, for example by systematic review or meta-analysis and using self-report to ask "why" questions.

(V) So what? Implications for policy and practice

(1) Metacognition: the neural machinery of thinking about thinking (a) Self-report is meaningful *and* there will always a gap between self-report and behavior. (b) Utilise specific aspects of metacognition. E.g. **confidence** (how confident an individual is in their judgment?) may be a force multiplier in the acquisition of other self-report population data, and is itself a key quantity in the Grey Zone. (c) We need more research on variation/commonalities between cultures.
(2) Classic psychology (a) Attitudes *and* behaviors matter – extreme views that only one or the other matters are incorrect. This is convergent evidence between psychological and neural evidence. (b) Behavioral change can change attitudes – and thus the unidirectional account in the JCOIE (attitudes drive behavior) may be augmented to include this additional tool.
(3) Grey Zone confrontations occur at multiple levels (e.g. national populations or local target groups), and so too must analysis of attitudes. For instance, measure national public opinion of key allies and third parties that constrains national decision-makers.
(4) Measure impacts of influence campaigns using self-report (a) Measuring behavior is best where possible (e.g. rates of poppy farming, online choices) but often self-report is very useful (e.g. election polling, favorability ratings) and may be the only feasible metric. (b) Self-report may provide information to *explain* behavior – understanding mechanisms or reasons for behavior can be important to design interventions. (c) Convergent evidence from multiple self-report methods and/or behavior is often more powerful than one method alone.
(5) Scientific foundations of the JCOIE (draft v.0.80, Sept 2017) (a) The JCOIE contains a model of attitudes and perceptions driving behaviors: (i) Operationalize this by combining with a cognitively realistic account of the audience decision calculus, e.g. as in Figure 6 here (Wright, 2017). This is also consistent with, for example, the Deterrence Operations Joint Operating Concept (DoD, 2006) and related approaches. (ii) Use evidence-based tools for behavior and attitude change from disciplines such as public health, criminology and security studies where appropriate (Wright, 2017). (b) The JCOIE stresses the importance of worldviews and socio-cultural prisms – but applying this requires new robust cross-cultural research on key aspects of self-report, e.g. on confidence.

Table 2. Policy implications

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Part III: Advantages, Limitations, and Pitfalls of Social Media

Digital Participation Roles of the Global Jihad: Social Media's Role in Bringing Together Vulnerable Individuals and VEO Content

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Violent Extremist Organizations (VEOs) have posed security challenges for decades. However, in the modern era, with the advent of more lethal weapons, global mobility, and improved communication methods (e.g., open social media), the span and impact of these groups grows from regional to worldwide via their online brand (Ligon, Harms, & Derrick, 2015). Thus, these cyber technologies have increased VEO lethality and messaging reach (Derrick, Sporer, Church, & Ligon, 2017) and are becoming an ever-increasing part of the portfolios of VEOs (Denning, 2010). Historically, access to resources allows wealthier nation-states and other large organizations to build and maintain infrastructures in comparison to their smaller, less prosperous counterparts. With the advent of participatory internet technologies and the promulgation of open and free internet architectures, however, less technical infrastructure is required for smaller or resource-poor organizations to communicate and conduct operations. While digitalization initially acted as a supply driver of this phenomenon, the advent of 'digital natives' (generally speaking, those born after 1980) reversed the equation and the move to ubiquitous online presence and content has become a demand-led necessity for groups communicating online (Niemeyer, Hall, & Weinhardt, 2016). This new paradigm of highly connected, low-cost communication technologies has simultaneously offered such organizations access to resources that further benevolent or malicious goals (Derrick et al., 2017). Terrorist groups use these technologies in a variety of ways, such as group decision-making, cyber facilitated financing, recruitment, enabled (remote-control) attacks, and propaganda dissemination (Derrick, Ligon, Harms, & Mahoney, 2017).

VEO content sharing is neatly formatted for digital natives in a way that makes vulnerable youth feel like stars of their own action movies (Pape & Gunning, 2016). Yet despite its prominent place in public discourse, a basic understanding of how digital media content influences individuals to participate in propagating VEO content is lacking. Emerging qualitative approaches identify which digital media content influences individuals to adopt extremist beliefs and behaviors (Derrick et al., 2017; Pelletier, Lundmark, Gardner, Ligon, & Kilinc, 2016). This chapter proposes investigating the pathway to extremist beliefs and behaviors from the perspective of the digital participation lifecycle (Li & Bernoff, 2011), considering the transition from viewing to actively participation in content dissemination. To illustrate the variety of roles users can play in digital communities, we highlight how a variety of individuals associated with Salafist-inspired Jihad have manifested roles spanning Lurkers to Creators.

Participation in Digital Communities

Broadly speaking, participation on the Internet and social media has a looped dependency. Individuals rely on connected technologies to receive content, where connected technologies rely on individuals to create the content that is propagated (Bishop, 2007; Malinen, 2015). Conceptually, content is created, then consumed. One issue in the current discourse scenario in social media as well as VEO research is that social media content is simultaneously treated as both an input and an output variable for measuring user behavior. A more mature theoretical lens investigates VEO social media from the perspective of how users engage or participate with the content. This allows practitioners and researchers to classify user behavior given their engagement with social media content. While

the figure below may connote movement between the levels based on increasing commitment, individual differences (e.g., backgrounds in graphic design, degree of leadership) could drive individuals to move more quickly through the levels. The key consideration is that there are far more lurkers than there are creators in online digital communities (Li & Bernoff, 2011):

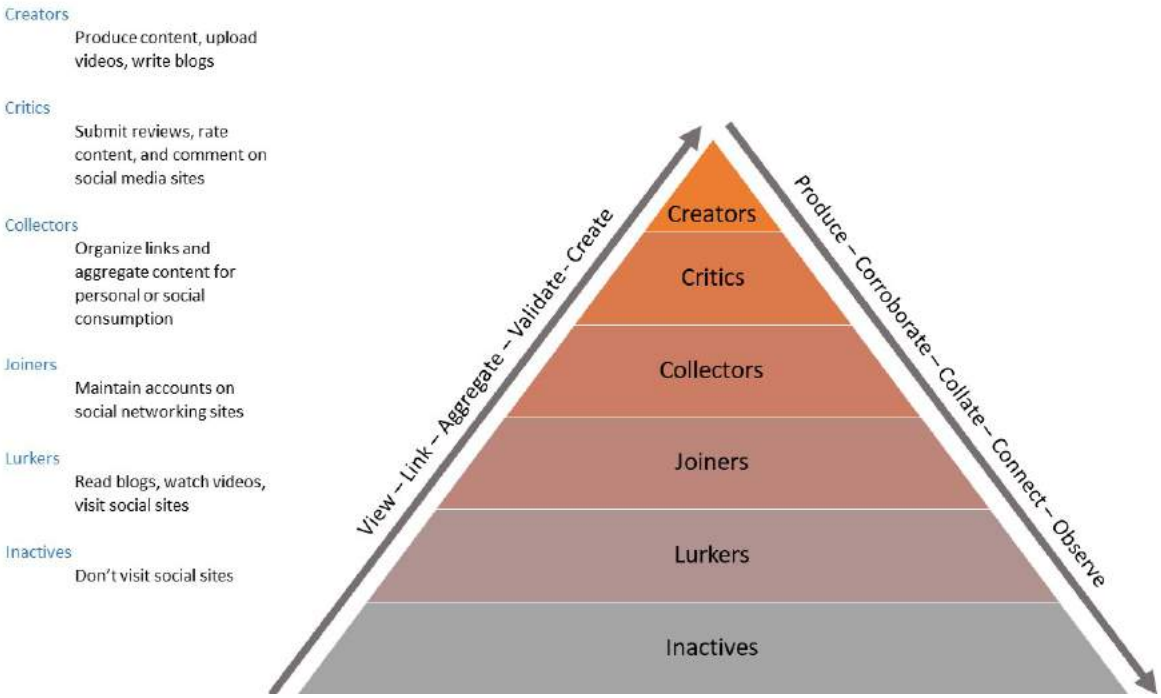

Figure 9. Digital participation roles.

In the following discussion, we connect the literature on digital participation roles with the social media activities of violent extremists. In this discussion, we highlight notable individuals who manifest attributes described by Li and Bernoff (2011).[36] This schema has alternatively been described as a ladder or a pyramid. There are progressively less active individuals the higher the level of participation is required; it should be noted that an individual can be differentially engaged in different communities and may find themselves in one of many roles simultaneously in different communities. By linking content, behaviors, and users, it is possible to estimate escalating behaviors by mapping types of activities by individuals. Network science is a useful approach for mapping the escalation of individual behaviors.

Connecting the Digital Participation Lifecycle and VEO Social Media Content

Social media and content sharing technologies are ideal for groups with unknown followings, as it enables producers of content to have a one-to-many reach with potential followers (Li & Bernoff, 2011). VEOs (ISIL in particular) have capitalized on this by disseminating varying content types which are potentially relevant to an unknown, international, vulnerable audience. Derrick and colleagues classified 37 different content types produced and disseminated by ISIL in their advertising and recruitment campaigns (Table 3). The variety and frequency of the content types

[36] Inactives are not represented in this discussion as it is not possible to estimate the number of people in total who are online but have never had access to VEO content on the (social) web.

speaks to the sophistication of VEO content producers in disseminating enticing content for an unknown audience.

Quran	Media	Shame
Legitimacy	Justify	Apocbattle
Caliphate	Leader	Cyber
Education	Territory	Hijrah
Violent items	Military ops	Hisbah
Mujahideen	Shahid (Martyr)	Repent
Apostate	Helping locals	Diyya
Antiwest	Destroy property	Ribat
Jihad	Bayat	Training
Sharia	Destroy by enemy	Village ldr
Destroy by ISIS	Motivate	Lonewolf
Atrocities	Manuals	
Mohammed	Baghdad	

Table 3. Manually coded results of VEO content scraped from open architectures and English-based social media (D. Derrick et al., 2017). Words displayed on created social media content are listed in order of frequency.

User-specific tailoring has become more important with the rise of social media outreach, as 'brands' that do not excite their audiences risk losing network traction. Followers who take an interest in social media content more thoroughly consume the presented information (Schacht, Hall, & Chorley, 2015). Content engagement is critical for growing support and recruitment through the internet.

Lurkers

The diversity of content types also indicates the variety of ways that groups can move passive content consumers (lurkers or spectators) into joiners. Lurkers are generally the largest of any online community. They are classified as content consumers who are otherwise inactive in radical behaviors. While an argument has been made that participation is dichotomous (thus any viewing of content should be considered active participation (Malinen, 2015)), this is an oversimplification of the problem. Both in theory and practically, there is difference between an impact of seeing materials and using or propagating materials. Lurking and all forms of general exposure are tantamount to the material's reach and impressions count, and not clicks other return on investment metrics (Schacht et al., 2015).

Due to their lack of engagement with the content (e.g., sharing, downloading, commenting), it is not possible to estimate the extent to which lurkers are consuming content for interest, values alignment,

research or other motivations. Due to the nature of VEO content, it is also possible that lurkers are not stakeholders but may actually be intelligence agencies or competing groups. This fact drives the need for VEO content on the open social web to be attractive enough to further entice users' joining but not so specific to ongoing operations such that they may be disrupted. For this reason, much of the online planning and coaching that happens is done with encrypted services and not on the open social web (Ligon et al., 2017). In our technical report in 2017 to the Studies of Terrorism and Responses to Terrorism (START, University of Maryland), we identified that the majority of VEOs required some type of log-in to view content, which indicates that most members of Jihad digital communities quickly move to the Joiner stage (Ligon, Logan, Hall, Derrick, Fuller, & Church, 2017).

Joiners

Joiners may either transition from lurking or join the digital community directly. This is generally understood to be driven by user motivation and network structure. Motivation can be linked to interests or values. Specifically, the focus on religious content and community reflects values activation (see Table 3), whereas interests may be any combination of the content available or even driven by desire to digitally belong to a specific group affiliation (Lindner, Hall, Niemeyer, & Caton, 2015). Group affiliation is in this case an umbrella function which addresses both interests of the user and the network structure they belong in.

Network structures are highly pertinent to Joiners' transformation into active users. While the likelihood an individual will share increases monotonically with exposure, explicit feedback about how many friends have previously shared the same content increases the likelihood of an active response. Friends and 'influencers' (very active nodes in the social graph) activate other users and have the highest impact on network ties and their behavior. The positioning of content on a user's interface strongly affects social contagion (Schacht et al., 2015). Estimating the propensity of one node in a graph to transition into an active node is feasible using Granovetter's theory of the strength of weak ties (Granovetter, 1973). His theory has been used to track peer-based diffusion by identifying constrictions and contractions across nodes and edges (Granovetter, 1973). These data reasonably can be, but have not been, extrapolated for online radicalization. Network models trace the spread individual influence. As such, network structures are useful to consider for discerning activation (as compared to lurking) along the participation spectrum.

One exemplar of a Joiner is *Saddam Mohamed Raishani* (aka *Adam Raishani*), who was arrested after attempting to flee the United States (Bucher, 2017). Most of evidence related to this case involves audio recordings of Raishani discussing his allegiance to ISIS, his desire to travel overseas, and information about how he had helped another flee abroad as a foreign fighter. According to the criminal complaint related to Raishani's case,[37] he had downloaded and used a web browser that allows the user to conceal online activities. During one of the recorded conversations with FBI agents, Raishani stated that he used the browser to view jihadi videos. In a March meeting with undercover agents, Raishani was provided with a laptop where he covered the camera and microphone, wore gloves, and deleted all jihadi content after viewing it. Beyond utilizing the web browser and downloading videos, Raishani's online footprint was minimal, indicating he fit the profile of a Joiner in his digital community.

[37] United States of America v Saddam Mohamed Raishani. 18 U.S.C. § § 2339B & 2.

Collectors

As opposed to seeing digital media content or joining a digital Jihad community, collecting, storing, owning and/or disseminating extremist materials is a direct violation of criminal statutes. This represents (knowingly or not) an escalation in radical behavior. Collectors transition from joiners: they are already activated by VEO content and now are actively working to further organize and disseminate it. Collectors are not creators. They do not generate new or original materials. Collectors are those who clone and fork digital repositories. They also collate collections of interest for the broader community to access. This is a particularly critical group for maintaining the pipeline of non-indexed websites (i.e., justpaste.it) (Ligon et al., 2017), as well as for maintaining clear and open pathways to said content. Figure 10 contains a sample screenshot of how Collectors accomplish this pathway maintenance. Collectors are second only to creators in terms of maintaining the visibility of VEO content on the social web.

Figure 10. An example of disseminating VEO content on the platform YouTube. Image taken from: "Upload Knights": How Terrorists Slip Beheading Videos Past YouTube's Censors. https://motherboard.vice.com/en_us/article/xyepmw/how-terrorists-slip-beheading-videos-pas

The value of individual collectors (nodes) in the social network is contingent upon their betweenness and closeness with other high value individuals(nodes) in the social graph. Betweenness is the likelihood of a person to serve as the most direct route between two others. Closeness of nodes is a measurement of the speed by which information is disseminated in a network. Collectors with high betweenness and/or closeness scores are especially well-poised to broadly disseminate content. This propensity increases when they are connected to Creators with a high eigenvector score. Eigenvector scores measure how well connected an individual is to other well-connected individuals in a network. Those with high eigenvector scores will be well connected with suspects of terrorism investigations (Brooks, 2011).

Collectors are critical for the forming of 'small world' networks. These are networks that appear almost random but exhibit significantly high clustering coefficients (i.e., nodes that tend to cluster locally) and a relatively short average path length (i.e., nodes that can be reached in a few steps). Such a network will have many sub-clusters but be joined by many bridges between clusters which shorten the average distances between individuals and other sub-networks. For these reasons, Collectors are strategically relevant targets for shutting down the pipeline of VEO content on the social web.

Khalid Ali-M Aldawsar exemplifies a Collector role (Bernstein, 2011). During the time of his radicalization, Saudi immigrant Aldawsar was 20 years old and failing out of his chemical engineering program at Texas Tech. When he was arrested, he was a business student at South Plains College in

Lubbock, TX. His Facebook posts progressed from being positive about his life, the United States, and liking girls to critically discussing U.S. and Israel foreign policy. One personal blog post explained how he excelled academically in high school, earned a scholarship that allowed him to be sent to America where he intended to learn English, learn to build explosives, and target U.S. citizens. Collecting behaviors ranged from accumulating guides and materials for making bombs and to acquiring information about selecting targets. Using three email addresses, he sent himself summaries and stored them in a common location before writing about them in his personal journal.

Critics

'Critics' as a stage in the participation lifecycle is a slight misnomer. While Critics may criticize, they are known for content evaluation or reviewing. Critics are also the 'experts' in mature social systems that set the standards of engagement and behaviors (Lampe, Johnston, & Arbor, 2005). They are tantamount to moderators of subreddits or verified purchasers on e-Commerce sites. Critics take on the roles of discourse management in forums and posts. Discourse management or norm setting is a factor in establishing likeness (or homophily) within the group and for new entrants (lurkers and joiners). A strong established identity can lead to the formation of homogeneous groups (clusters) where facilitating direct relationships is easier. It must be remembered that Critics respond to content, rather than create content themselves. Critics shape and refine the messages and consequently influence its meaning.

They are the commenters on YouTube and the active retweeters of VEO 'influencers' on twitter. At this stage of activation Critics validate the organizations by interacting with VEO as it were any social media content. Critics comment, discuss, and evaluate VEO content in the same vein as the twitterati or redditors comment, discuss, and evaluate on their respective platforms. Content engagement at this level serves to make the social network denser. Density is a measure of the connections between nodes in a social network and serves as an indicator of popularity or influence. Density is a critical metric as information in dense networks can flow more quickly. In the case of non-indexed websites or content that is in violation of the Terms and Conditions of a platform, a swift flow of information can more quickly support Collectors in their dissemination of VEO content.

An example of a Critic is *Nicholas Michael Teausant*, who actively engaged across several social media platforms.[38] Teausant had accounts on several social media platforms, including Ask.fm, Google+, Facebook, Tumblr, and Instagram. During the time of his arrest, he was 20 years old and was a community college student in Stockton, CA. A National Guard dropout, Teausant communicated with an undercover FBI agent, stating he planned to bomb the Los Angeles subway system. His social media accounts were plagued with anti-Western messages, calling for violent action. He was arrested for attempting to flee to Canada in the hopes of making it abroad as a foreign fighter. Below are some of his Instagram comments:

> May 31, 2013: user Assad Teausant bigolsmurfposted: @don-quad lol "don't get me wrong I despise america and want its down fall but yeah haha. Lol I been part of the army for two years now and I would love to join Allah's army but I don't even know how to start."

[38] United States of America v. Nicholas Michael Teausant. Case no. 2:14-MJ-0064 DAD; 7 June 2016. California Man Sentenced to 12 Years I Prison for attempting to join ISIL. Department of Justice: Office of Public Affairs.

August 5, 2013: user Assad Teausant bigolsmurf posted: Anyone know where I can get the "lone Mujahid pocket book" #alqaeda #jihadis t#jihad #islamicpridetimuslim#mashallah#islam#allah#AllahuAkbar#thelonemujahid

Creators

There are far fewer content creators than consumers (Li & Bernoff, 2011). Social media's one-to-many content provision is built upon this model. Creators are the least common individuals in the digital participation lifecycle but are lynchpins to thriving content-based networks. Content creation entry points can include blogging, online fundraising, ideological campaigns, active recruitment, video or other media creation, or active participation in organizational decision-making. There is not a linear progression through the digital participation ladder or a known entry point for content creators, other than identity validation by the organization. Once validated, Creators directly engage in content creation. The more mature social network or digital communities are, the more they allow for this immediate progression. In other words, their skills may allow them to start at the top of the digital community pyramid.

Jose Pimentel exemplifies a Creator role (Goldstein & Rashbaum, 2011). Pimentel maintained his own website (www.trueislam1.com) with bomb-making instructions from *Inspire Magazine*, and he also posted his own recipes. His personal website communicated anti-Western propaganda, ultimately calling for violent action against the United States. "Pimentel talked about killing U.S. military personnel returning home from Iraq and Afghanistan, particularly Marines and Army personnel," Mr. Kelly said. "He talked about bombing post offices in and around Washington Heights and police cars in New York City, as well as a police station in Bayonne, N.J. Once his bombing campaign began, Mr. Pimentel said the public would know that there were mujahideen in the city to fight jihad here" (Goldstein & Rashbaum, 2011).

Summary

Standard analytical models are built on the assumption that engagement with social media content is binary – content is created, and content is received (Malinen, 2015). Empirical and theoretical models increasingly show that participation in digital communities is actually a spectrum (Bishop, 2007; Li & Bernoff, 2011). This more nuanced view allows practitioners and researchers to better diagnose where individuals are in their engagement within communities by measuring their types of engagement, rather than the output of content created. It also corrects the current analytical issue in social media analysis, which is the use of social media content as an input and output factor of analysis. Analyzing the person in terms of which stage of participation they are currently in is more pertinent in terms of stopping the progression of extremist beliefs and behaviors. Whereas traditional analyses would suggest Creators should be the focus of disruption activities, this analysis suggests that there is an entire pathway of participation with VEO content. At each stage of participation there are entry (and exit) points which can effectively stop the flow of content and information dissemination. Escalating behaviors along with their qualifying activities help practitioners and researchers more accurately classify the differences between Lurkers and those who more actively create malevolent content.

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The Next Frontier: Moving Beyond Social Media into Sociotechnical Space

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The Strategic Multilayer Assessment (SMA) community participated in a panel discussion on December 13, 2017, entitled "Exploitation of Technology: Technological Advances and Terrorism Adaptation Potential." During the question and answer session, the panelists and participants agreed that using technology to understand foreign environments requires a fusion of multi-vector publicly available data sources. The overall conclusion acknowledged the over-privileging of social media data, such as reliance on Twitter, as the sole source to convey data about the cognitive aspects of an environment. It also pointed to how researchers, whether government or academic, can improve their approaches to understanding foreign populations by combining social media with other data sources. Combining multiple data sources is the next major milestone in understanding populations, as such research moves beyond social media to encompass larger, more robust sociotechnical spaces (i.e., spaces that are simultaneously social/sociological and technical/technological, such as cyberspace when it involves human interactions).

When decision makers rely on research based solely on social media, it presents inherent operational and intelligence challenges. While social media can contain valuable insights to understanding a population's behaviors and decision making in specific contexts, using it as the sole, or even primary, data source limits understanding. Few populations reach 100 percent internet and social media usage; the percentage of social media penetration varies widely by country. Social media users are people who self-selected to interact through specific digital media platforms. Where and how they interact are influenced by personal, social, and cultural preferences. Because of individual preferences, social media produces non-random samples—which can be biased due to selective participation even when examining a large volume of messages. Consequently, such data samples may not be generalizable to a regional or national population. These samples sometimes function as an amplifier for examining beliefs and behaviors that might be microscopic in a wider context, or may only represent a minor theme when viewed with a wider lens.

Social media analyses often require even more cautions and caveats when used to address national security issues. Many of the current approaches to population analyses require improved theoretical and methodological approaches. They would benefit further from being fused or integrated with other data sources.

Social media is one piece of larger sociotechnical constructs in which populations of individuals interact, not only with each other but also with and through technology. The cultural context that emerges through and exists within sociotechnical space remains largely unmapped. Yet, these cultural spaces are critical to understanding and operating effectively in the digital world. These spaces merit additional attention to enhance operations and intelligence in the information environment (IE). Improving methodological and technical approaches to analyzing sociotechnical space closely align with several joint concepts, such as the Joint Concept for Human Aspects of Military Operations (JCHAMO) and the Joint Concept for Operating in the Information Environment (JCOIE, currently under development), and a recently proposed SMA-community initiative construct

on the Cognitive Aspects of Military Operations (CAMO).[39] It is time to move beyond overreliance on social media and open the aperture to explore sociotechnical space, an integral portion of the IE.

> "WhatsApp is to South Africa as Snapchat is to Ireland as WeChat is to China"
>
> *-Adweek*

Limitations of Social Media and the Importance of Sociotechnical Space

Social media is a part of sociotechnical space. For this reason, it cannot be discounted as a source of information. In fact, within the sociotechnical space, social media contributes information direct from participants who shed light on their opinions, beliefs, and sometimes, behaviors. However, social media usage and preference is not universal; it alone does not provide analysts with holistic information about populations.

For much of the world, significant barriers exist to internet, and therefore social media, access. To participate in cyberspace-based activities, one must meet the following basic criteria: a) have the means to purchase or acquire an internet-enabled device; b) have the means to purchase or acquire internet access; c) have the knowledge to use the internet (e.g., searching, downloading apps, traditional and media literacy, etc.); and d) have access to platforms that correspond to social and cultural communications needs (e.g., if one only speaks a non-Roman character language such as Arabic or Burmese, that person must find and choose a platform that functions in their language). An individual who meets these criteria has online access.

Who uses the internet and social media around the world can differ widely. Populations in the West generally have an advantage because platforms are often designed in the West, primarily for English speakers. In some parts of the world, only elites or specific social classes meet the access criteria. In other parts, some people will sacrifice and save to obtain specific devices and access, as they enable communications and raise social status. Today over 50 percent online media users worldwide who meet the access criteria and choose to communicate digitally are between the ages of 18-24 years. The result is that social media usage exposes a generational divide in most societies on technology usage. Thus, social media usage occurs unevenly across the globe; it is often self-selected based on the ability to overcome the financial and technical barriers to access, social pressures, and other significant demographic, social, or cultural divisions.

Even when barriers to access are reduced, sociocultural influences affect how people use social media. The interaction of these two forces, sociocultural influences and the use of digital media, defines sociotechnical space. Country by country, region by region, and group by group, social media and networking preferences differ. No two environments function in exactly the same way. People choose how they communicate based on how they wish to interact and with whom (e.g., Facebook connects "friends," while Twitter attracts "followers"—and each of these categories can have different cultural implications) (Steckman & Andrews, 2017). Additionally, individuals make choices based on interpersonal skills and relationships, agreement with privacy (and other) policies, language script compatibilities, and the purpose of communication. They also make decisions on the basis of sociocultural norms: censorship, restricted speech, anonymity, social status, religion, and gender, depending on nationality and location. Ultimately, these sociocultural factors affect if and how people choose to use social media. Therefore, to incorporate social media into analyses

[39] See Astorino-Courtois et al., 2017

effectively, the nuances of how people in an area of interest use social media are paramount to understanding.

As a comparative example, consider the use of social media in the Arab World. The differences between regional averages and country-specific usage statistics demonstrate the impact of sociotechnical space and how additional research in this space can further national security interests.

Social Media in the Middle East and North Africa

In the Arab World Online 2017, a survey of digital technologies across 22 countries concluded that 42 percent of the population (173 million of 414 million people) uses the internet. The same report lists 47 percent social media penetration, meaning that 20 million people (raising the number from 173 to 193 million people) claim to access social media through some alternative to the internet.[40] Fifteen Arab World countries have 90 percent or greater national internet penetration. Of the total social media users, 65 percent (approximately 125 million) are between the ages of 18-24 years (Salem, 2017).

Most Arab social media users prefer social networking sites (SNS). Table 4 lists the top five.[41] These are the sites that should receive greatest analytical attention when studying the region. Examining specific countries, while most preferred WhatsApp, in Libya and Iraq Viber rated highest, while Facebook Messenger ranked highest in Algeria and Tunisia (Schwartz, 2016).

Why do these numbers matter? They generalize to the entire region and cannot be assumed to represent any specific country. Based on these sites, an analytic effort on Tunisia would consider data from sites listed in Table 5. That analysis could miss data from YouTube (18 percent) and Instagram (0.3-23 percent, depending on the

SNS	% of users
WhatsApp	89
Facebook Messenger	74
Snapchat	22
Telegram	15
Yahoo Messenger	14
Windows Live	11

Table 4. Most Popular SNS in the Arab World (Salem, 2017)

[40] The report does not explain the discrepancy between internet and social media penetration. In most reports, internet penetration is a higher number than social media penetration, because users require the internet to access social media. The possible alternative here is either that some of the people surveyed did not count their smart phone access as internet access or that they have ways to access social media without an internet connection.

[41] When social media sites are included, the top three regional sites become WhatsApp (67%), Facebook (63%), and YouTube (50%), while the bottom three are Instagram (33%), Snapchat (23%), and Twitter (20%) (Northwestern University in Qatar & Doha Film Institute, 2017).

source consulted) (Statscounter, 2017; Northwestern University in Qatar & Doha Film Institute, 2017).[42] However, the general statistics do not provide the most robust look into the Tunisian media environment; with an estimated 55 percent internet penetration (according to the Internet World Stats). Half of the Tunisian population communicates and consumes media through channels other than the internet. Without supplemental data sources, analyses of a portion of half of the population is generally inaccurate. Many current social media analyses examine only Twitter data, which as of December 2017 would cover only 3-8 percent of the 55 percent of the Tunisian population online (approximately 190,000 to 505,770 out of 6.3 million). There is also the inherent assumption that all of the accounts included here are active.

SNS	% of users
WhatsApp	7
Facebook Messenger	57-74
Snapchat	5
Telegram	No data
Yahoo Messenger	No data
Windows Live	No data

Table 5. Percentage of Tunisia's Population with Access to Regionally-Favored SNS (Statscounter, 2017: Northwestern University in Qatar & Doha Film Institute, 2017)

Looking closer at the Tunisian social media environment, there are age and gender differences to consider. The age breakdown for Tunisian users is 35 percent aged 18-24, 33 percent aged 25-34, 13 percent aged 35-44, with the remaining 20 percent spread over the 13-17 and 45-65-year-old categories. The gender break down is 58 percent male and 42 percent female (L'Economiste Maghrébin, 2016). However, these are averages for the entire environment, with each platform having different demographics.

The result is that Tunisian social media data can contribute information only on half the population from the outset. From there, the data becomes more limited and divides into smaller and smaller demographic pieces that may not form representative samples. Without representative samples, conclusions drawn about beliefs, attitudes, and behaviors may not provide decision makers with the information they need. They could, however, lead to unexpected secondary and tertiary consequences if they are factored into an assessment of the operational environment or used as the foundation for baselining the IE. Analyzing the more representative data produces results that are more effective, more conducive to operational requirements, and more precise for analytical purposes so that the value of the data increases significantly for national security interests.

The Tunisian case is, of course, very specific. The methodology used to analyze its social media and the specific sites analyzed are unique, and as described here, do not address sociocultural considerations. Analyses on other countries, such as Egypt or Saudi Arabia, would need tailoring to confirm social media data requirements for each country and address the limitations of that data in understanding the population, or the segments of interest. To overcome these limitations and develop cutting-edge ways to analyze beliefs and behaviors, especially when they appear online, more attention must be paid to the wider context in which they occur in sociotechnical space.

Evolving the Understanding of Sociotechnical Space

Social media is a resource that, as explained above, can lead to insights about specific populations with some significant caveats. When combined with other data sources, to include those that are

[42] The percentage range shows the difference between data collected by survey and data collected by technical means. The actual percentage likely lies somewhere in the middle.

publicly available or commercially acquired, the combination can provide more substantial information about a population in sociotechnical spaces and the physical world. Techniques, theories, and methodologies to combine data and derive more accurate, meaningful insights about populations are currently cutting-edge research areas, which must become standard operating procedure for analysts.

There are already examples of innovative research combining publicly available information (PAI), which includes social media, to derive previously unknown information on behavior. In an innovative attempt to examine sociotechnical space, Ozsoy, Polat, and Alhajj (2016) combined 22 social media data sources to understand users' preferences and behaviors, and developed a method to send tailored recommendations to specific groups. Through further experimentation, they determined that combining data sources provided significantly better results than using a single platform alone. Patel et al. (2017) combined satellite images of settlements, urban areas, topographic features, and nighttime lights with data sets covering transportation networks, health facilities, population counts, mobile phone calls, and social media to improve Indonesian census results. In the arena of virus detection and prediction, Santillana et al. (2015) achieved near-real- time predictions by combining social media data with five other health-related datasets, surpassing most other research that identifies virus-related trends through social media alone (and often, post facto), with the further potential to be correlated with additional demographic and topological data.

Thus, while noting limitations inherent within social media data, including the self-selective nature of the medium, we also note an opportunity to explore sociotechnical space in greater detail. At the same time, the benefits of combining social media data with other types can enhance knowledge about populations' beliefs, attitudes, and behaviors in ways that can enhance operations and intelligence and be used to advance national security interests.

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Part IV: Meta-Opinions: The Link Between Polling and Social Media

Encouraging and Assessing the Validity of Answers to Questions about Radicalization: The Use of Meta-opinions

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When it comes to questions about radicalization, interview and poll respondents may lie to avoid detection by security services, to minimize their responsibility for damaging and illegal behaviors, or to project a more socially acceptable persona to the researchers—or even to themselves! The biased direction of these misrepresentations makes them a greater threat to a survey than the more random perturbations that result from misunderstanding the question or making up an answer to avoid looking ignorant. Here we review seven ways to encourage and assess the validity of answers to sensitive questions, especially questions about political radicalization. One way is to compare personal opinion with meta-opinion—opinion about the opinions of others. We conclude by highlighting the link between meta-opinions and opinions posted on social media: both measure the power of social norms.

How to encourage and assess truthfulness in interviews and polls

1) **Assure anonymity of respondents.** Responses to interview questions or to poll questions are coded in a way that makes it impossible for the researchers themselves, not to mention government officials, to connect participants' answers with their personal information. All participants are assured of anonymity before they agree to be part of the study.

Of course, it is possible that participants do not believe assurances of anonymity. But then, they can always say no to the study; the fact that they agree to participate suggests that they feel safe to answer questions. The fact of participation is thus some evidence of participants' willingness to contribute truthful information.

2) **Use internet polling.** In an internet poll, respondents agree to answer polling questions posed and answered on their computer screens, rather than questions posed by a face-to-face or telephone interviewer. Recent research has shown that responses to sensitive questions are often more truthful in internet polls than in face-to-face or telephone polls—perhaps because screen answers do not open the respondent to evaluation by an interviewer. Internet polls were more accurate than telephone polls, for instance, in predicting that U.K. voters would vote for Brexit (Clarke, Goodwin & Whiteley, 2016).

3) **Use questions that are clear and culturally appropriate for the respondents of interest.** When introducing new questions, pilot testing may be required. Better than pilot testing is to use questions that have been used before with the population of interest.

Our 2013-2017 internet polls of U.S. Muslims have used several questions that earlier appeared in the 2007 and 2011 Pew telephone polls of U.S. Muslims. These well-tested questions not only guaranteed clarity and comprehension for the population of interest, they provided extra information value in permitting comparison of new results with earlier results.

A question about whether suicide bombing is justified in defense of Islam, for instance, produced results in our internet poll similar to results in the earlier Pew polls. In the Pew polls of 2007 and 2011, respondents saying that suicide bombing is often or sometimes justified were 8 percent (both polls). In Waves 4, 5, 6, and 7 of our internet polling (Jan, June and October 2016; April 2017), respondents saying that suicide bombing is often or sometimes justified were 10, 8, 9, and 13 percent (Fajmonova, Moskalenko & McCauley, 2017; Moskalenko & McCauley, 2017). This convergence of results over years and methods increases our confidence that internet polling can replace slower and more expensive telephone polling of U.S. Muslims.

4) **Use tracking polls: repeated polls with repeated questions**. Tracking polls can produce valid indications of change in opinion even if some respondents are confused or lying. Market research for commercial products depends on tracking polls and some experts believe that it is a mistake ever to draw conclusions from a single poll. The meaning of responses to "How much do you like Tide detergent?" can be debated, but a six-month increase of fifteen percent saying they like Tide 'very much' is a result to be taken seriously.

As response rates for face to face and telephone polls have declined, commercial polling companies have competed to develop representative internet survey panels, including panels representing minority groups such as African-Americans, Hispanics, and Muslims. In our internet polls of U.S. Muslims, results on many questions repeated over years show confidence-inspiring stability. As already noted, Waves 4, 5, 6, and 7 showed respondents agreeing that suicide bombing in defense of Islam is often or sometimes justified were 10, 8, 9, and 13 percent.

Stable results for many items lead us to take seriously changes measured for a few items. For instance, Waves 4, 5, and 6 of our internet poll of U.S. Muslims asked, *Do you feel the war on terrorism is a war against Islam?* Respondents answering *yes* were 47 percent, 30 percent, and 32 percent, indicating a significant decline in agreement with this radical opinion between Waves 4 and 5. Notice that the 32 percent *yes* in Wave 6 is essentially the same as the 30 percent *yes* in Wave 5, adding confidence that there was a decline in agreement with this radical opinion between Waves 4 and 5.

5) **Focus on normatively undesirable (radical) responses**. For questions about radical opinions, respondents should be minimizing their violent ideas and intentions, not maximizing them. Thus, to the degree that participants do report radical thoughts or intentions, we can be more confident that they are telling the truth. For instance, if a respondent agrees that suicide bombing is "often justified in defense of Islam," we can be confident this participant is reporting his or her true feelings.

In other words, normatively undesirable responses to questions about radicalization can be more revealing than more desirable responses. Most researchers are ready to assume that those giving radical responses are on the average more radical than those who do not—even if there are some lying radicals hiding among the non-radicals. If the assumption holds, then responses to a sensitive question can still be used to identify factors associated with more radical opinions.

6) **Compare results across different methods and different investigators.** In general, social scientists validate research results by triangulation. Thus, data from polls about radicalization need to be supported by data from interviews and case studies; data from one research team need to be supported by findings from a different team. When polls or interviews produce results similar to results from case studies or database research—methods that do not rely on self-report—we gain confidence that participants' responses were largely truthful.

An example of this kind of convergence emerged from our Wave 7 internet poll of U.S. Muslims. More depressed respondents were more likely to justify suicide bombing. This result converges with a possible profile of suicide bombers that was derived from case history materials. Case materials indicated that many suicide bombers were socially disconnected, with a history of mental health problems, especially depression (McCauley & Moskalenko, 2014). It seems possible that depression is a risk factor for both radical opinion and radical action.

7) **Compare results for questions about radicalization in two formats: *personal opinion*** ("Do you personally believe that suicide bombing in defense of Islam is justified?") **and *meta-opinion*,** or opinion about the opinions of others ("Thinking now not about yourself, but about other U.S. Muslims, how many would you say agree that suicide bombing in defense of Islam is justified"). Meta-opinion questions allow participants to express their true feelings without risking being considered radical.

In places where many fear the operations of security forces (in Palestine for instance) we have found (unpublished research) substantial differences between personal and meta-opinion questions about radical opinions: meta-opinion responses tend to be more radical than personal responses. Where this is the case, we rely more on meta-opinion responses than on personal responses.

In the U.S. the difference between personal and meta-opinion responses is small, usually only a few percentage points, suggesting that respondents are answering honestly to personally worded questions. In our Wave 5 (May-June 2016) internet poll of U.S. Muslims, for instance, agreement that suicide bombing in defense of Islam is often or sometimes justified was 8 percent for personal opinion and 11 percent for meta-opinion.

Meta-opinions and social media posts measure social norms

Meta-opinions are not just a way to assess the truthfulness of personal opinions. Meta-opinions are perceptions of social norms. A hundred years of social psychology have shown the power of social norms manifested in their ability to make people say and do things incongruous with their beliefs, moral standards and even personal safety

Roger Brown's classic 1965 text defined a group norm (p.49) as the expected behavior for a specified combination of actor and situation. In a specified situation, most specified actors will behave in the same way (regularity of behavior), most people will expect this behavior in this situation (regularity of expectation), and most will see not acting this way as somehow wrong (regularity of prescription). For example, a job hunter can attend an interview just as well in jeans and a T-shirt as in a suit and tie – but few interviewees would risk the more comfortable attire. Most applicants dress up, most people expect a job applicant to dress up, and an applicant showing up in jeans and T-shirt is not just eccentric but wrong.

Perhaps the strongest demonstrations of the power of norms are Solomon Asch's 1950s conformity experiments (Brown, 1965, pp. 670–673). Eight participants were shown a stimulus line, then asked to pick which of three lines was the same length as the stimulus. Only one of the participants was an experimental subject; the others were all Asch's confederates, who, on preselected trials, would choose the same obviously wrong answer. Three-quarters of the subjects went along with the crowd at least once. In the real world, where correct answers are rarely so obvious, the pressure of the crowd can be enormous – but this power depends on the strength of consensus. Even a single ally for the real subject cut yielding to about a fifth of what occurred when the real subject faced a unanimous majority.

In other words, the power of a social norm depends upon maintaining the three kinds of regularity. If performance, expectation, or prescription lose consensus, the norm will lose its power to define both the right answer and the safe answer. A meta-opinion measures the strength of the regularity of expectation, and the larger the majority perceived, the stronger the norm. Poll questions about a meta-opinion thus directly assess a perceived norm.

At first glance, there is a curious circularity about meta-opinions. Meta-opinion questions can tell us about both the truthfulness of personal opinion and the perceived group norm that affects that opinion. The resolution is to recognize that, for many respondents, there is more than one relevant meta-opinion. Personal opinion versus meta-opinion for the ingroup can tell us about truthfulness when the meta-opinion is more radical than the personal opinion. Personal opinion versus meta-opinion of an outgroup tells us about the pressure against reporting a radical opinion. In short, understanding radicalization of norms will require asking respondents about multiple meta-opinions. For U.S. Muslims it will be necessary to ask about meta-opinion for U.S. Muslims and about meta-opinion for U.S. citizens in general.

Similar issues arise for posts (including likes and retweets) on a social media site. The actual and perceived distribution of opinion on a social media site can measure a social norm. There is not space here to pursue this direction.

Governments in the age of the Internet are concerned about social norms that challenge the policies, the justice, and even the legitimacy of the state. Indeed, development of such norms in small groups and subcultures is precisely what is meant by *radicalization*, and many governments today have programs to combat radicalization by controlling the opinions appearing on social media sites (McCauley, 2015). The war of ideas has become a war to control the social norms represented on the Internet.

Conclusions

Three ways to encourage truthful responses to questions about radicalization are:

- Assure anonymity
- Use internet polling
- Use questions that have been used before for the population of interest

Four ways of assessing the truthfulness of responses to questions about radicalization are:

- Use tracking polls
- Focus on radical responses
- Compare results across methods and investigators
- Compare personal opinions and meta-opinions

Meta-opinions and social media posts can measure the power of social norms.

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The Continued Relevance of Survey Research

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When Surveys Makes Sense

While recent prominent examples such as the 2016 U.S. Presidential Election, the Brexit Referendum in the U.K., or the French Presidential election where researchers were correct in their forecast for Emmanuel Macron victory, but significantly underrepresenting support for Macron are frequently cited as examples of survey research failures, they in fact underscore just how important surveys remains for the modern democratic process. Surveys are expected to be accurate, if not individually, then certainly in aggregate, as political forecasters such as FiveThirtyEight claim. Unfortunately, many commentators in the political sphere remain ignorant of just how far such claims can be pushed – when partial percentage point differences can swing a vote either way, no survey will ever be able to reliably pick winners. Moreover, there are also many poorly designed or executed survey attempts, from biased or incompetent traditional methods to "innovative" approaches such as opt-in online panels, click-polls, social media surveys of professional respondents drawn from sources such as Amazon Mechanical Turk.

However interesting this debate may be, it is almost entirely Western-oriented, ignoring the many settings where survey research remains the best, and at times only, method for reaching all segments of a population. Take the example of Yemen. As of 2017, just over half of Yemenis have access to a cellphone and a mere 19% have access to the internet in any location while hardly any households have internet access (5%).[43] Even that slim segment of the population is primarily clustered in the major western cities, internet penetration in the eastern desert—where AQAP dominates—is virtually nonexistent. Such technological constrains are exacerbated by Yemen's political and demographic barriers. While the country shares a common language, Yemen's society is rift with division across ethnic (e.g., Houthi), tribal (there are hundreds of cross-cutting tribal affiliations, organized in complex, often contradictory alliances), and political lines (e.g. Southern Separatists).

In this setting, cheap solutions like social media scraping or traditional media monitoring make little sense for capturing a population-wide measure of opinion. There is simple too large an uncovered segment to make online community opinion representative of the broader public. Other approaches to evaluating public sentiment suffer from their own limitations. For instance, remote sensing approaches can be used to track broad pattern of life data but are limited in answering the central question of "what do others think." Meanwhile other approaches such as Human Terrain Teams (HTT) and Socio-Cultural Research and Advisory Teams (SCRATs) have had some utility in understanding attitudes and behaviors but are still often constrained by the use of unfamiliar western interlocutors who both provoke reluctance on the part of research subjects and themselves often lack a deep understanding of the populations they seek to evaluate.

[43] As measured through the Gallup World Poll http://www.gallup.com/178667/gallup-world-poll-work.aspx

Access to the Internet	
Kuwait	94%
United Arab Emirates	94%
Bahrain	92%
Lebanon	86%
Saudi Arabia	85%
Jordan	78%
Kazakhstan	71%
Turkey	69%
Iran	67%
Iraq	63%
Kyrgyzstan	59%
Algeria	56%
Palestinian Territories	55%
Turkmenistan	36%
Egypt	34%
Uzbekistan	31%
Tajikistan	25%
Yemen	19%
Afghanistan	15%
Pakistan	14%

Table 6. Internet access across the CENTCOM AOR according to the 2017 Gallup World Poll

However, as Gallup has repeatedly demonstrated, representative nationwide surveys are possible in Yemen, despite the ongoing civil war, which has driven Yemen to the top of the word rankings in the percentage of its population currently classified as "suffering" according to Gallup's *Life Evaluation Index* – 40% of Yemenis were classified as "suffering" in 2017, 3rd behind South Sudan (46%) and Afghanistan (73%). Gallup has fielded over a dozen nationally representative surveys in Yemen in the last decade alone, including ten waves of the Gallup World Poll and multiple large-sample (i.e. N>10,000) custom studies.

While Yemen presents a uniquely difficult location for web-based research alternatives, population representation in online settings remains far from ideal in many critical countries. Consider just the CENTCOM AOR (see Table 6), even in Egypt—the center of the supposedly twitter-driven Arab spring—just 34% of the population has access to the internet, while Pakistan and Afghanistan, two of the most critical countries in the world for U.S. national security interests, 85% of the population lacks access to the internet.

The situation is similar across the PACOM and AFRICOM AORs as well (see Figure 11). Quite simply, even in 2018, survey research remains the only truly representative means for measuring public opinion in many countries across the world.

While a full primer on best practices in public opinion methods is beyond the scope of this essay, suffice to say that there are right and wrong ways of doing anything, and survey research methods are no exception. Expert oversight is required to ensure questionnaires are translated accurately, samples are designed correctly, survey operations are properly trained and implemented, and rigorous processes for quality control are instituted. Gallup has long been at the forefront of efforts to increase the scientific rigor of survey research, leading the push to set social science standards across the survey research community through the establishment of the American Association of Public Opinion Research (AAPOR) in 1947. However, the rapidly changing sociotechnical landscape of the internet era presents constant challenges to the collection and use of survey data.

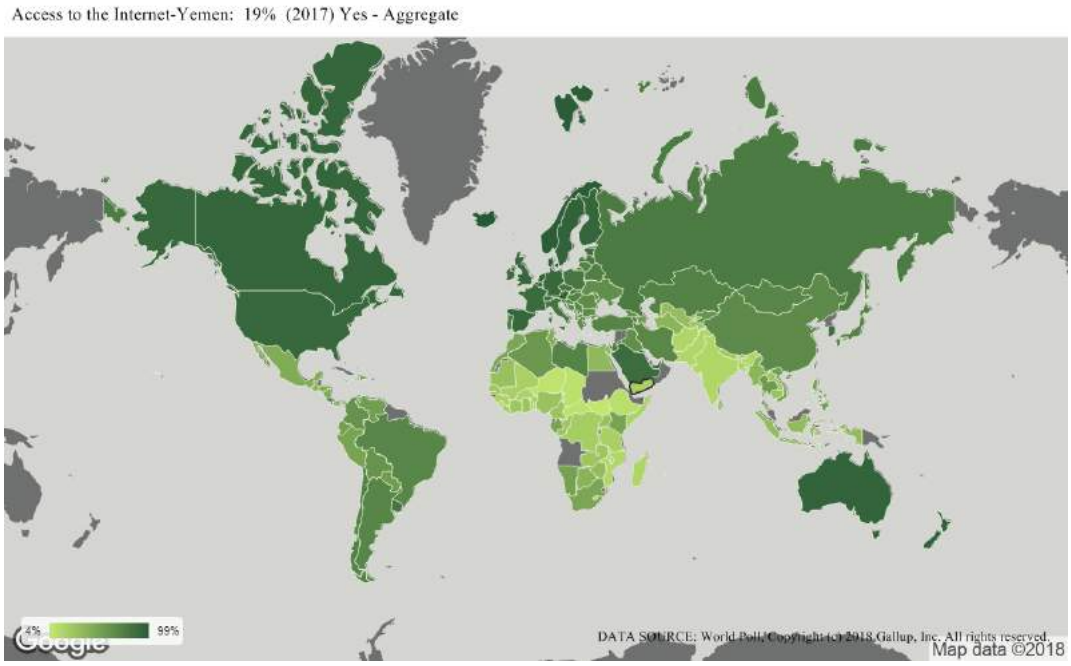

Figure 11. Global Internet access according to the Gallup World Poll (latest results 2016/2017)

Making Sense of Surveys

Perhaps the most fundamental challenge to survey research is the same fundamental problem industry founders like Dr. George Gallup set out to solve – how to measure and interpret variation. On the measurement side, this problem can be more properly thought about as the *problems* of data collection: sampling, questionnaire design, fieldwork, data processing, weighting, etc. Each of these survey design and administration steps are calibrated to ensure a survey accurately represents the natural underlying population variation it intends to measure. On the interpretation side, the solution to the problem of variation involves both art and science. People are not numbers in a spreadsheet. Qualitative contextual understanding of the issues and complex dynamics at play within any given society is a prerequisite to analyzing its survey data. At the same time, knowing the percentage of a population who holds a given belief can only take the analyst so far. While at a functional level, survey research is about the collection of data, it is just one among many potential sources of potentially useful data for answering the questions that inspired the collection of data in the first place. Survey researchers should be radically open to the new possibilities of secondary or non-traditional data sources enabled by the rapid advances in fields like data science, machine learning, and artificial intelligence.

Its unique ability to capture and interpret population variation makes survey research ideally suited to inform activities where subgroup nuance is critical. The most obvious example being the long history of collaboration across the survey research and advertising industries. The same holds for survey research and DOD's various forays into the communication space, from MISO/PSYOP to Public Affairs/Strategic Communications to Recruiting. In fact, DOD's involvement in survey research predates DOD itself – with the Office of War Information hiring Gallup to conduct research with populations behind enemy lines in Germany during WWII.

The common theme across each of these applications of survey research within DOD is the need to understand what a particular group thinks, ideally with a high-degree of nuance as in the case of

subgroup stability modeling or target audience-specific narrative development. In each of these cases, survey research provides otherwise unattainable "ground truth" – for instance, by accurately measuring stability risks and drivers in at a village level or by establishing baselines to measure a messaging campaigns effectiveness at countering the spread of a particular narrative or belief within key population segments.

Stretching Survey Research

While survey research will remain the only viable option for a wide range of applications across a large swath of the world for quite some time, innovations within the field are also expanding its value to a broad array of research questions. Gallup and others are pioneering new applications, design concepts, field methods, and analytics that highlight the continued relevance of survey research for diverse domains.

For instance, through DARPA's Next Generation Social Science (NGS2) program,[44] Gallup is experimenting with new approaches to the recruitment of non-WEIRD[45] research subjects that draw heavily on techniques perfected through Gallup's varied survey research experiences. Until recently, little consideration was given to the composition of research subject pools, even in domains where diversity (in whatever form) is likely to be critical to the research results. However, surprisingly few researchers have made meaningful attempts to overcome this barrier with increasing reliance instead on cheap, easily accessible research subjects such as those available through participant-for-hire services like Amazon Mechanical Turk. Using representative sampling principles to recruit participants and best practice participant management techniques to maintain subject pools throughout experiments could help trigger a revolutionary shift in our understanding of core principles of human behavior and psychology by enabling researchers to test accepted theories on previously unstudied segments of the population.

In addition to novel applications of core survey research methodologies, Gallup is actively exploring novel design concepts that re-envision the concept of respondents providing single, moment-in-time snapshots of their self-reported data by incorporating new technologies and methods. For instance, designing data collection plans that combine sources like wearable sensors in sync with methods like Gallup Senior Research Advisor Arthur Stone's ecological momentary assessment approach[46] to better understand how factors like time of day and setting affect issues like well-being, health, and productivity on an ongoing basis. Mobile technologies and the communication models they enable also present the opportunity to rethink the traditional data collection process. App-based, survey designers have far more control over how and when a survey is administered thanks to enabling technologies like GPS, SMS, and notifications. App-driven business models hold the same potential to disrupt the survey research landscape as they have done for countless other industries. On-demand interviewing services are already well-established in many global markets, though their methodological robustness remains to be proven relative to traditional field methods.

Finally, the role of advances in analytics tools and techniques in cultivating innovation among survey researchers bears restating. Whether through permitting saleable applications of longstanding

[44] https://www.darpa.mil/program/next-generation-social-science

[45] https://www.ncbi.nlm.nih.gov/pubmed/20550733

[46] https://www.researchgate.net/publication/49641157_A_Comparison_of_Affect_Ratings_Obtained_with_Ecological_Momentary_Assessment_and_the_Day_Reconstruction_Method

techniques like small area estimation,[47] which uses auxiliary data from sources like census bureaus to construct reliable synthetic estimates for survey data at far smaller geographic units than would traditionally be possible. Meanwhile, the ubiquity of new technologies like satellite imagery are revolutionizing survey design by opening the door to techniques like geospatial sample designs that apply image processing algorithms to select interviewer starting points and deliver precise walk route instructions, reducing two common sources of bias/error in survey fieldwork. While these are just a few examples of the new capabilities that are radically altering the survey research landscape, these innovations in survey analytics and technologies, combined with survey research's essential nature for reaching much of the world's population, ensure the field's continued relevance in the face of competing approaches to measuring public opinion.

[47] https://www.popcenter.umd.edu/mprc-associates/plahiri/partha-lahiri-bibliography/articlereference.2013-10-02.8154073636

Part V: Discussion of Alternative Options

Stealing History

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If you can destroy truth you can destroy trust; and if you can destroy trust you can destroy institutions. While tactics differ, the objective of the tyrant—across political systems—are markedly the same. In developed nations with strong institutions, a frontal assault on trusted institutions often provokes a political reaction and can be counter-productive. A far more effective strategy is to appoint the least competent people to the top of targeted institutions in the hope that the incompetence trickles down. In quasi-democracies and dictatorships, it is common to imprison or execute political rivals often including previous office holders. Terrorism thrives in nations or regions with weak institutions often accompanied by high levels of corruption and unemployment. Here, the tools to steal history include fear and terror accompanied by the systemic destruction of the past. Cultural and religious symbols and icons are blown to rubble in hopes that destroying the past will eradicate cultural memory, identity, and heritage.

Cultural History & Identity

Eradicating cultural identity and heritage leaves people without a historical relevance, which in turn affects their rules and traditions that were once integral to their cultural history. For example, when people think of themselves as a group with common interests and with norms and rules that oblige them at all times, they can gain confidence and indeed a certain kind of power. If people link a historical narrative to their cultural understanding, these stories of national identity, struggle, suffering, and resilience become the means to construct a particular social identity. Identity is thus constructed always in reference to some other. It is when the perception of identity threat is at its extreme in the context of conflict, when the legitimacy of identities is at stake (Guala, Mittone, & Ploner, 2013). The cultural psychology of identity, which is anchored in narrative provides valuable insights into what is both shared and contested among members of a given cultural community (Snyder, 2017).

Iconology & Psychology of Memory

Since the inception of print, precise thinking was thought to rely on text rendering images to a poor and misunderstood reputation. In spite of this, great thinkers of past, including Darwin and Galileo, resorted to drawn images when unable to express their thinking in words. What they had no way of knowing is this mixed method triggers a very different construction of memory. Wordless image as opposed to image with narrative can be even more powerful in the formation of long-term, cultural memory. Warburg's research as translated by Bredekamp and Diers (1932), concluded that the significance of image in the process of civilization lies somewhere between magic and logos. Michaud calls this "a mute language, freed from the constraints of discourse" (Grau & Veigl, 2011, p 341). In this way, images can represent a very acute and reasonable tool to convince the people who trust images more than words.

Short vs. Long-Term Memory

Memory can be both broadly and simplistically understood as a time when an experience influences current or future behavior. Short-term memory is characterized by low capacity and high volatility.

Information needs to be repeated, combined, or rehearsed, otherwise focus quickly shifts to other short-term interests. This volatility makes it difficult to sustain emotion over time decreasing the short-term role in the construction of both identity and personal belief.

Long-term memory revolves around the formulation of perception-making patterns. It is easier to recall future memories of personal experiences, which are a key factor in defining oneself as an individual or part of a group identity. Activating a long-term memory involves the same patterns in the brain that occurred when the memory was first formed. Interestingly, Brickman and Stern (2010) found that stress can impact different types of long and short-term memory. An emotional experience can influence people to make decisions based on; 1) easy-to-recall memories, 2) current perceptions, or 3) emotions that were elicited during an event. This may affect the way people perceive, experience, and eventually remember emotional experiences or respond to emotionally challenging situations. When it comes to personal belief and change, long-term memory is where the action is. But can it be triggered if the memory was recalled by others rather than experienced first-hand?

Visual Memory & the Image

Visual information can be overwhelming but is key in our ability to understand and change people's perceptions and behavior. In George Orwell's *1984*, the language of visual media is highly constrained, to starve the public of the concepts needed to think about the present, remember the past, and consider the future. Modern communication and propaganda rely on repeating imagery over time so that the viewer remembers the memory and not the event. This is even more pronounced in how group memory or culture develops. Over time, both individual and group memory are subject to memory loss and both are subject to memory addition. This can lead to remembering events that didn't actually happen or at least didn't happen as remembered, but the introduction of visual memory recreating events, particularly geospatial events, as they were rather than how they are, can recreate and reinforce group memory and culture. The image becomes the lever for both understanding and social influence. The implications are profound, as Davidson et al. (1994) suggest emotion has the capacity to set aside a lifetime of cultural history and learning, which can reveal a common denominator of human response. Visual image triggers this emotion.

Mechanisms of Visual Working Memory

Whenever a person's eyes are open, they are forming memories and their brain is computing a three-dimensional representation of what is in their field of vision. The brain may not retain all the information it encodes in a day, but of those memories retained, how does visual memory affect remembering? Visual memory and visual imagery rely on highly similar, but not identical cognitive processes (Slotnick, Thompson, & Kosslyn, 2012). Visual working memory and visual attention are intimately related, such that working memory encoding and maintenance reflects actively sustained attention to a limited number of visual objects and events important for ongoing cognition and action. It is not known whether exposure to irrelevant environmental stimuli impairs people's ability to accurately retrieve long-term memories. However, Wais, Rubens, Boccanfuso and Gazzaley (2010) hypothesize that visual processing of irrelevant visual information would interfere with mental visualization engaged during recall of the details of a prior experience. Wais and Gazzaley (2014) suggest a memory network that supports visual imagery and successful recollection, is disrupted by external distraction.

Countering Media Through Visual Memory

Visual media can be used as a weapon against truth and as such, it is important to understand how the visual media weapon works. When a population responds to a video, photograph or graphic with a tweet, impact can be expected. For example, "one moment of shock enables an eternity of submission" (Snyder, 2017, p. 110). Visual memory is necessary to counter other media. Research reveals social manipulation can alter memory and extend the known functions of the amygdala to encompass socially mediated memory distortions. Human memory is strikingly susceptible to media input and other social influences, and recent studies of visual perception are bringing us closer to an understanding of what we remember and more importantly, what we forget when we recall a scene.

Stealing Symbols

Mosul's Great Mosque of al-Nuri is among the scores of World Heritage sites destroyed by ISIS (Figure 12). This destruction of religious and cultural symbols is one tactic aimed at the destruction of history and with it the destruction of memory. Imagine a father, standing before the rubble of all-Nuri, attempting to explain to his children what used to be there. Words fail to elicit the emotional memory shared by those who experienced the event. Group memory becomes the victim.

Figure 12. Great Mosque of al-Nuri (before and after)

Yet memory, even emotional memory, can be recreated. Mobile phones, increasingly smart phones have become ubiquitous, making it possible to visually display what used to be there. Now, imagine that same father, before the same rubble, is able to show his children what used to be there. Augmented Reality (AR) makes it possible to look through the camera functions of the phone and see what used to be. This triggers emotional memory and wordless images can enhance group memory.

The Art of Immersion

Through immersion such as virtual reality (VR) or augmented reality (AR) visual memory can be enhanced by not only visualizing media, but experiencing media—images, maps, videos, illustrations.

Understanding media visualization has the ability to increase our ability to anticipate behavior through allowing the target audience to forget they are the audience and instead fall into a newly manufactured reality. This is relevant because immersive environments can provide cues in the virtual environment that can remind subjects of some past event or aid in the memory retrieval process, which involves reconstructing and sometimes altering the information being recalled. However, some information may not be easily recalled but can be recalled with prompting or cueing.

In this way, VR can add an emotional layer of persuasion that did not exist before and "the emotional connection at the end of a VR experience is often what is remembered" (Jerald, 2016, p. 79) and what counts.

Augmented reality can enhance the perception of real world by enriching what people see, feel, and hear in the real environment. AR products can provide skilled activities, which allows acquired memory skills to be stored in long-term memory and kept directly accessible by means of retrieval cues in short-term memory. The idea is simple: whatever is created could readily move from one medium to another, changing perceptions and emotions along the way. As part of the executive function of the brain, cognitive flexibility describes the ability to adjust thinking, attention and memory recall in response to what's happening around them. This cognitive ability allows people to apply old information or memories to new problems or change people's beliefs and attitudes with new information or a new experience, such as immersive and visual environments.

Restoring History

Can reality can be reconstructed—digitally restored—through immersive technology? The invention of virtual and augmented reality has created shifts in people's perception of the world, and their decision-making process. The common idea appears to be the ability to use these tools to create a process by visualizing historical media and composing them into a sequence that creates a narrative through graphics, data visualization, visual explanations such a mind mapping, virtual reality, thematic mapping, statistical interactivity, or graphical methodologies. In essence, these tools can aid in the creation of interpretation of behavior and behavioral patterns.

What Could Be Done

The salient question becomes, what do we know about the psychology of visual memory and its applications in defining cultural history and identity? Although the desire to participate in engaging VR experiences is compelling, for immersive interfaces to be effective they need to be rooted in the real world.

The following strategies are designed to create a deeper understanding of cognition and immersive media, the hands-on creation of real-time AR applications and the tools and measures used to assess the cognitive impact of the created media.

1. Train PSYOP in cognition and immersive media

2. Train PSYOP in the creation of real-time AR applications

3. Train PSYOP on the use of cognitive neuroscience tools designed to assess the emotional impact of the applications created in 2, above.

Key Points

1. Eradicating cultural identity and heritage leaves people without a historical relevance, which in turn affects their rules and traditions that were once integral to their cultural history.
2. Wordless image as opposed to image with narrative can be even more powerful in the formation of long-term, cultural memory.
3. Short-term memory role in the construction of both identity and personal belief. Short-term memory is characterized by low capacity and high volatility. Long-term memory revolves around the formulation of perception making patterns.
4. Emotion has the capacity to set aside a lifetime of cultural history and learning, which can reveal a common denominator of human response. Visual image triggers this emotion.
5. Visual memory and visual imagery rely on highly similar, but not identical cognitive processes.
6. Through immersion such as virtual reality (VR) or real-time augmented reality (AR) visual memory can be enhanced by not only visualizing media, but experiencing media.
7. Restoring history using immersive tools can aid in the interpretation of behavior and behavioral patterns.

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Groupthink: Training New Technologies to See That Humans Don't All Think Alike

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This paper discusses a methodological and technological alternative to conventional collection and analysis methods. To take the preliminary step toward addressing the issues raised in this paper—that we lack insight into how other cultures think and this is at the heart of many of our contemporary national security challenges—by developing a collection and analysis method that is sensitive to what we seek to understand. When we wanted to measure light, we developed the photometer. When the state of the art advance and we wanted to monitor patterns of movement, we used deltas between pixels in imagery to develop machine learning algorithms. For the problem of understanding how other cultures think, we need to develop a means to sense and analyze cultural variation. Conventional collection and analytics lack this capability and are hindering our pursuit. This paper proposes we must start at the very foundation of the technologies and methods we rely on, strip them down to the assumptions from which they are built, and examine if they are serving their purpose. Are they sensitive to cultural variation, to cognitive variation? Can these technologies and methods expose variations in how other cultures think? If not, how do we evolve them to meet the needs described in this paper?

Learning how other culture's think often comes from looking at data sources including social media, online polling and survey tools, self-reporting, or a combination of these and the associated analytics. How reliable are any of the available options from a technical perspective (this has been addressed in previous sections)? And what are the alternatives that the PSYOP community can leverage to support decision-makers? Based on working in conflict mediation and risk analysis in the field in places like North Africa during the Arab Spring when social media use came to the forefront and serving as a Kreyol to English translator during the 2010 earthquake in Haiti when many online survey and self-reporting technologies were born, my research evolved from watching the evolution of communication technologies used in the conflict and crisis space. I specifically look at how these technologies, including social media, self and crowdsourced reporting tools, and online and mobile surveys contribute to analysis for decision-making—as a class, referred to as information and communication technologies (ICTs).

My research examined the following problem: if ICTs were designed by a single culture and exhibit a single culture's way of seeing the world, how does that impact other cultures when they use these ICTs? (Sutherlin, 2016) To put it another way, we (Anglophone/Americans) are simultaneously admitting we do not understand other population groups well and are trying to do so by gathering communications information, and at the same time, we are asserting that all humans communicate in a universal manner because our ICTs treat every cultural group the same. This means the very tools we use to understand difference assume there is no difference; they are blind to it. The consequence for population groups that contribute content via ICTs is that they must conform their communication patterns and content to the prescribed logics of the ICT which follows the Anglophone/American cultural norms of its designers. They must adhere to the use of categories, concepts of locations and time, agents (who is responsible), connections between events, etc. To put it another way, using the ICT puts the user in an 'Anglo-American way of thinking' even if they are using their own native language. They are obliged to recall the narrative in Anglo-American cognitive terms because the ICT is constructed around an Anglo-American cognitive norm. This dissolves the

key ingredient we were after, namely, an understanding what others are thinking. The ICT more or less homogenizes other cultural cognitive schemas to fit those prescribed by the ICT. These same assumptions underpin the methods of analysis that link and correlate results derived from ICTs. These cognitive norms are often described as universally human although there is considerable evidence that there is high variability across cultures in cognitive processes (Majid, 2018; Pavlenko, 2014; Boroditsky, 2011). The result of other cultures expressing narratives via ICTs is distorted content (i.e. distorted narratives) at a foundational conceptual level. This is the level of 'thinking' that we want to address in the white paper. The ubiquitous ICTs we have come to rely on to collect information, to assess 'what people are thinking', are inherently flawed because they capture and frame the content in the way an Anglophone American thinks at a conceptual level. These ICTs homogenize content to conform to this cognitive norm that we believe to be universal, and they erase the crucial aspects we seek to learn through our investigations.

I was first made aware of this problem by listening to groups and individuals on the ground and comparing their responses (in their native languages) to results from large survey samples or crowdsourced aggregations and other technologically aided analyses (2013a). What I heard on the ground and what I would read in a report was never in agreement. Not even close. While I was only speaking with a relatively small number of individuals compared to what is possible with crowdsourcing or social media polling, for example, I was convinced this was not an issue of translation or of people telling me what they thought I wanted to hear. It was deeper. It was at the level of 'thought' that the mode of their ICT communication was scripting their communication.

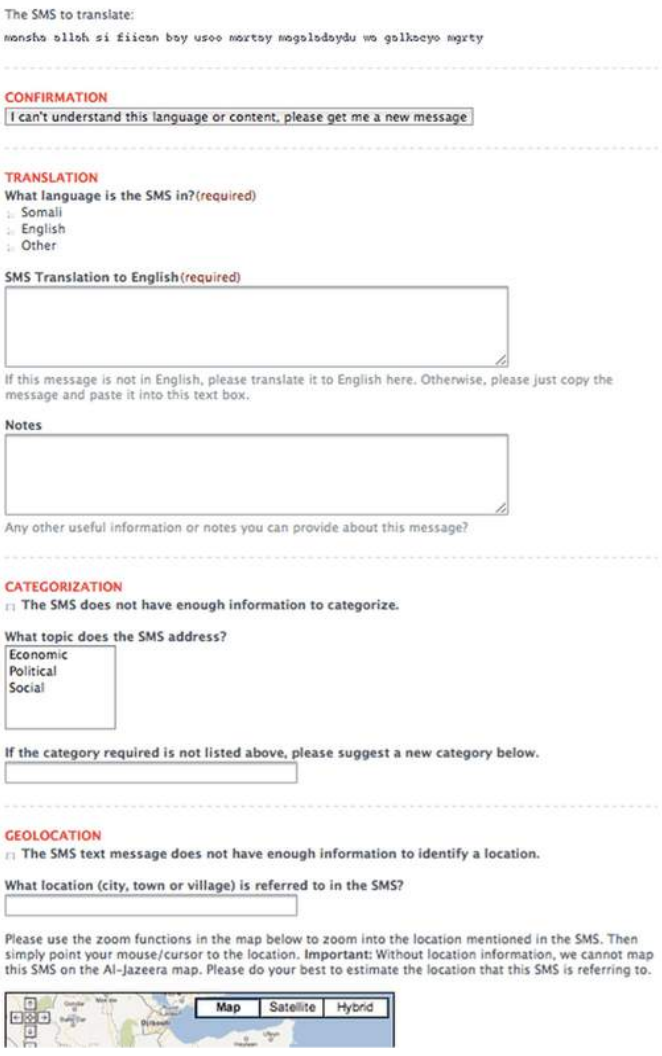

Figure 13. Screenshot of survey as seen by translators (Sutherlin, 2013b).

This is one example excerpted from a 2013 essay (Sutherlin, 2013b). In December 2011, *Al Jazeera* launched Somalia Speaks, an SMS crowdsourcing collaboration with Ushahidi. Their stated aim was giving a voice to the people of Somalia and sharing a picture of how violence was impacting everyday lives. A call for translators in the diaspora, particularly Somali student groups, was issued online, and phones were distributed on the ground throughout Somalia so multiple users could participate. The volunteers translated the SMSs and categorized the content as either political, social, or economic. The results were color-coded and aggregated on a map.

While *Al Jazeera* is a news organization, not a research institute or a government actor, it plays an important role in informing electorates who can put political pressure

on governments involved in the conflict. Furthermore, this same type of technology is used on the ground to gather information in crisis situations by USG and international partners. This example illustrates two key design flaws that prevent us from gaining a better understanding of what others are thinking. The ICT design and analysis methods make assumptions that all humans understand events in a universal manner (i.e., denying cultural cognitive variation) and communicate them in the same straightforward way. The ICTs we rely on are therefore blind to the exact attribute we want to see.

The SMS poll asked an open question: How has the Somalia conflict affected your life?

In one response example: The Bosaso Market fire has affected me. It happened on Saturday.

The response was categorized as 'social.' But why didn't the fact that violence happened in a market, an economic center, denote 'economic' categorization? There was no guidance for maintaining consistency among the translators, nor any indication of how the information would be used later. It was these categories chosen by the translators, represented as bright colorful circles on the map, which were speaking to the world, not the Somalis—whose voices had been lost through a crowdsourcing application that was designed with a language barrier. The primary sources could not suggest another category that better suited the intentions of their responses, nor did they understand the role categories would play in representing and visualizing their responses to the English language audience. Already, the concepts framing the narrative were part of the design.

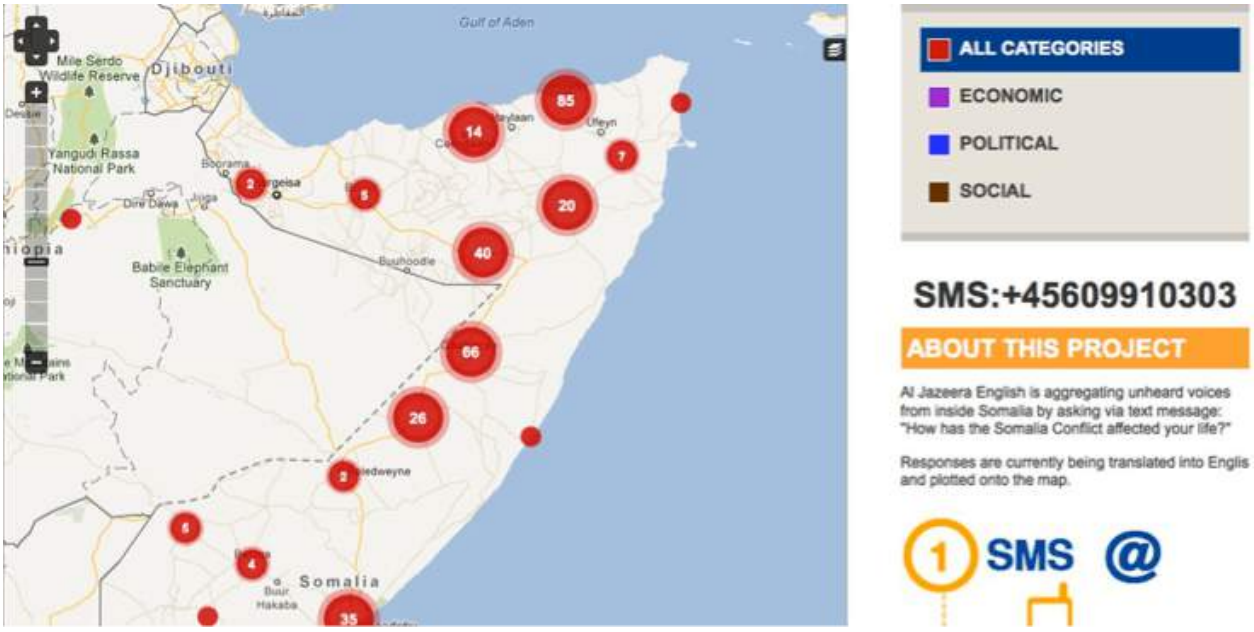

Figure 14. Geospatial aggregation of event categories from Somalia Speaks survey (Sutherlin, 2013b)

An 8 December 2011 comment on the Ushahidi blog described in compelling terms how language and control over information flow impact the power balance during a conflict:

A—-, My friend received the message from you on his phone. The question says "tell us how is conflict affecting your life" and "include your name of location". You did not tell him that his name will be told to the world. People in Somalia understand that sms is between just two people. Many people do not even understand the internet. The warlords have money and many contacts. They understand the internet. They will look at this and they will look at who is complaining. Can you protect them? I think

this project is not for the people of Somalia. It is for the media like Al Jazeera and Ushahidi. You are not from here. You are not helping. It is better that you stay out.

Ushahidi director Patrick Meier, responded to the comment:

> Patrick: Dear A—-, I completely share your concern and already mentioned this exact issue to Al Jazeera a few hours ago. I'm sure they'll fix the issue as soon as they get my message. Note that the question that was sent out does *not* request people to share their names, only the name of their general location. Al Jazeera is careful to map the general location and *not* the exact location. Finally, Al Jazeera has full editorial control over this project, not Ushahidi. (Meier, 2011)

Did it occur to the designers that their concept of location and the local concept of location or name or anything else was at odds? This was not an issue of misreading instructions. This is a cognitive variation of how we see/perceive and recall the world around us. While the differences are sometimes subtle, it is that nuance that leads to the conflict we seek to unravel. We need technologies that can detect this.

In the example above, the danger is that these categories—economic, political, and social—become the framework for aid donations and policy endeavors; the application frames the discussion rather than the Somalis' understanding. We lose an opportunity to really learn what another group is thinking. The simplistic categories become the entry point for decision-makers and citizens alike to understand and become involved with translated material. Decisions and policies developed from the translated information are less connected to 'real voices' than we would like to believe. Even before the material is translated, when participants are responding to the open question via SMS, my experiment examined this, less scripted interaction and found the engagement with ICTs still came with a foundational narrative shift. For some participant groups, this may be intentional. They see ICTs as inherently connected to the West and any communication via ICT is directed at this audience. For others, it was less intentional, but the cognitive shift to manipulate their narrative into the norms dictated by the ICTs was apparent.

Developing a methodology to evaluate what someone is thinking is crucial. Having demonstrated that this problem exists through empirical research several years ago, the method developed to illustrate the problem was also designed as the key to solving it and evolving the technology to incorporate cultural cognitive variation (Sutherlin, 2016). The experimental sample brought the issue of cultural cognitive variation into relief by selecting a culture that was highly distant to the Anglo-American designers of the ICT. It showed nearly three-quarters of the participants who shared a narrative via ICT changed their recall of a conflict event narrative from the way they reported it as a spoken narrative. This means they changed what happened, who was there, how many people were involved, how certain they were about what they were describing, when and where the event took place, and the roles of those culpable vs. victimized. These changes occurred irrespective of the presence of a researcher, and in both open and closed survey type formats. These are foundational things to change, particularly if aggregated and developed into the basis of a report for decision makers. The description of events on the ground will quickly become skewed.

The method for capturing the shift in narrative offers a means to identify cultural variation at a conceptual level. Once these core cognitive activities can be culturally localized, then they can be incorporated into software and the applications we know today that change from English to Swahili to Arabic, will be able to instead shift to another cultural conceptualization. This is the path forward.

Adding this level of sensitivity to analytics or to modelling would enable a rich growth in ML for social science driven applications such as patterns of life.

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The Internet of Things (IoT) and the Art of Mapping a Population's Thinking, Behavior, and Influencers

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Key Points

- The promise of the IoT is in providing continuous insight into human behaviors and the fidelity with which it can return I&W on daily decision-making processes within or among populations and allow military decision makers to increase their operational situational awareness while mitigating against strategic surprise.
- Effective utilization of Internet of Things requires an approach grounded in a theory of identity and a clear concept of the type of logical reasoning needed to meet analytical needs.
- The Logic of Appropriateness provides a conceptual linkage between interests, thinking, behavior and identity.
- Algorithm-based analysis is insufficient to make full use of the data available in the IoT; rather, it requires the lens of the three types of logical reasoning, generically described as crowdsourcing, detective work, and designing the future.

Advancing the military's insight into a population's thinking and behavior requires going further than probing social media for tactical insights. It requires approaching populations from the perspective of the social construction of identity and through the lenses of the three types of reasoning in social scientific research. As the Internet of Things (IoT) is explored as another potentially disruptive technology, developing and designing appropriate research "rules of engagement" is of vital importance for future operations. This chapter describes the importance of (a) the Logic of Appropriateness as a behavioral indicator of identity and (b) utilizing three different lenses of reasoning—generically dubbed here crowdsourcing, detective work, and designing the future—to make use of the IoT. While these concepts are not new, they are often overlooked in the art of designing technical research because the appeal of tactical IoT applications appear so compelling. The chapter first explains why the Logic of Appropriateness is crucial as a behavioral indicator of identity; then briefly describes the differences between the three types of reasoning; and concludes with why IoT has grown and offers examples of how it can be leveraged to reveal distinct aspects of the Logics of Appropriateness.

The Impact of the Logic of Appropriateness on Thinking and Behavior

What a person thinks about, holds as interests, considers rational, and acts upon is in the first instance a matter of the identity a person adopts in a given context (Berger, et al., 1966; Wendt, 1999; Katzenstein, 1996; Weldes, et al., 1999). One of the most valuable concepts linking interests and behaviors to identity is called the Logic of Appropriateness. Typical models of rational behavior make the material interests of the individual the primary motivator. In contrast, James March writes that Logic of Appropriateness behavior

> come[s] from matching a changing (and often ambiguous) set of contingent rules and identities to a changing (and often ambiguous) set of situations (Turner, 1985)…Actions reflect images of proper behavior, and human decision makers routinely ignore their own fully conscious preferences. They act not on the basis of subjective consequences and preferences but on the basis of rules, routines, procedures, practices, identities, and roles (Anderson, 1983; Biddle, 1986; March & Simon, 1993). (1999 p. 22)

Logic of Appropriateness analysis asks, "what are normatively and ethically appropriate behaviors given who I am in this situation?" By clearly linking interests and behaviors to roles and the rules of right and wrong associated with them, the Logic of Rationality becomes subordinated to the Logic of Appropriateness. Interests and behaviors in this view depend on contextualized identity, which inevitably draws upon a limited range of acceptable behaviors. For example, astute observers of ISIS might notice that the Salafi Jihadi group mandates wearing pant legs above the ankles. This behavioral trait is rational because Salafi Jihadis interpret the Prophet Mohammed as having done so, which means it is appropriate for good Muslims to follow suit. Unsurprisingly, ISIS also forces people under its sway to adopt the same behavior and socializes children to this norm. Analysts have a much easier job of deriving reasonable hypotheses and research assumptions when the range of acceptable behaviors is knowable based on existing sociological and anthropological literature.

Figure 15. Children in training by ISIS in Syria (November 18, 2015). https://www.express.co.uk/news/world/620051/Islamic-State-jihadi-camp-children-school (accessed January 31, 2018).

Nevertheless, what a population thinks about and the behaviors it finds rational are mutable, context-dependent, and based on competing narratives over which identities to draw upon to perceive and interpret a given issue. Importantly, these identities often move well beyond the typical ethnicity, religion, race, and tribal identities through which military units often perceive most situations. Other meaningful identities could be, for instance, oppressed citizen, water-starved farmer, technocratic professional, civil libertarian, or, perhaps, a member of the *umma* as opposed to a citizen of a state. Thus, to truly digest the issue of how to forecast rational behavior, the analyst must first have a sense of the range of behaviors flowing from the different identities in a person's identity palette.

One way to link possible behaviors with identities is by understanding the priorities associated with each identity. For example, an oppressed citizen may prioritize free speech, whereas a water-starved farmer may prioritize access to equipment that results in greater crop yields. People consistently make decisions and act according to the priorities associated with specific identities. While context influences which identities become salient, the priorities associated with specific identities tend to be stable in the short-term (Plott, 1996; Bettman, Luce, & Payne, 1998). If priorities do change, they change gradually over time and in predictable ways according to external events (Jennings & Wlezien, 2011). For instance, after 9-11, national security became a top priority of the American identity and this resulted in more patriotic behaviors, such as civic engagement, and greater opposition to foreigners.

Appreciating the reasoning and priorities behind posted data and messages enables analysts to better interpret how to use the information and the technologies most appropriate for the research design. The Logic of Appropriateness changes the emphasis from what is posted (a perspective based

on content at a given point in time), to one exploring the role identities that make the posting the content a rational behavior in the first place (a perspective rooted in priorities, motivation, and reasoning). Both are valid types of inquiry, but the latter is far more interesting to the intelligence analyst.

IoT Indicators, Behavior Priorities and Identities Matrix

The link between identity, priorities, and behaviors allows for the creation of a matrix that can be used to analyze the behavioral patterns in IoT data. The matrix identifies patterns of behavior (e.g., cryptocurrency usage, traffic patterns around government centers) from IoT data and links these behaviors with the range of possible behaviors stemming from people's priorities (e.g., economic stability, trust-worthy government, safety). These priorities are in turn linked with specific identities (e.g., oppressed citizen, technocratic professional).

Identifying people's priorities allows for a better understanding of how the individuals as well as the public will react to different campaigns, movements, and interventions. Campaigns that target or frame their messaging around people's top priorities will produce the greatest reaction from the public. Since different identities have different priorities, messaging and interventions can target the top priorities of specific identities or groups of people. For example, water-starved farmers will respond the most to campaigns that enhance their crop yields, since this is likely a top priority for them.

The Art of Reasoning behind Mapping the Internet of Things.

The IoT analytics provide emerging exponential opportunity to develop Indications & Warning (I&W) from an identity and Logic of Appropriateness perspective. The art of mapping a population's thinking, behavior, and influencers should start with a theory of the social construction of reality, a firm grasp of the identities and social structures vying for dominance within the population, and a sense of the life interests of a population's various subgroups. Different questions arise from this base, and IoT data can be interpreted through three different lenses to reveal different insights. To avoid jargon, the lenses can be described as crowdsourcing, detective work, and designing the future.

Crowdsourcing (Inductive Reasoning)

Crowdsourcing seeks to let the data identify relevant correlations without any preconception of what relationships might be important. Algorithmic analysis, upon which most social media analytics today are based, can yield some insight into immediate concerns and issues through trend analysis. The assumption is that the technology can tell analysts what they need to be concerned about since they are often only superficially familiar with a population. Unfortunately, crowdsourced data often comes too late to be actionable. By the time sufficient data is available to illustrate a noteworthy trend, the majority of the socio-political forces are well entrenched and the output mostly has tactical value only. Operating in this kind of information environment always cedes the initiative to other forces, especially in the information environment.

Detective Work (Deductive Reasoning)

Detective work begins with a hypothesis about correlations and causal relationships and then looks at the evidence in the historical record to determine if the assumptions hold. This is an approach to discovery based on intuition and has significant merit when deep socio-cultural appreciation of a

population already exists. Otherwise, detective work is highly subjected to the mirror imaging problems recognized in the intelligence community's literature (Heuer, 1999 pp. 9-16 & 70-71).

While detective work is a step in the right direction, it, too, is retrospective in nature since it favors insight gathered from past interactions based solely on the relationships and variables the researcher believes might matter. Thus, it cannot adequately predict the future because analysts do not know about all the relationships and interactions in the open systems they study. Yet, analysts have a chance of at least asking better questions of the data, and the historical record might illustrate how the interplay of social structures shape identities, thinking, and Logics of Appropriateness and therefore provide clues on how to think about the range of possible futures.

Designing the Future (Abductive Reasoning (Can Wicked Problems Be Tackled Through Abductive Inferencing, 2000))

Designing the future is most closely associated with the social construction of identity because subgroups of a population are forever promoting ideas, thoughts, and norms in order to change their social structures. Cultural meanings and the boundaries of identity are consequently formed by ideas locked in a competition for dominance. Identity in this view is ecological, highly variable, and permanently under threat of being supplanted by new codes and logics of understanding (Society as a Complex Adaptive System, 2008; Dilemmas in a General Theory of Planning, 1973). Identity is not static, and ideas are always a potential threat, so dominant cultural norms and identities must always reproduce themselves and inculcate their logic throughout society lest they be overcome by new ideas and identity constructs (Weldes, et al., 1999 p. 16; The Evolution of International Norms, 1996 p. 372). The future is created by activists, influencers, networks, and communication streams, and for such people the future is current operations. Think again about ISIS socializing previously non-jihadi Syrian children to new norms of appropriate dressing and all the religious interpretations and socio-political behaviors associated with it!

The reality is that today's inductive, algorithmic trend analysis is based on some interaction of activists and networks working diligently five years ago, for example, on creating new relationships, identities, and Logics of Appropriateness, hence ISIS as an organizational and socio-political phenomenon. The social infrastructure for lone wolf terrorists did not occur with the rise of ISIS; it took many decades to put the global jihadi education system in place, the internet to amplify it, and ISIS to give physical expression to an already vivid narrative of the caliphate inculcated by others.

The power of the Internet and social media lies in their ability to generate homophily and propinquity among disparate populations and provide them with the common vocabulary and frames of reality to create a new or adapted identity (Kadushin, 2012 pp. 18-20). Socialization in a virtual network has the same potential to inculcate norms, values, and ethics and, as a result, role behaviors as direct interpersonal communication. In this view, for instance, "lone wolf" terrorists almost never act alone; rather, they are part of a virtual social system or nation replete with a sense of community, roles within that community, norms of behavior associated with roles, and sophisticated narratives that reinforce the role identities resulting in terrorist or enabling behavior (Just, 2015 pp. 34-55).

Synthesizing the Art of Reasoning

By exploring populations through the three lenses, the IoT could provide excellent data to determine which possible future is "trending" given the wealth of empirical, crowdsourced data, while good detective work based on an analyst's hunch might illuminate a potential, localized threat that

crowdsourcing algorithms might not elevate as an important trend. Synthesizing these types of reasoning is what makes the thinking and behavior of populations come alive.

For example, persistent IoT "crowdsourcing" in a new post-ISIS controlled conflict zone might illustrate a change in patterns of movement, showing that traffic is slowly increasing in the areas around traditional normative mosques. Simultaneously, de-identified radio frequency scanning and traffic pattern analysis may demonstrate increased attendance of public authority buildings during working hours. These indicators seen through the Logic of Appropriateness suggest gradual improvement in trust of governmental and traditional institutions. Detective work on the population and their IoT footprint might reveal actors and social structures having interest in propagating the movement toward Jihadism, those opposed, and the narratives both groups might express. Hypotheses could then be formed about their discourse, behavior, and alliances in the struggle for the social construction of reality and generate, for instance, local agricultural support interventions to bolster the influence of non-Jihadi networks and the overall resilience of the population against the threat. Designing the future reasoning could then develop possible future scenarios against which I&W on the actors, alliances, and narratives could be assessed for trend analysis.

Figure 16. Open Access IoT connected devices' in Middle East/North Africa and South East Asia, Source: Thingful IoT Search Engine, (accessed on January 30, 2018).

The promise of the IoT is in providing continuous insight into human behaviors and the fidelity with which it can return I&W on daily decision-making processes within or among populations and allow military decision makers to increase their operational situational awareness while mitigating against strategic surprise.

The Growth of the Internet of Things

According to a recent CISCO/DHL report, roughly 1.5 trillion "items" globally can benefit from an internet protocol (IP) address, with just under 15 billion connected as of 2014 (Macaulay, et al., 2015). Recent enterprise IoT deployments have grown by over 300 percent since 2012. While much of the data will concentrate in information-rich, developed countries, a significant portion will be emplaced in information-poor, hard-to-reach areas in the developing world (see Figure 16). The recent explosion of the IoT to complex, hard-to-reach, often conflict environments is driven by a number of factors.

The IGO and NGO Drive for Transparency and Improving Accountability

Recently, many large Intergovernmental Organizations (IGOs), including the World Bank, European Union, and to a lesser extent the UN, re-evaluated how and when to engage in fragile domestic and conflict environments. The previous modus operandi sanctioned engagement mainly in the post-crisis setting with a recognized national government in stabilized areas. However, due to increased state fragility in the Middle East and North Africa (MENA) and Horn of Africa (HOA) regions, as well as unprecedented levels of migration into donor countries, this approach has been criticized for being too slow in its implementation and operationally unsuitable given the longevity of many conflicts.

Faced with the challenges of operating in the conflict setting and requiring higher levels of accountability, these organizations have actively contributed to the development of the IoT. For instance, some have embraced the promise of blockchain and radio-frequency identification (RFID), specifically to improve pharmaceutical and supply chain management in conflict settings (Stanley, 2017; Kucheryavenko, et al., 2017). Additionally, smart sensors are starting to be integrated into sensitive water management systems, most notably in Somalia and Malawi, in order to facilitate assistance and to anticipate water-related stress and conflict. Additionally, these technologies are seen as critical for improving trust in the global distribution of aid, for mitigating corruption, and ultimately for improving faith in the institutions themselves.

Precision Farming Initiatives for Optimizing Farm Management

Precision farming combines sensors, robots, location intelligence analytics, and unmanned aerial vehicles (UAVs) to provide unprecedented insight on individual plants, improve time management, reduce water and chemical use, and produce healthier crops as well as higher yields. Although precision farming is encountering adoption issues in developed nations due to potential up-front equipment costs, farmers in developing nations are adopting cheaper, lower energy solutions that rely on wireless, solar-powered sensors. Both large companies and local start-ups are developing sensor plug-and-play solutions for systemic, real-time measurements of soil data, including temperature, nutrients, vegetative health, and yield as well as for providing audio and SMS-based guidance to farmers based on real-time weather and financial market forecasts (Ling, et al., 2017; Ekekwe, 2017; economist.com, 2016). Simultaneously, the willing adoption of internet-connected sensor systems by farmers across the globe can enhance the analyst's appreciation of socio-economic drivers of human behavior, especially in remote areas in MENA, HOA, and East Africa.

The Local Adoption of Mobile Financial Transactions for New Product Markets

Use of secure mobile communications in areas that rely on remittances is not new. International Fund for Agricultural Development (IFAD) estimates that 30-40 percent of remittances go to rural areas, globally amounting to $2.5 trillion. It is estimated that two million Somalis living overseas send an estimated $1.3 billion back home every year with many of these transactions increasingly done over encrypted mobile applications, including via cryptocurrency (International Fund for Agricultural Development, 2016). Increasingly, however local market transactions, including those involving export of agricultural products and livestock are done using mobile financing. For example, Somaliland's mobile money platform, Zaad, counted approximately 10% of the local region's 3.8 million people as subscribers as of 2014 (Iazzolino, 2014). Similarly, in Mogadishu and Galkayo, AriFarm, a local mobile livestock-selling platform that was created in August 2016 with the promise of giving local nomadic tribesmen the ability to find new customers in the Gulf, is conducting 10% of its transactions via bitcoin (Dahir, 2017).

Critical Asset Management in Complex Environments

Logistics management, while a major factor for IoT implementation in developed countries, is increasingly viewed in developing countries as a source of improved operational efficiency, critical resource tracking, an anti-graft instrument, and a promising component of early warning systems to prevent natural disasters and enable better understanding of drivers of conflict. Additionally, the IoT has been seen as a way to anticipate equipment failure and understand employee utilization. Currently, a number of solutions have been developed to assist in real time telematics and sensors hardware tracking and sensing, including Agheera, and initiatives that attempt to democratize access to traffic sensor data such as World Bank's Open Traffic initiative (The World Bank, 2016). Increasingly, solutions that combine IoT logistics tracking with blockchain technology are becoming available as well, such as a recent collaboration between AOS SAS and IBM Watson to provide truck tracking solutions specifically designed for increasing transparency and security in a conflict zone (Lewis, 2017).

The Rise of Urban Planning and Resilience Projects

Finally, the recent alliance between leaders of emerging megacities and IGOs, to make infrastructure and organizations more resilient in the face of localized disasters is driving adaption of IoT technology and making "existing infrastructure 'smarter.'" A recent World Bank/GFDRR report noted that "60 percent of the areas expected to be urban by 2030 are yet to be built" and strongly urged donors and municipalities to invest in resilient infrastructure. As part of its work, the World Bank along with nine other large actors has significantly expanded its "Resilient Cities" program to include emerging megacities in Latin America, MENA, East Asia, and South East Asia. For example, urban resilience projects, including the localized "IoTization" of existing infrastructure, are currently taking place in Beirut, Dhaka, Addis Ababa, Can Tho, the Greater Accra Region, and Lahore, with additional resilience diagnostics taking place in another 28 cities (The World Bank, 2016).

How the Internet of Things Allows Us to Infer a Population's Thinking and Behavior

Clearly the sheer volume of IoT data streams currently in existence and likely to be emplaced over the coming decades will overwhelm analysts lacking a clear research design and corresponding lens of reasoning through which to seek out and interpret the data. The art of mapping the interests, thinking, and behaviors of populations starts with the questions analysts ask.

Much of the power of the IoT is on the surface about crowdsourcing since all the technologies mentioned reveal behavior and decisions made in real time. Looked at more deeply, however, they reveal more interesting questions as to why the decisions were made and this goes to identity. Does an increase in the use of cryptocurrency in a country instead of its banking sector indicate lack of legitimacy of the institutions and therefore a weak national identity? If farm sensors indicate a severe drought and low yield, what is the Logic of Appropriateness of a "water stressed farmer" identity in a particular country, and how might international assistance reinforce social order through the systems of formal and informal governance? If traffic patterns avoid governmental centers, but traverse other areas more consistently, does this pattern indicate alternative, informal centers of gravity and corresponding identity constructs about which the analyst should know more? What patterns of life can be discerned from the full range of IoT in a country, and what are the subgroups contributing to the various subsystems as revealed by their social media posts?

Conclusion

A disruptive technology like the IoT could exacerbate the challenges analysts face in the information environment, but only if they rely on algorithmic trend analysis and a crowdsourcing lens of reasoning. The rules of engagement with the IoT necessitate research and analysis on the motivations behind and implications of received data for the social construction of reality. Otherwise, the content of the data will lie inert among the noise and socio-cultural indicators will be lost. When viewed through the perspective of the Logic of Appropriateness, the data can be more richly interpreted to proactively assess the information environment for I&W and greater strategic awareness.

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The Impact of the Internet of Things (IoT) and Blockchains on Future Warfare

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"*The Future is already here. It's just not very evenly distributed.*" – William Gibson, science fiction author who coined the word cyberspace in 1984.[48]

Purpose

This paper briefly describes the impact of the Internet of Things (IoT) and blockchain technology on future warfare. It begins with a problem statement, followed by a short discussion of the future operating environment (FOE). It next provides a brief working description of the IoT and blockchains. Subsequent paragraphs discuss potential impacts of the IoT and blockchain on future warfare. The final paragraph suggests a way ahead.

Problem Statement

Faced by increasingly capable adversaries in an era of exponential technological change, what are the probable impacts of the Internet of Things (IoT) and blockchains on future warfare?

The Future Operating Environment (FOE)

Figure 17. Exponential Convergence - Five converging technologies that will drive the exponential development of increasingly capable Artificial Intelligence.

A survey of the two most commonly available, authoritative sources on the FOE points to an ever-increasing rate of technological change, the growth of mega-cities, and the diffusion of cutting-edge technology into the hands of both state and non-state actors.[49] Over the next ten to twenty years, the world will experience dramatic changes in technology, many of which will affect how Army Special Operations Forces (ARSOF) operates.

Dr. James Canton, a noted technologist and futurist, observed that the five emerging technologies noted in Figure 17[50] are driving an exponential growth in Artificial Intelligence (AI). This growth rate will approximate that of Moore's Law, doubling in

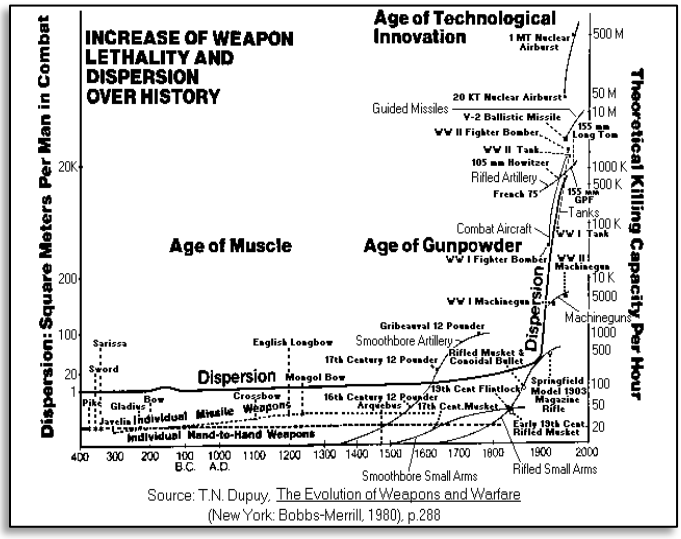
[48] https://en.wikiquote.org/wiki/William_Gibson, accessed 18 April 2017.
[49] The FOE depicted in this paper is a synthesis of the National Intelligence Council *Global Trends (2035) Paradox of Progress*, National Intelligence Council, Washington DC, January 2017 and the Chairman, Joint Chief of Staff, *Joint Operating Environment 2035, The Joint Force in a Contested and Disordered World*, Joint Staff J7, Washington, DC, 14 July 2016.
[50] Taken from a PowerPoint presentation entitled "*AI Futures*" given by Dr. James Canton at the USASOC Futures Forum, 8 August 2017.

power while dropping in price every two years. Increasingly capable AI will in turn accelerate the development of each of the five converging technologies. As data proliferates, verifying its accuracy will become increasingly important for AI to be able to process it. On the other hand, AI coupled with increasingly capable computers will have the ability to attack unprotected data. Our adversaries will undoubtedly seek to harness those trends to accomplish their ends.

Kevin Kelly, another futurist of note predicts that soon, AI will be both cheap and ubiquitous. He uses electricity as an illustration to describe the future of AI in society. In addition to being cheap and ubiquitous, it will also be diffuse, running many of the processes of society without even being noticed – until it doesn't work. He forecasts, "You'll simply plug into the grid and get AI as if it were electricity. It will enliven inert objects, much as electricity did more than a century past."[51]

AI will operationalize the IoT, which will include the robotics and autonomous systems (RAS) that will be a significant part of future military operations and warfare. ***The value of the IoT to the warfighter will come from the data it generates.*** However, there will simply be too much data coming from the IoT for humans to sort through. Only AI will be able to sort through the oceans of data and produce actionable insights.

Increasingly capable reconnaissance and surveillance technologies will bring about an increase in the lethality of weaponry. These will depend, to a degree on their ability to 'see' targets through their associated sensors. What can be seen can be targeted. That which can be targeted can be destroyed. As lethality increases, so does the need for dispersion (Figure 18). Future units of action will tend to operate in an increasingly dispersed fashion, even more so than today. Their operations will tend to pulse, where widely dispersed operators and units mass quickly, act, and then disperse before the adversary can counter them effectively.



Source: T.N. Dupuy, The Evolution of Weapons and Warfare (New York: Bobbs-Merrill, 1980), p.288

Figure 18. Relationship of lethality to dispersion.

The Internet of Things (IoT)

This paper will employ the following definition for the IoT: "The Internet of Things (IoT) is the rapidly expanding network of physical objects such as devices, vehicles, buildings and other objects that

[51] Kelley, Kevin. *The Inevitable, Understanding the 12 Technological Forces That Will Shape Our Future.* New York: Penguin Books (Kindle Edition), 2017, 33.

contain embedded electronics, software, sensors and network connectivity. This enables things to collect and exchange data."[52] The IoT is experiencing explosive growth as shown in Figure 19.[53]

The growth of the IoT has depended on the convergence of three key technologies. By itself, the IoT generates massive amounts of data. AI provides the means to analyze that data. Two other key enabling technologies are the reduced cost of sensors and the availability of cloud computing.[54]

Embedded sensors have been around since the 1970's for many industrial devices. Most were costly and did not connect to an external network. Lower cost sensors has led to them becoming ubiquitous. For example, the typical smart phone has a dozen sensors (see Figure 20).[55] With the current number of smart phones at around two billion, that translates to 24 billion sensors generating data. As sensors become smaller and less costly, they will continue to proliferate. Finally, cloud computing allows the vast amounts of data to be collected, analyzed, and mined.

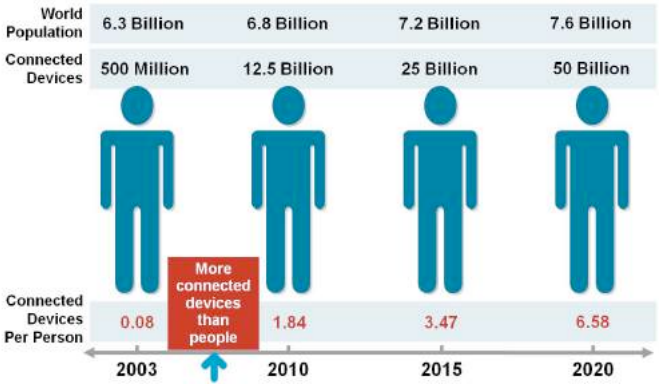


Figure 19 Growth of the Internet of Things by Number of Devices

Like the Internet, the IoT is a physical layer or network whose primary function is to transport information from one point to another quickly, reliably, and securely. While speed and reliability present few problems, security is another matter. The foremost reason is that the IoT was not created with security as a primary consideration. Instead, security was an addition to the software components of the IoT. Government and the private sector are currently wrestling with ways to secure the IoT, with some measure of success.[56] As the Internet of Things (IoT) grows and matures, we must consider the impact of how these technologies may affect the population and civilian groups. Additionally, the emerging fields of human-machine interfaces, human augmentation, and brain-computer interfaces will require that we consider the emerging trend towards the Internet of People (IoP) as a companion of the IoT.

Figure 20 Sensors in a Typical Smartphone

[52] Scoble, Robert, and Shel Israel. *The Fourth Transformation: How Augmented Reality & Artificial Intelligence Will Change Everything*. USA: Patrick Brewster Press (Kindle Edition), 2017, Location 2870.
[53] Evans, Dave. *The Internet of Things: How the Next Evolution of the Internet Is Changing Everything*. USA: CISCO Internet Business Solutions Group, April 2011, 3.
[54] https://www.designnews.com/automation-motion-control/evaluating-business-impact-industrial-iot/95347012958024 Accessed 08 January 2018.
[55] https://www.quora.com/how-many-different-sensors-are-available-inside-a-smartphone Accessed 08 January 2018.
[56] https://spectrum.ieee.org/telecom/security/to-secure-the-internet-of-things-we-must-build-it-out-of-patchable-hardware Accessed 09 January 2018

Blockchain

Blockchain is an information technology based upon a series of universally accessible, encrypted digital ledgers distributed at numerous points across the Internet. It is a subset of distributed ledger technology.[57] In blockchain, the digital legers are called a chain because changes can only be made by adding new transaction information at the end. Blockchain technology originated as a "distributed ledger platform for cryptocurrencies such as bitcoin." It provides a way to "securely and transparently store information in near real time thereby providing transaction confidence in a trustless environment." Blockchain and digital ledger technologies have become "tools to record, enable, and secure huge varieties of transactions, incorporating rules, smart contracts, and digital signatures among many new and emerging technologies." [58]

Blockchains form based upon a series of transactions (Figure 21). Once a transaction occurs, it is transmitted to all of the nodes in the system. The transactions are signed with a public key visible to all, while the owner or originator holds the private key. The two keys have a mathematical relationship that makes them useful in signing digital messages. The next step is for each node to collect the new transactions into a block. Each node then records data for each new transaction, it

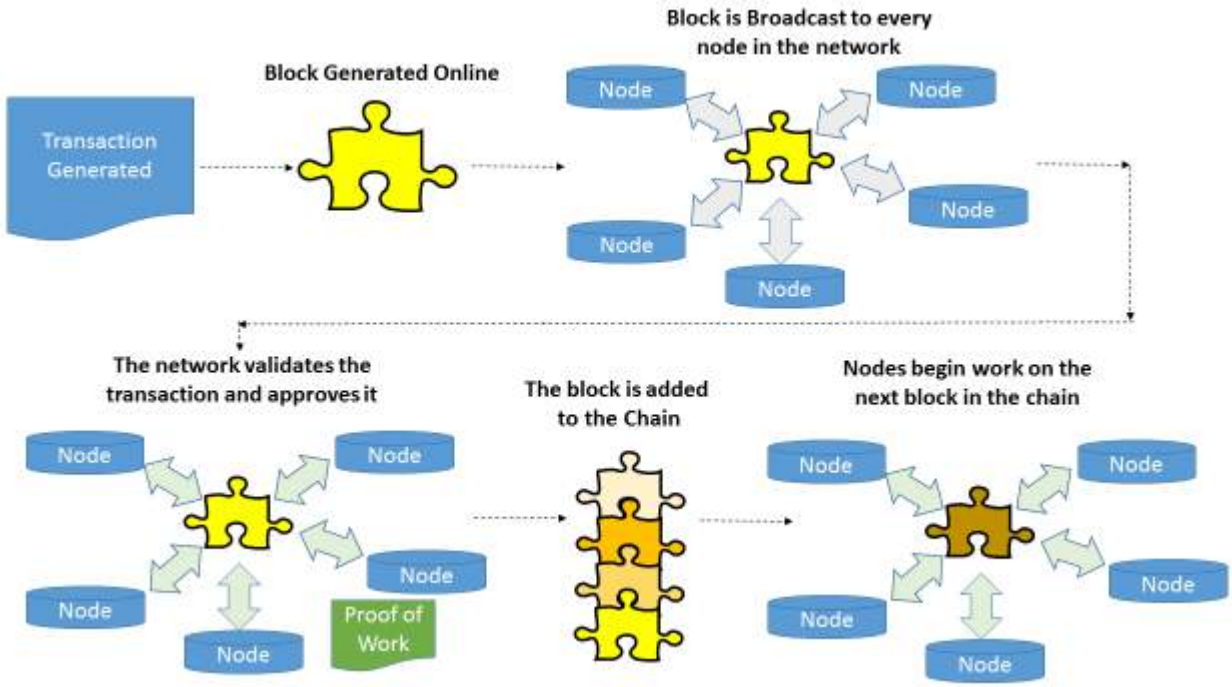


Figure 21. The Blockchain Process

[57] For more on distributed ledger technologies, see "Distributed Ledgers," *Investopedia*, http://www.investopedia.com/terms/d/distributed-ledgers.asp accessed 10 January 2018 and https://www.federalreserve.gov/econresdata/feds/2016/files/2016095pap.pdf accessed 10 January 2018.
[58] American Council for Technology-Industry Advisory (ACT-IAC). *Enabling Blockchain Innovation In The U.S. Federal Government, A Blockchain Primer*. Primer, Fairfax, VA: American Council for Technology-Industry Advisory (ACT-IAC), 2017, 1.

does so with private keys that correspond to the public key most recently associated with the asset or information being tracked.

The nodes then generate what is referred to as a 'proof-of-work' for the block. This involves checking the current transaction against previous blocks. Each new addition, or block, contains a new set of transactions that reference previous transactions in the chain. Through the cryptographic process of hashing, each block in the chain is used to generate subsequent blocks.

Once a node establishes a proof of work, it transmits the block and the proof-of-work to all other nodes. The nodes then approve the transaction and validate it. Then the node which generated the proof-of-work is paid in bitcoin by the owner of the chain. The block is then added to the chain, providing a permanent, non-repudiable, and transparent record of the transaction. The nodes show their acceptance of the transaction by beginning to build the next block in the chain based upon the hash of the accepted block. This secures the chain from tampering.

A variant of the open ledgers described above, permissioned ledgers are an approach used by government and the commercial sector for a number of reasons. Most importantly, they restrict who can view data on the system. They offer other advantages as well. Unlike open blockchain, the identity of those adding data is known. Also, the owner of the blockchain assigns the rights to create new blocks, so there is no need for proof-of-work or a subsequent payment.[59]

Future Impacts

There are many ways to frame the future impacts of the IoT and blockchain on warfare. This paper will examine those impacts within the Joint Capability Areas (JCAs) framework. It is beyond the scope of this paper to examine each JCA in detail. Neither the IoT nor Blockchain constitutes a single, plug-and-play solution. Employment will require replacing existing systems or tightly integrating the two.[60] Also, not all JCAs will be affected by blockchain.

IoT

Force Support: Perhaps the most useful force support application of the IoT is in the maintenance of health. Networked, wearable sensors can provide indications whether the wearer is healthy, wounded, injured, or ill. Rather than simply reporting a static state these sensors could provide data to support preventative medicine. They could revolutionize health service delivery by identifying service members in the initial stages of the transition from healthy to ill. It would also make diagnosis of injured or wounded service members more rapid and accurate.

Battlespace Awareness: The IoT will provide the future force with data to plan and direct operations. This data can come from Joint Force Tracking or RAS, exploitation of adversary devices, or from civilian sources. Depending on the class of devices being targeted, collection may present a challenge. However, the data obtained will support predictive analysis that provides the commander with nuanced insights of the area of operations.

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[59] https://spectrum.ieee.org/computing/networks/blockchains-how-they-work-and-why-theyll-change-the-world Accessed 10 January 2018.

[60] American Council for Technology-Industry Advisory (ACT-IAC). *Enabling Blockchain Innovation In The U.S. Federal Government, A Blockchain Primer*. Primer, Fairfax, VA: American Council for Technology-Industry Advisory (ACT-IAC), 2017, 9.

Force Application: Data provided by the IoT will facilitate friendly pulse type operations. The heightened battlespace awareness it provides will allow friendly forces to maneuver physically, virtually, and cognitively though areas not under adversary control. Avoiding adversary strengths, the Joint Force will position forces and ideas that face the enemy with multiple dilemmas. IoT data will support Joint Force physical, virtual, and cognitive targeting as well increasing the precision of kinetic and non-kinetic means.

Logistics: From simple radio frequency identification (RFID) tags to sophisticated on-board sensors, the IoT will provide data that greatly increases the speed and efficiency of logistics functions. Not only will it allow the tracking of supply levels, it will enable precision tracking of supply chains. Predictive analysis based on IoT data will allow proactive logistics management. Maintenance of major end items will be easier as well with IoT data providing the basis for fault prediction and proactive maintenance.

Command and Control: The IoT will ease the burden of command and control insofar as it provides heightened battlespace awareness. Processed by AI, this data will enhance the Joint Force commander and his staff's ability to individually and collectively comprehend the battlespace in its physical, virtual, and cognitive dimensions. Providing both knowledge and situational awareness, it will also aid in the speed and quality of planning and decision making. The IoT will also allow the Joint Force commander and his staff to monitor and assess the results of their decisions.

Communications and Computers: Net management will be the greatest value added of the IoT for the Joint Force in this JCA. Data from the IoT will allow AI to proactively configure and reconfigure networks, services, and underlying physical services. Cybersecurity will be aided by data from the IoT as well as it protects, defends, and restores information systems. However, the IoT will also pose significant cybersecurity challenges for the Joint Force. AI and changes in hardware configurations will be part of the constant effort to render friendly portions of the IoT both resilient and reliable in the face of adversary attacks. The IoT could also provide a backup means of position, navigation, and timing – particularly if the source of data is from adversary devices and systems.

Protection: Data from the IoT analyzed by AI will provide the Joint Force with advanced warning of attacks, whether physical, virtual or cognitive. This will allow the Joint Force to prevent or mitigate effects of attacks on personnel and physical assets. Protection may consist of repositioning or reconfiguring. Repositioning is simply moving the person or physical asset within physical or virtual space. Reconfiguring will consist of altering the physical or virtual signature of the person or physical asset to confuse and deceive the adversary.

Building Partnerships: The primary utility of IoT data in building partnerships for the Joint Force will come from the ability to determine misinformation and to fine tune our messaging. Analyzed by AI, adversary IoT data will develop into patterns that can indicate adversary misinformation efforts. Similarly, AI analyzed IoT data from friendly, neutral, or hostile sources can gauge the effect of friendly messaging. An example might be if friendly messaging wanted to persuade the population to remain in place, the IoT data gleaned from smart phones or other personal devices could establish if the population was heeding the message.

Corporate Management and Support: The areas of audit, inspection, and investigation will benefit greatly from IoT data. Processed by AI, it will provide clear audit trails for DoD assets whether in location or maintenance status. Inspections will be easier because asset holders can inspect assets virtually. Likewise, the audit trails provided by IoT data will greatly ease the task of investigators as they examine issues raised by audits or mishaps.

Blockchain

Force Support: The areas of human capital management and health readiness are the most likely candidates for implementation of blockchain technology for the Joint Force. Digital personnel and medical records could be secured from tampering by making them part of a blockchain.[61] Additionally, blockchain could render medical devices less vulnerable to hacking by using smart contracts.[62] Using smart contracts would require authentication by the entire blockchain ledger before a device could activate or perform a task.[63]

Battlespace Awareness: For battlespace awareness, blockchain offers the Joint Force the ability to assure that data has not been tampered by keeping it transparent and traceable. As AI becomes more prevalent in intelligence analysis, it is vital to assure that the data it processes is not corrupted. Otherwise bad data will lead to bad decisions. Also, smart contracts could secure the automated tasking of sensor platforms. Digital currency could provide the Joint Force with a secure means to fund human based collection.

Force Application: As in battlespace awareness, the value of blockchain to the Joint Force lies in its ability to keep data transparent and traceable. AI will perform force application functions in both maneuver and engagement. Blockchain will raise the level of confidence that the decisions supported by AI will be the right ones.

Logistics: For the Joint Force, the area offering the most opportunities to employ blockchain is logistics. The Federal Government is already testing blockchain in contract management, to include vendor tracking, financial commitments and transactions, schedule tracking, and performance tracking. [64] In the near future they will be used to monitor assets and ownership registries, supply chain transfers, in a manner that is cheap, auditable, and open.[65] Additionally, logisticians can use blockchain to track data from stationary or mobile assets or major end items.[66]

Command and Control: By safeguarding the data used in the decision-making process, blockchain can reduce risk. Using blockchain in the promulgation of orders can help assure their security and traceability. It can also assist the Joint Force in monitoring the effects of decisions, particularly in their ability to analyze, track, and measure the results of actions taken.[67]

Communications and Computers: Blockchain technology has obvious application in cybersecurity. It can protect against modification of data by an adversary. It can also secure information exchange by

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[61] In 2017 the Massachusetts Institute of Technology (MIT) recently began issuing diplomas secured with blockchain. See: https://futurism.com/mit-has-started-issuing-diplomas-using-blockchain-technology/ accessed 11 January 2018. Also, see: American Council for Technology-Industry Advisory (ACT-IAC). *Enabling Blockchain Innovation In The U.S. Federal Government, A Blockchain Primer*. Primer, Fairfax, VA: American Council for Technology-Industry Advisory (ACT-IAC), 2017, 14.

[62] A smart contract is an automated task that is performed only when a blockchain ledger verifies it to be authentic.

[63] See: https://www.designnews.com/iot/how-blockchain-key-secure-iot/87877979557738 accessed 11 January 2018.

[64] American Council for Technology-Industry Advisory (ACT-IAC). *Enabling Blockchain Innovation In The U.S. Federal Government, A Blockchain Primer*. Primer, Fairfax, VA: American Council for Technology-Industry Advisory (ACT-IAC), 2017, 11 - 12.

[65] Ibid, 13 – 14.

[66] Ibid, 14.

[67] https://spectrum.ieee.org/computing/networks/blockchains-how-they-work-and-why-theyll-change-the-world Accessed 10 January 2018.

authenticating individuals, groups, or entities and their level of access to services and information. It can also facilitate data governance and information sharing within a permissioned ledger framework.[68]

Protection: The JCA definition of Protection limits discussion to the physical realm.[69] Therefore, blockchain has little to add to protection. The one possible area where blockchain might be useful is in securing data an adversary might need for purposes of targeting friendly personnel or physical assets.

Building Partnerships: Blockchain can be helpful in establishing relationships requiring a high degree of trust between strangers.[70] Access to a permissioned ledger would permit partners to see data that is both verifiable and transparent, thereby building trust. Partnership agreements could be secured with blockchain to build confidence among our partners that those agreements are substantial.

Corporate Management and Support: Audits, inspections, and investigations would all be simplified with the application of blockchain technology. Blockchain would provide clear data trails to follow. This would extend to personnel security and clearance investigations. Joint Force program, budget, and finance functions would benefit from the verifiability and transparency afforded by the technology as well.

The Way Ahead

The IoT will provide a rich source of data for the Joint Force and DoD as they cooperate with our allies and partners, compete with our adversaries, or engage in conflict with our enemies in the physical, virtual, and cognitive domains. Friendly IoT data must be secured with a combination of blockchain technology, changes in hardware, or by building applications with security as a primary consideration. Because of sheer volume, AI must be capable of analyzing, curating, and using that data to plan, develop, and execute courses of action by the Joint Force and DoD. AI must also be capable of discerning adversary attempts to disrupt or corrupt IoT data. It should also be capable of responding to such attempts. Failure to take these steps will inevitably degrade the Joint Force's operational capabilities.

Blockchain technology presents a means to increase trust in data, including that from sensors, devices, or digital transactions. As such, it offers real opportunities to help secure the IoT. It is not a panacea, but it does seem to offer a means to significantly reduce risk in a number of JCAs. The Department of Defense should aggressively develop and deploy blockchain based solutions wherever appropriate.

[68] American Council for Technology-Industry Advisory (ACT-IAC). *Enabling Blockchain Innovation In The U.S. Federal Government, A Blockchain Primer*. Primer, Fairfax, VA: American Council for Technology-Industry Advisory (ACT-IAC), 2017, 15.

[69] "The ability to prevent/mitigate adverse effects of attacks on personnel (combatant/non-combatant) and physical assets.

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Narrative Technology to Detect and Defeat Adversary Ideological Influence

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Developing technology suites to detect and exert influence is of paramount importance in a world where kinetic and non-kinetic effects interact to produce final outcomes in the national security domain. Here, I discuss development of a comprehensive technology suite to allow the US and its Allies to detect and disrupt radicalization processes in multiple media; the suite is distinguished by its use of human-in-the-loop cognitive testing to allow rapid retailoring of information activity, and will give military personnel entirely new capabilities to understand and influence the information environment.

Violent non-state movements such as ISIL, al Qaeda, and others leverage cultural expertise and exquisite locally-grounded historical knowledge to form narratives and tell stories which exploit innocent bystanders and cultivate permissive operating environments in which to thrive; the same goes for state actors, such as Russia. Adversary information operations can be effective at convincing their sometimes innocent targets to look the other way—or even actively support—terrorist tactics and strategies by providing people, money, moral and materiel support, or can be used to achieve strategic objectives such as undermining cultural conditions enabling democracies to thrive.

Detecting these ideologically-driven information operations is an important capability; the United States and its allies cannot respond to what we do not sense. More important, being able to formulate a holistic strategy for undercutting the efficacy of these operations is a critical part of a counter-terrorism and counter-radicalization strategy. This will involve developing tools and technologies to formulate and forecast the effect of counter-narratives, supporting information, and larger environmental factors on the future abilities of our adversaries. This could involve leverage existing technologies, and tools which could be built relatively quickly, to equip the US with a comprehensive "counter-radicalization toolkit" to contest adversary information influence. This suite would allow the US to detect, analyze, and understand adversary information operations, and provide "human-in-the-loop" tools to assist in developing counter-narratives to influence the behavior of the audience in ways which will prevent them from being exploited by malignant violent non-state actors. Measures of performance and effectiveness will provide feedback to allow rapid calibration of a comprehensive counter-radicalization information campaign.

The proposed system accomplishes this by automating the analysis of multiple forms of media (broadcast, social, etc.), detecting emerging themes which enable violence to take root. Narrative templates connect the automated analysis of content with facts about local circumstance to build models which forecast future population and group-level behavior in light of the information being received and the surrounding environment. These drive a campaign planning tool, which allows the US and allies to shape the political and economic environment to minimize the chances of radicalization, and to build effective counter-narratives and alternate schema which trusted voices in the local community can use to change the information environment. Uniquely, the tool suite is connected to behavioral, psychological and physiological monitoring systems which allow rapid tailoring and pilot-testing of narratives in light of the expected audience, to boost the chance they will be heard and considered. This enables the US and its allies to speak truth to the power that violent non-state movements sometimes hold over innocent populations.

Technologies are available which are relatively mature which can contribute to this process, such as the Integrated Crisis Early Warning System (ICEWS)[71] and the Human Systems Cognitively-Aided Design and related cognitive engineering processes, which can be leveraged to build this comprehensive counter-radicalization suite. Some technologies used in the construction of the system are exploratory, but with modest investment could be turned into operationally useful tools which the military—ranging from strategic planners to combatant commanders, to specialists in information support operations—can use to comprehensively defeat groups such as ISIL. This could take place quickly, allowing the technologies to be refined to give the US new capability to operate in the information and narrative domain by 2020.

Operational Opportunity

The Final Report of the 9/11 Commission spent a fair amount of time identifying and discussing the ideology of al Qaeda and made strong recommendations to engage in the "struggle of ideas." Since that report, successive national strategy documents on counter-terrorism (CT) have arguably weakened the linkages between CT efforts and ideology and have focused primarily on kinetic actions. Further, the 9/11 Commission's report was very explicit about the nature and the definition of the ideology behind some violent non-state actors. Given that the process of radicalization has an information component, being able to understand and act within your adversary's information observe-orient-decide-act ("OODA") loop is a requirement for a comprehensive counter-radicalization strategy. Put differently, a grand counter-terrorism strategy would benefit from a comprehensive consideration of the stories terrorists tell; understanding the narratives which influence the genesis, growth, maturation and transformation of terrorist organizations will enable us to better fashion a strategy for undermining the efficacy of those narratives so as to deter, disrupt and defeat terrorist groups. More, recent developments in near-peer information operation awareness highlight how state actors leverage narrative formation and disruption to influence internal events elsewhere, as in the case of Russian interference in the NATO member nation and US political domains.

Such a "counter-narrative strategy" will have multiple components with layered asynchronous effects; while effective counter-stories will be difficult to coordinate and will involve multiple agents of action, their formulation is a necessary part of any comprehensive counter-terrorism effort. *Indeed, a failure on our part to come to grips with the narrative dimensions of the war on terrorism is a weakness already exploited by groups such as al Qaeda and ISIL; we can fully expect any adaptive adversary to act quickly to fill story gaps and exploit weaknesses in our narrative so as to ensure continued survival.* More than giving us another tool with which to confront terrorism, though, narrative considerations also allow us to better deal more generally with the emerging security threat of violent non-state actors and armed groups.

Why think that storytelling has anything to do with terrorism and counter-terrorism? Consider the psychological aspects of terrorism: there are multiple reasons why people choose to form or join organizations which use indiscriminant violence as a tactic to achieve their political objectives, all of them dealing at some point with *human psychology*. People feel alienated from their surroundings; they are denied political opportunity by the state; the state fails to provide basic necessities; they identify with those who advocate the use of violence; they are angered by excessive state force against political opponents; their essential needs are not being met; they feel deprived relative to peer groups elsewhere; and so on. These have all been offered as "root causes" of contentious politics

[71] For information on this system, see the ICEWS website at www.icews.com.

in general, and terrorism in particular. Our purpose here is not to defend any particular position about root causes (indeed, some of those previously listed have been discredited as theories of terrorism), but instead merely to point out that all these causes have a proximate psychological mechanism—they exert influence by affecting the human mind/brain. If stories are part and parcel of human cognition, we would also then expect consequently that stories might affect how these causes play out to germinate, grow and sustain terrorism and radicalization (Casebeer & Russell, 2005).

Operators need to be able to detect and analyze stories in progress, forecast their effects, formulate and enact alternate stories in a human-in-the-loop fashion, and assess the behavioral impact of their counter-narrative strategy. Our adversaries do this presently owing to their closeness to the cultures in which they operate; cultivating our own capability to do so will allow us to systematically disrupt their operations and leverage the softer elements of national power to prevent the exploitation of vulnerable populations.

Enabling Technologies

The technologies required to build this suite include the ability to sense, analyze and understand narrative information operations in multiple media, the ability to refine models forecasting group and population behavior in light of detected narratives quickly and with sensitivity to audience variability using cognitive and physiologic measures, and the ability to assess the behavioral impact of information operations.

Developments in existing technology suites—discussed below—and recent developments in the cognitive science of narrative and storytelling, serve as the backbone for this proposed system. It builds off well-established technologies (such as ICEWS) but incorporates novel physiologic and neurobiological sensors so as to provide a unique in the world human-in-the-narrative-loop counter-radicalization information operations test bed.

Proposed System

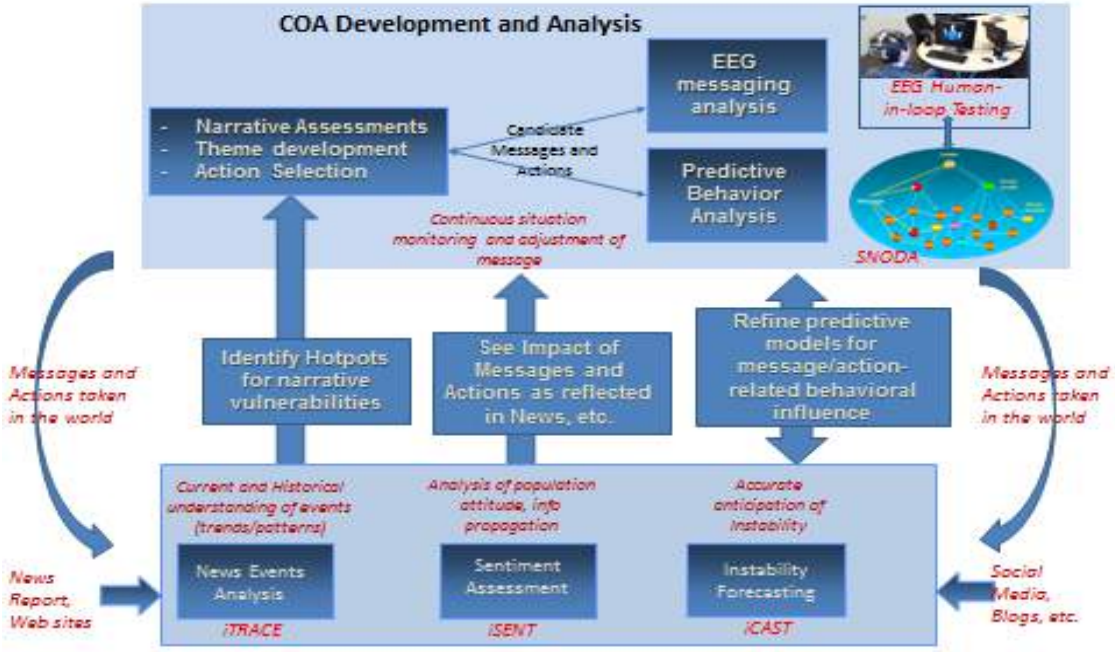

Figure 22. The Narrative Information System

The proposed system integrates a two-pronged approach to analyzing information operations and their impact. The first chart details some of the existing and near-future technologies required to *detect* narrative information activity (using ICEWS Trending, Recognition and Assessment of Current Events or "iTRACE," a tool allowing you to detect event patterns in multiple media types), *predict* the impact the messaging might have on sentiment and behavior (the Social Network Opinion Dynamics and Analysis or "SNODA" tool, and the ICEWS Forecasting or "iCAST tool), and *evaluate* the actual impact on sentiment and behavior (using the ICEWS sentiment analysis or "iSENT" tool)(Malinchik, 2010). Other systems could be used as well. This capability can then be connected to course of action development and analysis via the ICEWS environment in conjunction with electroencephalogram (EEG) signals—patterns of brain-generated electrical activity sensed on the top of the head—and other cognitive variables to quickly assay the impact of a revised narrative. This allows us to improve models of audience behavior in light of the change to the message or to the environment in which it is delivered. Figure 22 captures the information-related dimensions of the proposed system. Figure 23 captures the human-in-the-loop message prototyping dimensions.

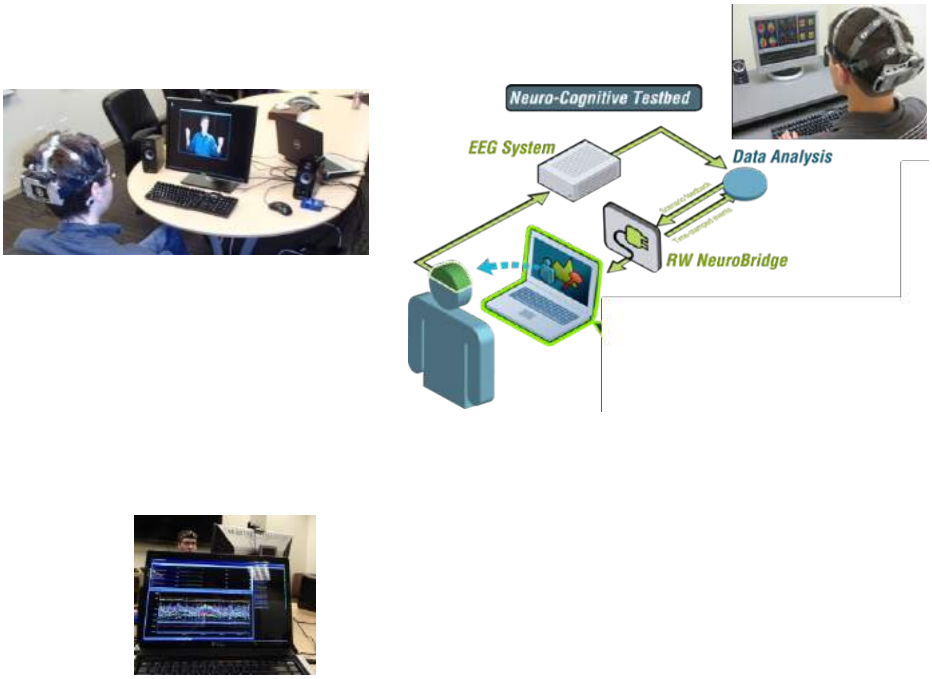

Figure 23. Expanding the "EEG (Electro-Encephalogram) Human-in-Loop Testing" Block—A Prototype Narrative Influence and Message Analysis Test Bed

System Capabilities

The system operates by combining the best computer science algorithms for parsing structured and semi-structured text from open sources to extract events and sentiment with models which forecast behavioral impact, and leverages work done by my lab and others in this area. These models are constantly improved by having representatives of the population one hopes to reach look at prototype messages in a closed-loop monitoring situation where their psychological and physiological reactions serve as proxies for attention, engagement, arousal, empathy for characters, narrative transportation and immersion, and ultimately expected behavioral influence. Capabilities are discussed in more detail in the following section.

The technology suite would have the following general capabilities to:

1. monitor and analyze multiple media types in real time,
2. combine that analysis with other types of event data,
3. automate extraction and analysis of narratives to allow sentiment forecasting,
4. connect narrative analysis to social network analysis of populations and group,
5. pilot test proposed information operations and counter-narratives with a human-in-the-loop, using the latest cognitive science and physiology,
6. allow effective detection, analysis, forecasting, planning and execution of information operations.

Significance of Capabilities to Operational Opportunity

These capabilities enable military strategic planners, combatant commanders, military information support operations personnel, and others to understand the narrative dimensions of the information environment they will operate in and provide planning guidance necessary to allow rapid adjustment of messaging activity, improved mid-to-long-term adjustment of the environment of action via economic and political development, and an ability to understand the second and third-order effects of operations and adversary radicalizing narratives on the military operations environment (even in those rare cases when no particular information action can be taken).

In the military information support operations environment, this tool suite can provide capability that cuts across all aspects of the traditional operational cycle: planning; target audience analysis; series development; product development and design; approval; production, distribution, and dissemination; and measures of effectiveness. Traditional tools related to counter-messaging can be brought to bear but in an environment, which allows rapid retailoring of them to maximize their effectiveness.

Enabling Technology

Enabling technologies leveraged here include EEG devices and collection platforms used by companies such as Intific and others (such as my lab), and from scientific developments stemming from work accomplished by the City College of New York (the Parra lab) (Dmochowski, et al., 2014), the University of Southern California (Damasio lab)(Araujo, Kaplan, & Damasio, 2013), the Massachusetts Institute of Technology (Saxe lab) (Cikara, Bruneau, Van Bavel, & Saxe, 2014; Bruneau, Dufour, & Saxe, 2013), and others. This work has confirmed and extended relationships between story structure and content and detectable neural signals linked to behavior change. For example, principal components from the EEG signal correlate closely to viewer attention to a media stimulus and also predict whether the viewer will send a tweet about it (Dmochowski, et al, 2014). These existing models are primarily at the proof of concept level. However, as advances in technology and the sciences are used to improve the models, enabling the responses to messaging and actions to interact within a population will likely produce a more reliable result than models that produce these responses independently. See Figure 24 for a summary of inputs and outputs for the model.

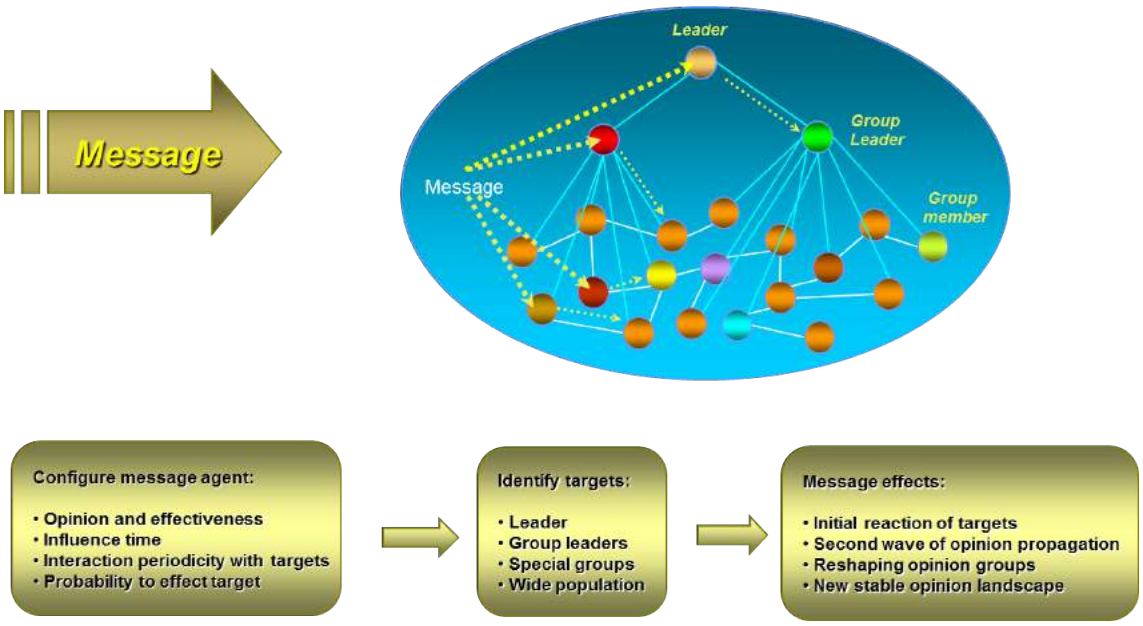

Figure 24. Analyzing Messages in Social Network Influence Context

In addition, the target audience will respond not only to messaging, but also to the actions that are taken by our military in the areas where the messaging is taking place. It will be important to make sure that the messages and actions together tell a coherent story. Understanding of how the target audiences responds to the messages and actions together can be analyzed in a "behavior-predictive agent-based model" that includes agent-based models of individuals and groups that are based on knowledge of their decision-making strategies designed and validated from inputs from the news, social media, social scientists, psychologists, and neuroscientists. The agent-based models can be combined in the Lockheed Martin Advanced Technology Laboratories (LM ATL) model interaction "backplane," allowing the agents to interact with models that represent their environment, such as whether they have electricity, food, access to water, etc., and the messaging models. The Social Network Opinion Dynamics & Analysis (SNODA) will analyze opinion propagation and stabilization in response to external influence campaigns or actions of the military. SNODA represents the network of influence relationships in a society and the opinions of individual members. Connections in the network encode the propensity for individual opinion shifts based on influences affecting each individual (Malinchik & Rosenbluth, 2011). These existing models are primarily at the proof of concept level. However, as advances in technology and the sciences are used to improve the models, enabling the responses to messaging and actions to interact within a population will likely produce a more reliable result than models that produce these responses independently.

The events which feed into narrative templates and drive SNODA and iCAST predictive analyses come from iTRACE—it extracts event type, participants and intensity, locations, and times from unstructured open news sources. It provides a graphic display of events, trends, and patterns with drill-down to underlying news stories. Event coding of news stories using Raytheon BBN's SERIF product as the primary event coder is one of the core technologies at the heart of the iTRACE capability. The stories come from English, Spanish, and Portuguese language sources. To date, over 30 million news stories processed and 20 million events have been extracted going back 20 years. This includes Factiva-aggregated news stories from over 6000 sources, plus Open Source Center feeds. The coder extracts events of the form of a "tuple" of (1) source actor, (2) event, and (3) target

actor, using established taxonomies and at a high ~80% accuracy. Once the events are coded the LM ATL geocoder, Lautenspot, is used to identify the location of the events. Most events can be correctly located to the country level, while some can be located at the province or even the city level. Each event is also assigned a hostility level between -10 and 10 based on the Goldstein scale where a 10 represents a cooperative event or cessation of hostilities and a -10 represents a very hostile (i.e. violent) event. These events and the Goldstein scores are used as source data by the SNODA and iCAST forecasting tool.

Maturity

A variety of technologies are brought together into this comprehensive suite. Depending on which piece of technology is under consideration, some capability exists that is already operationally fielded (for example, in the primary ICEWS system)(O'Brien, 2012). Other capabilities—such as relationships between certain aspects of human physiology and likely narrative influence on behavior—are emerging findings from the basic sciences which are ripe to be incorporated into the technology suite. Pieces that are relatively immature, such as agent-based models linking narrative structure and content to expected propagation, can be matured relatively quickly.

The principal barriers to making the system usable are doctrinal and only secondarily technological. For instance, it is entirely possible to detect and analyze a story spreading in a particular form of social media, to model its likely effect on behavior, and then to propose and propagate an alternate narrative that has been stress-tested in the human-in-the-loop test bed. However, whether the results of this process can be used quickly are contingent on ensuring that operational commanders have the requisite authorities to quickly act in the information space abroad. In some cases, approval chains for the release of information can slow this process and render the technology not as effective as would otherwise be the case.

There is an industrial base here (primarily in assessing the impact of entertainment, and in informing business operations), and some of the work in the cognitive science laboratories mentioned earlier has used more familiar polling methodologies from this industry to test posited relationships between EEG monitoring and behavior. LM ATL and some of its personnel have been involved in both government and commercial settings in the development and testing of these technologies.

Many of the practitioners in this domain have military and information operations experience; for example, the author of this white paper is a former military officer with familiarity with the military planning process and who has worked with the military information support operations community in the information technology domain on previous projects, and LM ATL has experience in transitioning prototypes into operational use (as has already occurred with ICEWS).

Recommendations for Development

This system could emerge from prototype component development and integration to become fully operational with appropriate investments in (1) the narrative templates which will link sensed events to estimations of the impact of a particular narrative on a population, (2) the agent-based models which could undergird forecasting of narrative influence, and (3) continued investigation of and integration into the full system of neurobiological and physiological behavioral impact measures. The technologies will need to be tested in a controlled environment beginning with a demonstration, and then validated in an operational environment. This process will take several years, but the combined technology readiness level of the technologies—and the gaps that will need to be filled to

develop an operational prototype—means that the right investment could assist in transitioning the technology from prototype to fielded system with demonstrated capability quickly.

Methods for Employing the Technology

The system could be fielded operationally for use in the military decision-making process, with forward-deployed components as well as reach-back to domestic piloting sites. It can support training exercises aimed at the military decision-making process, assisting staff development at training facilities such as those operated by the J-7 at Suffolk, VA, where social media analysis and operations are already tested, but not in a persistent fashion. It can be used at the strategic and operational levels by combatant commander staffs seeking quick intelligence preparation of the environment and rapid turns on the expected information effects of military operations, and by units such as Strategic Command's headquarters (charged with developing and deploying deterrence and influence frameworks). Most easily, it could quickly be integrated into all the existing processes used by groups such as the US Army's Military Information Support Operations Command at Fort Bragg, or the US Marine Corp's Information Operations Center at Quantico, who are already building and deploying information campaigns in support of US and coalition operations. The technology could also be usefully deployed to multinational coalition environments, such as the NATO Cyber Defense Centre of Excellence in Tallinn, Estonia.

The suite could also be deployed in other research environments, such as social media laboratories operated by the military at the Naval Postgraduate School, or even by national labs investigating influence and social media, such as Sandia National Laboratories. It would thus serve as a technical driver in supporting the larger whole-of-government exploration of deterrence, influence, and information force projection.

Like almost all technologies, there are conversations to be had about ethical, legal, and social issues. Existing legal and statutory authorities suffice for the system to be deployed in the environments just mentioned. To be used most effectively and in an agile fashion, information operation decisions will need to be pushed to the lowest levels possible, however. In general, there is a well-developed framework supporting the synchronization of traditional military operations and the information dimension (as in our core joint doctrine). Multiple analysts have already discussed the need for the US military to continue investment in technologies which allow it to prevent violent non-state actor exploitation of the vulnerable (e.g. Casebeer, 2014). The system does not need to be secret to be effective—the scientific findings that it relies on apply even when individuals understand that information influences their behavior. The development of the suite may even act as a deterrent to groups such as ISIL or the Russian Internet Research Agency who at present arguably think they have information dominance and can operate with impunity in the narrative sphere.

Equipping the US military and its allies with the technology required to engage and defeat ISIL and other violent non-state actors is challenging. The types of technologies discussed in the Technology Suite to Detect and Defeat Radicalization would provide us with an important tool that can be used to deter, disrupt and defeat our adversaries in the narrative and information spaces where they currently operate to radicalize individuals and cultivate permissive operating environments. It can be an important enabler for a comprehensive and effective counter-terrorism and counter-radicalization strategy and an important cultural stabilizer for democracies concerned to disrupt and deter attempts by other nation states to skew democratic deliberation and internal political events. Twenty-first century security challenges demand sophisticated and subtle approaches of the kind enabled by this technology. Its effective use in phase zero, one and two of conflict can save lives,

prevent the need for costly kinetic operations, and work in synergy with the use of force when its application becomes a necessity (see multiple chapters of Thomas, Kiser, & Casebeer, 2005).

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Acronyms

American Association of Public Opinion Research (AAPOR)

adaptive planning and execution (APEX)

Artificial Intelligence (AI)

Augmented Reality (AR)

Cognitive Aspects of Military Operations (CAMO)

counter-terrorism (CT)

diplomatic, informational, military and economic (DIME)

electroencephalography (EEG)

functional magnetic resonance imaging (fMRI)

future operating environment (FOE)

galvanic skin response (GSR)

high-value target (HVT)

high-payoff target (HPT)

Horn of Africa (HOA)

Human Terrain Teams (HTT)

Indications & Warning (I&W)

information and communication technologies (ICTs)

information environment (IE)

information operations (IO)

Integrated Crisis Early Warning System (ICEWS)

internet protocol (IP)

International Communication & Negotiation Simulations Project (ICONs)

International Fund for Agricultural Development (IFAD)

Intergovernmental Organizations (IGOs)

Internet of People (IoP)

Internet of Things (IoT)

Joint Capability Areas (JCAs)

Joint Concept for Human Aspects of Military Operations (JCHAMO)

Joint Concept for Operating in the Information Environment (JCOIE)

Joint Functional Concepts (JFC)

joint intelligence preparation of the environment (JIPOE)

joint, intergovernmental, and multinational (JIM)

joint planning process (JPP)

knowledge, attitudes, beliefs, intentions, and behaviors (KABIB)

measures of effectiveness (MOE)

Middle East and North Africa (MENA)

military deception (MILDEC)

military information support operations (MISO)

Narcissistic Personality Inventory (NPI)

Next Generation Social Science (NGS2)

North Atlantic Treaty Organization (NATO)

Office of Security Cooperation - Iraq (OSC-I)

observe-orient-decide-act (OODA) loop

operational environment (OE)

Psychological Operations (PSYOP)

Psychological Operations Objectives (POs)

publicly available information (PAI)

radio-frequency identification (RFID)

robotics and autonomous systems (RAS)

Social Network Opinion Dynamics & Analysis (SNODA)

Socio-Cultural Research and Advisory Teams (SCRATs)

Strategic Multilayer Assessment (SMA)

Supporting PSYOP Objectives (SPOs)

Target Audiences (TAs)

Thematic Apperception Test (TAT)

unexploded ordnance (UXOs)

unmanned aerial vehicles (UAVs)

U.S. Air Forces Office of Scientific Research (AFOSR)

US Special Operations Command - Central theater (USSOCCENT)

Violent Extremist Organizations (VEOs)

virtual reality (VR)

Author Biographies

Brigadier General Alexus G. Grynkewich

Brigadier General Alexus G. Grynkewich is the Deputy Director, Global Operations (J39). He serves as the Joint Staff focal point for cyber and electronic warfare operations, information operations, special technical operations, and sensitive DOD support to government agencies.

Gen. Grynkewich received his commission in 1993 after graduating from the US Air Force Academy. He has served as an instructor pilot, weapons officer, and operational test pilot in the F-16 Fighting Falcon and F-22 Raptor. Gen. Grynkewich has commanded at the squadron and wing levels, and his staff assignments include duty at Air Combat Command, US European Command, and the Headquarters Air Force. Gen. Grynkewich is a command pilot with more than 2,300 hours in the F-16 and F-22.

Education
1993 Bachelor of Science in Military History, U.S. Air Force Academy, Colorado
1994 Master of Arts in History, University of Georgia
1997 Squadron Officer School, Maxwell AFB, Alabama
2003 Air Command and Staff College, by correspondence
2006 Master of Arts in Homeland Security, Naval Postgraduate School
2006 Air War College, by correspondence
2010 Master of Science in Joint Campaign Planning & Strategy, Joint Advanced Warfighting School
2012 Leadership Enhancement Program, Center for Creative Leadership, Greensboro, NC
2013 Executive Space Operations Course, Nellis AFB, Nevada
2014 Capitol Hill Workshop, Alan L. Freed Associates, Washington, D.C.
2014 Enterprise Leadership Program, Kenan-Flagler Business School, University of North Carolina

Assignments
1. June 1993 – August 1994, Student, Air Force Institute of Technology Civilian Institutions Program, University of Georgia, Athens, Ga.
2. September 1994 – September 1995, Student, Undergraduate Pilot Training, Vance AFB, Okla.
3. October 1995 – August 1996, Student, F-16C Replacement Training Unit, 63d Fighter Squadron, Luke AFB, Ariz.
4. September 1996 – July 1999, F-16 Pilot, Chief of Training, 18th Fighter Squadron, Eielson AFB, Alaska
5. August 1999 – December 2001, F-16 Instructor Pilot, Flight Examiner, and Flight Commander, 421st Fighter Squadron, Hill AFB, Utah
6. January 2002 – January 2003, F-16C Instructor Pilot and Chief of Weapons, 80th Fighter Squadron, Kunsan AB, Republic of Korea
7. February 2003 – August 2005, F-16C and F-22A Operation Test and Evaluation Instructor Pilot, 422d Test and Evaluation Squadron; Chief, F-22A Standardization and Evaluation, 53d Test and Evaluation Group; Director of Operations, 59th Test and Evaluation Squadron, Nellis AFB, Nev.
8. September 2005 – December 2006, Student, Naval Postgraduate School, Monterey, Calif.
9. January 2007 – December 2007, Chief, Interoperability Branch, 5th Generation Fighter Division; Executive Officer, Directorate of Requirements (A8), Headquarters Air Combat Command, Langley AFB, Va.

10. January 2008 – June 2009, Commander, 49th Operations Support Squadron, Holloman AFB, N.M.
11. July 2009 – June 2010, Student, Joint Advanced Warfighting School, Norfolk, Va.
12. July 2010 – May 2012, Joint Operational Planner, Chief, Crisis Response Branch, and Chief, Plans Division (J35), Headquarters US European Command, Stuttgart, Germany
13. June 2012 – May 2013, Vice Commander, 57th Wing, Nellis AFB, Nev.
14. May 2013 – June 2015, Commander, 53d Wing, Eglin AFB, Fla.
15. June 2015 – June 2016, Chief, Strategic Planning Integration Division, Deputy Chief of Staff for Plans and Requirements (A5/8), Headquarters Air Force, Pentagon, Washington, D.C.
16. June 2016 – June 2017, Deputy Director for Operations, Operations Team Three, J3, The Joint Staff, Pentagon, Washington, D.C.
17. June 2017 – present, Deputy Director, Global Operations (J39), J3, The Joint Staff, Pentagon, Washington, D.C.

Summary of Joint Assignments
1. July 2010 – May 2012, Joint Operational Planner, Chief, Crisis Response Branch, and Chief, Plans Division (J35), Headquarters US European Command, Stuttgart, Germany, as a lieutenant colonel and colonel.
2. June 2016 – June 2017, Deputy Director for Operations, Operations Team Three, J3, The Joint Staff, Pentagon, Washington, D.C., as a brigadier general.
3. June 2017 – present, Deputy Director, Global Operations (J39), J3, The Joint Staff, Pentagon, Washington, D.C., as a brigadier general.

Flight Information
Rating: Command Pilot
Flight hours: More than 2,300
Primary aircraft flown: F-16C, F-22A
Other aircraft flown: B-1B, B-2, B-52, C-17A, E-9A, F-15D, F-15E, HH-60G, MC-12, MQ-1, MQ-9, QF-4, T-38A, U-2

Major Awards and Decorations
Defense Superior Service Medal
Legion of Merit with one oak leaf cluster
Meritorious Service Medal with five oak leaf clusters
Air Medal
Aerial Achievement Medal with four oak leaf clusters
Joint Service Commendation Medal with oak leaf cluster
Air Force Commendation Medal
Joint Service Achievement Medal
Air Force Outstanding Unit Award with Valor device and oak leaf cluster
Combat Readiness Medal with oak leaf cluster
National Defense Service Medal with bronze star
Armed Forces Expeditionary Service Medal
Global War on Terrorism Service Medal
Korean Defense Service Medal
Nuclear Deterrence Operations Service Medal

Effective Dates of Promotion

Second Lieutenant	June 2, 1993
First Lieutenant	June 2, 1995
Captain	June 2, 1997
Major	August 1, 2003
Lieutenant Colonel	September 1, 2007
Colonel	September 1, 2011
Brigadier General	May 24, 2017

Clara Braun

Clara Braun is a graduate student at the University of Nebraska at Omaha (UNO), and is pursuing her M.A. in the School of Criminology and Criminal Justice. She works as a graduate assistant in the Center for Collaboration Science at UNO, which is devoted to facilitating innovative cooperation across multiple majors. Her primary research interests include leadership development within violent ideological groups, radicalization and mobilization pathways, homegrown violent extremism, and the politicization of Islam.

Dr. William Casebeer

WILLIAM D. CASEBEER, PhD (USAF LtCol, Ret.), SENIOR MANAGER, HUMAN SYSTEMS AND AUTONOMY, LOcKHEED MARTIN ATL: Bill is the Senior Research Area Manager in Human Systems and Autonomy for Lockheed Martin Advanced Technology Laboratories. He has a decade of experience in program management and leading teams of scientists and engineers in multiple settings.

Before ATL, Bill was a DARPA PM in the Defense Sciences Office and the Biological Technologies Office, where he started the Narrative Networks and Low-Cost EEG programs, and led the Accelerated Learning, Education Dominance, Strategic Social Interaction Modules, Young Faculty Award and other programs. His last command position was as Deputy Director of the Technology Advancement and Warfighter Training Department for the 500-person Joint Warfare Analysis Center (a DoD modeling and simulation unit), and he has multiple tours with deployed time as an intelligence officer. He has a joint PhD in Cognitive Science and Philosophy from UC-San Diego, MA in National Security Affairs from the Naval Postgraduate School, MA in Philosophy from the University of Arizona and a BS in Political Science from the USAF Academy. Publications include an *MIT Press* neural network and ethics book (here), a neuroethics article in *Nature Reviews Neuroscience* (here), and a book on violent non-state actors (here).

Patricia DeGennaro

Patricia (Tricia) DeGennaro is a Senior Geopolitical Risk Analyst for Threat Tec., LLC. She currently supports the US Army TRADOC G2/G27 as an analyst on ACE Futures and the Network Engagement Team. DeGennaro has lectured at West Point and New York University on International Security Policy and Civilian and Military Affairs. She was selected as a Subject Matter Expert (SME) on the Middle East, Iraq, and Afghanistan for various projects under the TRADOC G2, the commander of the Multi-National Forces in Iraq, commander of the Special Operations Command Central, and the US Department of Defense Strategic Multilayer Assessment program. In 2013, she was accepted into the US Department of State Franklin Fellows program where she served in USAID's Bureau for Democracy, Conflict, and Humanitarian Assistance - Office of Civilian and Military Cooperation (DCHA/CMC) as a Senior Policy Advisor to support the Office and an Agency-wide Civilian-Military Cooperation Steering Committee in an extensive revision to the Agency's Civilian-Military Cooperation Policy. DeGennaro capitalizes on over twenty years of experience as an academic, author and consultant in international security. Much of her work focuses on stabilization in the Middle East and surrounding region, countering violent extremism, and transitioning nations from war.

During her tenure, she has also consulted with the Asia Foundation, Director of National Intelligence Office, Department of Homeland Security, The Conference Board, World Bank, Senate Labor and Human Resources Committee chaired by Senator Edward M. Kennedy, and several organizations that support the Middle East Peace Process. She also spent four years in Albania as a Small and Medium Enterprise volunteer with the Peace Corps and, later, as a contractor with US Agency for International Development. Regionally, DeGennaro continues to focus on the Balkans, the Middle East and South Asia where she travels often.

DeGennaro has published several articles on US foreign policy and national security topics. Her focus is to encourage an integrated international policy that looks beyond war and the use of force. She is often an expert commentator for CNN, MSNBC, Al Jazeera, Fox News, BBC and various nationally and internationally syndicated radio programs.

DeGennaro holds an MBA in International Trade and Finance from George Washington University and an MPA in International Security and Conflict Resolution from Harvard University. She speaks fluent Albanian and has a basic knowledge of Italian, Arabic and Dari.

Dr. Diane DiEuliis

Dr. Diane DiEuliis is a Senior Research fellow at National Defense University. Her research areas focus on emerging biological technologies, biodefense, and preparedness for biothreats. Dr. DiEuliis also studies issues related to dual use research, disaster recovery research, and behavioral, cognitive, and social science as it relates to important aspects of deterrence and preparedness.

Prior to joining NDU, Dr. DiEuliis was the Deputy Director for Policy, (and served as Acting Deputy Assistant Secretary for Policy and Planning) in the Office of the Assistant Secretary for Preparedness and Response (ASPR), U.S. Department of Health and Human Services. While there, she coordinated policy in support of domestic and international health emergency preparedness and response activities, including implementation of the Pandemic All-Hazards Preparedness Act, the National Health Security Strategy, and the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE).

From to 2007 to 2011, Dr. DiEuliis was the Assistant Director for Life Sciences and Behavioral and Social Sciences in the Office of Science and Technology Policy (OSTP) in the Executive Office of the President. During her tenure at the White House, she was responsible for developing policy in areas such as biosecurity, synthetic biology, social and behavioral science, scientific collections, ethics, STEM education, and biotechnology. Dr. DiEuliis also worked to help coordinate agency response to public health issues such as the H1N1 flu.

Prior to working at OSTP, Dr. DiEuliis was a program director at the National Institutes of Health (NIH), where she managed a diverse portfolio of neuroscience research in neurodegenerative diseases. She completed a fellowship at the University of Pennsylvania in the Center for Neurodegenerative Disease Research, and completed her postdoctoral research in the NIH Intramural research program, where she focused on caellular and molecular neuroscience.

Dr. DiEuliis has a Ph.D. in biology from the University of Delaware, in Newark, Delaware.

Areas of Expertise: Biodefense; Biosecurity; Deterrence (Neuroscience & Neurobiology); Emergency Management; Ethics & Leadership (Life Sciences/Human Subjects); WMD Preparedness/Response

Dr. Linda Durnell

Dr. Durnell teaches at Fielding Graduate University the Psychology of Technology, Consumer Neuroscience and the Foundations of Media Psychology. Her current research is on The Emotional Reactions of Viewing a Crisis in Virtual Reality (VR). Durnell recently presented her research at Stanford's 3rd Annual Innovations in Psychiatry and Behavioral Health: Virtual Reality and Behavior Change, sponsored by Stanford University School of Medicine. Durnell has participated in the U.S. Army Special Operations Command (USASOC) and Department of Homeland Security (DHS) simulation, which was coordinated by the Strategic Multi-Layer Assessment (SMA) office in the Joint Staff, to assess options in the cognitive space to disrupt and counter ISIL operational capabilities and train the Psychological Operations (PO) operators and remains active in the Joint Concept for Operating in the Information Environment (JCOIE). With her background working at IBM, Xerox and Apple Computer, Durnell is a frequent presenter at technology conferences such as Augmented World Expo (AWE) and Digital Hollywood, and is presenting at the American Psychological Association (APA) convention in 2018. Durnell brings research and resources to industry-defining technology used to influence behavior, performance, and perception.

Dr. David C. Ellis

Dr. David C. Ellis is a Resident Senior Fellow at the Joint Special Operations University. He holds a doctorate in International Relations and Comparative Politics from the University of Florida ('05), a Master's degree in International Development with a specialization in International Marketing from The George Washington University ('97), and Bachelor's degrees in International Studies and Spanish from Jacksonville University ('95).

Dr. Ellis's research on democratization and development in identity conflict spans over two decades. His interests in peacekeeping, conflict resolution, development, and atrocity in ethnic conflict focused his doctoral research on identity, social movements, organization and social learning theory, and economic growth theory. Dr. Ellis served as an All Source Intelligence analyst in USSOCOM's J2 JICSOC from 2009-2013 and established its Socio-Cultural Awareness (SCA) Section. His research interests at JSOU focus on the opportunities for USSOCOM to become a learning organization through Design Thinking applications and more robust Socio-Cultural Analysis for intelligence, planning, and operations.

Dan Foy

Mr. Dan Foy is a Senior Consultant at Gallup, specializing in program management, research and analysis for U.S. government clients. Since joining Gallup in 2008, Foy has developed and led multiple advanced analytic projects that stretched the boundaries of traditional methodologies by piloting new data collection techniques and combining novel inputs to address hard research questions. He has contributed to dozens of successful complex quantitative and qualitative studies worldwide, providing significant support to all phases of the research cycle – from study design through data collection, analysis and reporting. Projects in Foy's portfolio range from massive multiyear multitrack studies in active war zones consisting of tens of thousands of monthly face-to-face interviews and hundreds of focus groups, to the development of predictive and classificatory models combining open-source, proprietary and classified inputs, to in-depth investigations of foreign online media environments using digital ethnographic methods. Through these efforts, Foy has developed a broad mastery of global and country-specific issues involved in conducting international research, with particular experience in Afghanistan, Bangladesh, Egypt, Iran, Iraq, Lebanon, the Maldives, Nigeria, Pakistan, Saudi Arabia, and Yemen.

Dr. James Giordano

James Giordano PhD is Professor in the Departments of Neurology and Biochemistry, and Chief of the Neuroethics Studies Program of the Pellegrino Center for Clinical Bioethics at Georgetown University Medical Center, Washington, DC, USA; and is Executive Director of the Center for Policy for Emerging Technologies (C-PET), a Washington DC-based international think tank. Dr. Giordano is also Distinguished Visiting Professor of Brain Science, Health Promotions and Ethics at the Coburg University of Applied Sciences, Coburg, Germany.

Dr. Giordano has served as an appointed member of United States Department of Health and Human Services Secretary's Advisory Council on Human Research Protections (SACHRP); appointed member of the Neuroethics, Legal and Social Issues (NELSI) Advisory Panel of the Defense Advanced Research Projects' Agency (DARPA); as Senior Science Advisory Fellow of the Strategic Multilayer Assessment Branch of the Joint Staff of the Pentagon; and as Research Fellow and Task Leader for the Sub-Program on Dual Use Brain Science of the European Union Human Brain Project.

The author of over 275 publications in neuroscience and neuroethics, 7 books, and 15 international governmental whitepapers on neurotechnology, ethics and biosecurity, he is Editor-in-Chief of the international journal *Philosophy, Ethics and Humanities in Medicine*; and Associate Editor of the *Cambridge Quarterly of Health Care Ethics*.

His ongoing research addresses the neurobiological bases of moral cognition and decision-making; and neuroethical issues arising in and from the development, use and misuse of neuroscientific techniques and technologies in medicine, public life, and military applications. In recognition of his work, he was elected to membership in the European Academy of Science and Arts, the Dana Alliance for Brain Initiatives, and the Royal Society of Medicine (UK).

Dr. Margeret Hall

Dr. Margeret Hall is an Assistant Professor of IT Innovation and holds a Position of Excellence in Violent Extremist Discourse with the School of Interdisciplinary Informatics at the University of Nebraska Omaha. Before this, she was a Senior Researcher and head of the Strategic Initiative 'Participation and Crowd Services' at the Karlsruhe Service Research Institute (KSRI). Dr. Hall's research investigates the integration of digital systems and people, and the digital lifestyle. Her PhD concentrated on the measurement of health and quality of life for the creation of sentiment-based indicators for community management, specifically in the case of online communities. Prior to starting her PhD, she worked at the United Nations Office in Geneva and at the United Nations High Commissioner for Refugees in Audit and Legal Affairs, and at Bayer Business Services in Training and Process Management. She completed her Bachelors and Masters degrees in Policy studies in the United States, Lebanon, and Switzerland. You can find her at: http://www.unomaha.edu/college-of-information-science-and-technology/about/faculty-staff/magie-hall.php and https://www.linkedin.com/in/magie-hall-7b0b454.

Dr. Garry Hare

Dr. Hare is doctoral faculty at Fielding Graduate University's Media Psychology PhD Program and Director of the *Social Impact of Immersive Technology and Real Time Media* doctoral concentration. He focuses on the junction where cognitive science, information design and immersive technologies impact the visualization of complex data. He advises selected companies, foundations and public agencies on strategy and the creative use and impact of immersive media, mobile augmented reality and the disruptive impact of real time media on social problems. His current focus is on media strategy, innovation and design and the rapid prototyping of immersive solutions to complex problems, in part, through the US Army Special Operations Command (USASOC) and Department of Homeland Security (DHS) with coordination by the Strategic Multi-Layer Assessment (SMA) office in the Joint Staff, assessing options in the cognitive space to disrupt and counter ISIL operational capabilities and train the Psychological Operations (PO) operators. He continues to be active in the Joint Concept for Operating in the Information Environment (JCOIE).

Over two decades, Garry has founded and/or held senior management positions with companies creating rich media content and enabling technologies. These solutions usher in new forms of entertainment, mobile communications and social impact. He was President and CEO of Amiga, Inc., Executive Vice President of Into Networks with worldwide responsibility for Broadband Media, President and COO of OZ.com, the creators of Helsinki 2000 (the first virtual world) and the Intel virtual museum project Garry was founder and CEO of the award winning digital publisher, Fathom Pictures Inc., specializing in sports and education simulations. He was founding Managing Director and CEO of Philips Media Europe on behalf of Philips N.V. As head of this European digital publishing company he built management and creative teams to support the creation and distribution of digital products throughout Europe. He has created digital products and/or advised companies such as LucasFilm, the Griffin Group, Philips N.V., Ericsson, ABC Sports, the PGA, and Apple Computer, among many others, on new media content creation and strategy. Garry has held faculty positions at INCAE

(an international campus of The Harvard Business School and The Harvard Institute of International Development), The University of Washington Graduate School of Public Policy and The University of Southern California Graduate School of Public Administration. He began his career at the Walt Disney Company and holds a Ph.D. in the Applied Behavioral Sciences from the University of Southern California.

Garry is affiliated with The American Psychological Association, The Broadcast Educators Association, CTIA, The National Association of Broadcasters, The Earth Institute, The Surfrider Foundation, The World Affairs Council, The Commonwealth Club, The Environmental Forum and others. As a producer, his work has been acknowledged with the Cindy Award, 5 InVision Awards, the NEVI, CDIA and Paris Super Show awards as well as Best Consumer Product at Japan's Flower and Green.

He is a frequent speaker on Media Strategy, Innovation and Design focused on the Cognitive Impact of Real Time Data and Information.

Selected keynotes and panels: The Immersive Tech Summit, Digital Hollywood, the Conference on Immersive Education, Media Summit New York, the Augmented Reality Event, IMTech, The National Association of Broadcasters, the Broadcast Educators Association, MILIA, The Forbes New Economy Conference, The Conference on Disruptive Innovation, The American Film Institute, The Sedona Conference on Technology and Education, the Edinburgh Conference, Personal Technology Outlook, the World Affairs Council, the London Conference on Interactive Media, CES, MipComm, CTIA, The Advanced Center for Computer Studies, and The Screen Actors Guild. Multimedia Producer Magazine selected him as one of the World's Top 100 Producers.

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Mr. Robert C. Jones

Bobby Jones is a retired U.S. Army Special Forces Colonel; a former Deputy District Attorney; and the senior strategist at U.S. Special Operations Command. Currently serving as a member of the SOCOM J5 Donovan Group, Mr. Jones is responsible for leading innovative thinking on the strategic environment and how it impacts factors critical to national security, such as the character of conflict, deterrence and societal stability. He also serves as the strategic Advisor to the Director of Plans, Policy and Strategy.

Mr. Jones's principle focus is on all aspects of political conflict, and how such conflicts are affected by our rapidly evolving strategic environment. He enjoys his role as a featured lecturer in the Joint Special Operations University's Enlisted Academy, focusing on the strategic environment, the nature of insurgency and terrorism, and the evolving character of conflicts currently challenging the force.

He has been a featured speaker at an Oxford University Changing Character of Warfare conference on Fragile States; a Harvard extension course on Irregular warfare; and also co-created and taught a pop-up course at the Stanford Design School in partnership with the Stanford Peace Innovation Lab on the role of trust in stable societies. Mr. Jones is a Fellow with the Center for Advanced Defense Studies; and a strategic analysis consultant with DS-48.

"If war is the final argument of Kings, then revolution is the final vote of the people." RCJ

Dr. Gina Ligon

Dr. Gina Ligon is an Associate Professor of Management and Collaboration Science at the University of Nebraska at Omaha. She received her PhD in Industrial and Organizational Psychology with a Minor in Measurement and Statistics from the University of Oklahoma. Since arriving at UNO, she has been awarded over $3,000,000 in National Security-related grants and contracts. She is a member of the National Academy of Sciences, Engineering, and Medicine, and serves on the panel for behavioral sciences for the Office of the Director of National Intelligence. Ligon is the Principal Investigator on a grant from Department of Homeland Security (DHS) examining the leadership and performance of transnational Violent Extremist Organizations (VEOs), and she is the originator of the Leadership of the Extreme and Dangerous for Innovative Results (LEADIR) database.

Her research interests include profiling leaders from afar, violent ideological groups, expertise and leadership development, and collaboration management. Prior to joining UNO, she was a faculty member at Villanova University in the Department of Psychology. She also worked in St. Louis as a management consultant with the firm Psychological Associates. She has published over 50 peer-reviewed publications in the areas of leadership, innovation, and violent groups, and she is the editor to the academic journal *Dynamics of Asymmetric Conflict*.

Dr. Rafael Linera

Rafael E. Linera Rivera (or 'Rafa') was commissioned in 1997 as a Second Lieutenant in the Infantry Branch. Rafa has served several assignments both domestically and abroad, including South Korea, Iraq, Mexico, Ecuador, and Afghanistan. He has served as Cyberspace Electromagnetic Activities & Influence Operations Chief in multiple Army and Joint-Combined Commands. He holds a Ph.D. and M.A. in Psychology from the Fielding Graduate University Media Psychology Program, a M.A. in Finance from Webster University, and a B.B.A. in Accounting from the University of Puerto Rico.

Clark McCauley

Clark McCauley is Research Professor of Psychology at Bryn Mawr College. His research interests include stereotypes, group dynamics, and the psychological foundations of ethnic conflict and genocide. He is co-author of *Why Not Kill Them All? The Logic and Prevention of Mass Political Murder* (2006), co-author of *Friction: How Radicalization Happens to Them and Us* (2011, second edition 2017), and founding editor *emeritus* of the journal *Dynamics of Asymmetric Conflict: Pathways toward Terrorism and Genocide*. He is a lead investigator with the National Consortium for Study of Terrorism and Responses to Terrorism (START) for research supported by the U.S. Department of Homeland Security.

Tom McCauley

Tom McCauley is a PhD student in the Political Science Department at the University of Rochester. He has a BS in Physics from Pennsylvania State University, and worked for Lustick Consulting, a political science modeling and analysis firm. His interests are centered on mass politics with particular focus on the formation and manipulation of public opinion, an area that offers considerable opportunity to combine quantitative analysis and social psychology theories with contemporary political concerns.

Dr. Ian McCulloh

Ian McCulloh holds joint appointments as a Parson's Fellow in the Bloomberg School of Public health, a Senior Lecturer in the Whiting School of Engineering and a senior scientist at the Applied Physics Lab, at Johns Hopkins University. His current research is focused on strategic influence in online networks. His most recent papers have been focused on the neuroscience of persuasion and measuring influence in online social media firestorms. He is the author of "Social Network Analysis with Applications" (Wiley: 2013), "Networks Over Time" (Oxford: forthcoming) and has published 48 peer-reviewed papers, primarily in the area of social network analysis. His current applied work is focused on educating soldiers and marines in advanced methods for open source research and data science leadership. He also works with various medical practitioners in the Baltimore area to improve the effectiveness of public health campaigns.

He retired as a Lieutenant Colonel from the US Army after 20 years of service in special operations and improvised explosive device forensics. He founded the West Point Network Science Center and created the Army's Advanced Network Analysis and Targeting (ANAT) program. In his most recent military assignments as a strategist, he led interdisciplinary teams of Ph.D. scientists at Special Operations Command Central (SOCCENT) and Central Command (CENTCOM) to conduct social science research in 15 countries across the Middle East and Central Asia to included denied areas, which he used to inform data-driven strategy for countering extremism and irregular warfare, as well as empirically assess the effectiveness of military operations.

He holds a Ph.D. and M.S from Carnegie Mellon University's School of Computer Science, an M.S. in Industrial Engineering, and M.S. in Applied Statistics from the Florida State University, and a B.S. in Industrial Engineering from the University of Washington. He is married with four children and a granddaughter.

Ms. Laurie McCulloh

Laurie McCulloh is the Chief Executive Officer of Arrow Analytics, LLC, a small Florida-based consulting firm specializing in education, data science, and neural marketing. Her projects focus on cognitive psychology, influence, and persuasion. Prior to Arrow, Laurie served as a high school English and Special Education teacher, specializing in outreach to disadvantaged children. She has taught in multiple states across the U.S. with experience ranging from public high schools to alternative, state-run, lock-up facilities. She holds a Bachelor's of Science in Special Education from Mansfield University. She holds a Master's of Science in Education from the State University of New York (SUNY) Potsdam. Her thesis focused on brain development from birth to age 3. She is currently a graduate student at Fielding University pursuing a graduate certificate in Media Psychology with Neuroscience Emphasis. She is married to a U.S. Army veteran with four children and a granddaughter.

Mr. Erinn McQuagge

Erinn McQuagge is a former Psychological Operations and infantry officer and currently works for Northrop Grumman. He spent several years total between Kosovo, Iraq, and Afghanistan on deployment. During this time, Erinn conducted multiple influence campaigns. He holds a master's degree in government.

Dr. Spencer B. Meredith III

Dr. Spencer B. Meredith III serves as an Associate Professor of National Security Strategy at the National Defense University, College of International Security Affairs. With two decades of research and work on post-communist countries, the Middle East, as well as broader expertise on governance and conflict resolution across multiple regions, his research bridges scholarly and practitioner communities as he advises Department of Defense, interagency, intelligence community, NATO, and joint special operations efforts.

With a doctorate from the University of Virginia in Government and Foreign Affairs, as well as a Fulbright Scholarship, he has a consistent record of original research and publishing. His first book, *Nuclear Energy Safety and International Cooperation: Closing the World's Most Dangerous Reactors* (2014) resulted from previous work with the Department of State and extensive interviews with key decision makers in the Departments of State, Energy, and Defense, as well as post-communist elites in Eastern European governments and nuclear industries. His articles have appeared in peer-reviewed journals ranging from *Communist Studies and Transition Politics*, *Peace and Conflict Studies*, *Central European Political Science Review*, and *Special Operations Journal*; as well as in professional publications including *Strategy Bridge, Small Wars Journal, Inter-Agency Journal*, *Special Warfare*, and *Foreign Policy Journal*.

Sophia Moskalenko

Sophia Moskalenko is an adjunct professor of psychology at the University of Pennsylvania. With Clark McCauley, she has co-authored research articles and books on radicalization, terrorism and martyrdom.

Randall Munch

Randall (Randy) Munch supports the TRADOC G-2 as an independent contractor, assisting the Network Engagement Team in developing training courses that operationalize recent doctrine and joint concepts related to network engagement, such as the Joint Concept (JC) for Human Aspects of Military Operations and the JC for Operating in the Information Environment. During 29 years of service in the Army as an Infantry officer and a Foreign Area Officer, he deployed with the 10th Mountain Division to Somalia and Haiti and with the Defense Threat Reduction Agency to Iraq. Following his military retirement in 2005, he worked with the Joint IED Defeat Organization and with TRADOC organizations to help operationalize and institutionalize the concepts of attack the network and network engagement, and he is now using that experience to help advance the concept of cognitive maneuver.

Mark Polyak

Mark Polyak is a Senior Vice President at Ipsos Public Affairs, North America, one of the largest public opinion and survey companies in the world. He is an internationally recognized SME in the use of big data analytics for rapid crisis assessment and decision support with over 15 years of experience supporting DoD and Multi-National NGOs in complex emergencies. His work focuses on providing self-service analytic solutions by utilizing data streams such as satellite imagery, social media and internet of things for crisis communications, reputation risk and strategic communication support. Mark has led projects in 27 countries of the world, including most recently leading rapid damage and needs assessments for World Bank, European Union and United Nations in Syria, Yemen, Iraq, Northern Nigeria, Somalia and Libya. This work resulted in development of effective crisis communications, disbursement of multi-billion dollar loans and development of strategic framework for engaging local actors in conflict and post-conflict environments.

Dr. Gregory Seese

Gregory Seese, Psy.D is a senior scientist at the Johns Hopkins University Applied Physics Laboratory in the Cyber Mission Operations Group, and a Lieutenant Colonel in the Army Reserve. He has over 20 years of military experience as a Psychological Operations (PSYOP) officer and has held positions in both the active and reserve components. Greg served as the PSYOP Division Chief in the United States Army Special Operations Command (USASOC), and prior to that was assigned to the Tribal Engagement Coordination Cell in the Office of Security Cooperation at the US Embassy in Baghdad, Iraq. Previous positions include the Director of Plans at the Joint Information Support Task Force in Qatar, a variety of assignments in the 6th Psychological Operations Battalion, the 1st Special Warfare Training Group, and combat tours in Iraq, Afghanistan, and Bosnia. Greg's research interests include attitude and behavior change, deception, and prediction modeling. He has published a variety of articles on strategic communications, Measures of Effectiveness (MOE) for behavior change programs, counter-propaganda methods and techniques, and non-lethal weapon systems.

Mr. Howard Simkin

Howard R. Simkin is a Senior Concept Developer in the DCS, G-9 Concepts, Experimentation and Analysis Directorate, U.S. Army Special Operations Command. He has over 40 years of combined military, law enforcement, defense contractor, and government experience. He is a retired Special Forces officer with a wide variety of special operations experience. Within the G9, he analyzes and defines the future operating environment and required capabilities Army Special Operations Forces (ARSOF) in support of future concepts development. His subject matter expertise includes analyzing and evaluating historical, current and emerging technology as well as Combined, Joint, Multi-Service, Army and ARSOF organizational initiatives, trends, and concepts to determine the implications for ARSOF units. Mr. Simkin holds a Masters of Administrative Science from the Johns Hopkins University and is a certified Project Management Professional.

Dr. Jason Spitaletta

Jason Spitaletta is a Major in the US Marine Corps Reserve and a psychologist with primary research experience in applied, experimental, political psychology and cognitive neuroscience as well as operational experience in Psychological Operations (PSYOP)/Military Information Support Operations (MISO) and intelligence assignments in the US Marine Corps as well as Joint and Special Operations communities. He has deployed to the Western Pacific, Iraq, and Uganda.

In civilian life, he is a researcher at The Johns Hopkins University-Applied Physics Laboratory as well as an adjunct faculty member at National Intelligence University. He holds a bachelors' degree in biochemistry from Franklin & Marshall College, a master's degree in human factors from Embry-Riddle Aeronautical University and a master's degree and Ph.D. in applied experimental psychology from The Catholic University of America. He also holds a graduate certificate from Stanford University's Summer Institute for Political Psychology.

Dr. Laura Steckman

Laura Steckman, PhD, is a social scientist at the MITRE Corporation. Her work operationalizes theories and methodologies from the social and behavioral sciences to address approaches and solutions to mission-specific problems sets worldwide. She has supported Information Operations (IO) and Military Information Support Operations (MISO) for U.S. Central Command, U. S. Pacific Command and various interagency efforts, and is the former Command Social Scientist for the Marine Corps Information Operations Center (MCIOC). Her current research examines the relationship between societies and emerging technologies, specifically in how the two shape each other and the impact that technology and electronic communications have on culture, language, and behavior.

Chris Stewart

Christopher Stewart is a partner at The Gallup Organization. Mr. Stewart provides strategic counsel in the area of marketing communications, advanced analysis and modeling, and population-based assessments. Additionally, he plays a senior leadership role as a strategic advisor for Gallup's 165 country public opinion tracking program - The Gallup World Poll.

Mr. Stewart previously served for 10 years as Regional Managing Partner of the Asia Pacific Division where he had responsibility for managing Gallup's seventeen offices in the Asia Pacific region. He remains a Director of Gallup in Singapore, Thailand, Australia, Malaysia, Hong Kong, and India, and as the General Director of Gallup Institute LLC, a Russian subsidiary of Gallup, Inc.

Mr. Stewart has consulted on management, marketing, and strategic communications strategy with many of the world's leading companies and North American, Asian and Middle Eastern Governments. With 25 years of experience in the Asia Pacific region, he is widely acknowledged as a leader in understanding population attitudes and behavior in East Asia, Southeast Asia, and South Asia.

Dr. Gwyneth Sutherlin

Dr. Gwyneth Sutherlin is the Director of Human Geography and Analytics Research at Geographic Services, Inc. She provides analytic expertise in socio-cultural dynamics, geospatial technology, cognitive linguistics, and emerging conflicts. She applies Human Geography research data collection and analysis, operational security, cyber security (software development), and geospatial intelligence (GEOINT). Her work draws from extensive field experience in conflict mediation and security risk analysis including projects for election monitoring in Afghanistan and Peru, training UK MOD on emerging conflicts, providing evaluation of South Sudan and Sudan conflict, and working with policy makers, academics, and parliamentarians on conflict mediation topics in Pakistan as a board member of the journal Peace, Conflict & Development.

Her publications in peer-reviewed information and technology journals seek to bridge social science and emerging technology. Topics have included human-computer interaction, an analysis of crowdsourcing data for decision-making in Haiti, Somalia, and the Arab Spring and an integration of cultural variables in open-source communication models supporting policy decisions in the ME. This work is informed by field experience, such as spending much of 2011 in North Africa training local pro-democracy groups how to leverage narratives in multiple languages. Her research is featured in textbooks and UN reports and her conference presentations range from the Africa Writes literature conference to GEOINT technology forums.

Currently, her research in human geography supports various government, military and NGO teams with analysis, including contributions the Strategic Multilayer Assessment group. Dr. Sutherlin has a degree in political science from Indiana University and a PhD in peace and conflict studies from the University of Bradford. She operates in seven foreign languages.

Colonel Scott K. Thomson

Colonel Scott K. Thomson is an Army Reserve Psychological Operations officer who recently completed a National Security Fellowship at Harvard University's John F. Kennedy School of Government, where he focused his research on the application of behavioral science to counter-insurgency and stability operations.

Prior to his fellowship, COL Thomson commanded of the 17th Psychological Operations Battalion in Austin, TX, from 2013-2015, where he provided Military Information Support Operations support primarily to Army South and the United States Southern Command. From 2011-2013, COL Thomson attended the U.S. Army Command and General Staff College and the School of Advanced Military Studies where he studied operational planning and leadership. From 2009-2011, he activated and commanded the 316th Psychological Operations Company at Grissom Air Reserve Base, IN. Activities included manning, equipping, and training the newly-established unit to conduct Military Information Support Operations. Prior to company command, COL Thomson served as the operations officer of the 16th Psychological Operations Battalion in Fort Sheridan, IL from 2007-2009. COL Thomson previously served in the regular Army as an Armor Officer in multiple armor and cavalry assignments, including duty in Germany and Iraq, and was enlisted as a Cavalry Scout for ten years prior to commissioning.

He holds a Masters of Arts in Communications Management from Webster University, and a Masters of Military Arts and Sciences in Operational Art from the Command and General Staff College. His academic interests include application of behavioral sciences such as complexity theory, systems thinking, social psychology, and behavioral economics to national security issues. He currently serves at the Pentagon, working in the Office of the Secretary of Defense focusing on policy issues related to the use of information and communication in national security. He is father to three children who reside in Texas.

Dr. Nicholas D. Wright

Dr. Nicholas Wright is a Senior Research Fellow at the University of Birmingham (UK). He applies insights from neuroscience and psychology to decision-making in international confrontations in ways practically applicable to policy. He has conducted work for the UK Government and Pentagon Joint Staff. He was previously an Associate in the Nuclear Policy Program, Carnegie Endowment for International Peace, Washington DC. Prior to joining Birmingham and Carnegie, he examined decision-making using functional brain imaging at University College London (UCL) and in the Department of Government at the London School of Economics. He worked clinically as a neurologist in Oxford and at the National Hospital for Neurology in London. He has published academically (e.g. Proceedings of the Royal Society), in general publications such as the Atlantic or National Interest, and with the Joint Staff at the Pentagon (see www.nicholasdwright.com/publications). He has briefed multiple times at the Pentagon, and also at the UK MoD, French MoD, German Foreign Office and elsewhere. He has appeared on the BBC and CNN.

Wright received a medical degree from UCL, a BSc in Health Policy from Imperial College London, has Membership of the Royal College of Physicians (UK), has an MSc in Neuroscience and a PhD in Neuroscience both from UCL.

Dr. Katie Ziemer

Dr. Katie Ziemer is an Associate Research Scientist at Ipsos Public Affairs, where she applies behavioral science principles to help agencies make evidence-based policy decisions. She has a PhD in clinical psychology and her research interests include attitude formation, behavior change, decision-making, and health promotion. She is trained in experimental, survey, and qualitative research and has applied data analytics to administrative records, surveys, and social media data. She has conducted research on many topics, including vaccination, prescription drugs, chronic pain, suicide prevention, patient satisfaction, health care improvement, and information sharing.

STRATEGIC MULTILAYER ANALYSIS TEAM

Dr. Hriar Cabayan

Dr. Hriar "Doc" Cabayan is currently in the Joint Staff/J-39, DDGO where he manages the Strategic Multilayer Assessment (SMA) Program. SMA provides planning support to Commands with complex operational imperatives requiring multi-agency, multi-disciplinary solutions. Solutions and participants are sought from across USG, academia, think tanks, and industry. SMA is accepted and synchronized by Joint Staff/J-39 and executed by ASD (R&E)/RFD. Prior to his current position he was with ASD (R&E)/RFD/RRTO (2007-2013). From 1997 to 2007, he was Special Technology and Science Advisor in the JS Directorate of Operations (J-3) where he provided technical and scientific assistance to the Combatant Commands in the areas of deliberate and crisis action planning. In 2007, Dr. Cabayan received a Joint Distinguished Civilian Service Award by the Chairman of the Joint Chiefs of Staff.

His current focus is on counter-terrorism, counter-WMD (State and non-State), Global & regional socio-cultural assessments, and Individual, state and national-level deterrence studies.

Dr. Cabayan received his doctorate degree from the University of Illinois in Urbana, Illinois. After graduating, he taught mathematical physics for four years at New York University's Courent Institute of Mathematical Sciences and McGill University. In 1977, he joined the Department of Energy's LLNL where he worked on nuclear weapons effects, Strategic Defense Initiative related efforts, and directed energy programs.

Ms. Mariah Yager

Ms. Mariah Yager serves as Deputy for the Strategic Multilayer Assessment (SMA) Program under the Joint Staff/J-39, DDGO. She is a Senior Research Analyst with NSI. From 2010 to 2017, Ms. Yager helped to develop a scientifically valid, replicable, and operationally trainable discourse analysis methodology. This methodology has been used to examine insurgent writings, the expression of trust and worldview, and cognitive complexity, both in the vernacular and English translations.

Ms. Yager received her Master's in Professional Communication from Purdue University of Fort Wayne and Bachelor degrees in Anthropology and Interpersonal and Group Communication, from Indiana University and Purdue University, Fort Wayne (IPFW) respectively. Ms. Yager has taught fundamental communication theory and public speaking at IPFW and previously worked in the private sector in client management and assessments for an executive coaching and consulting firm.