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The battlefield upon which the United States Military will fight is rapidly changing. It is possible to see that we are at a time in our history somewhat like the interwar period of the early 1900s. Innovation in society has implications for the environment in which the military will fight tomorrow. Currently, the most pervasive of these is the Electromagnetic Operating Environment (EMOE). This environment transgresses all of the physical domains and even penetrates the domains of Information and Cyber. Why is it then that the Joint Force is not scrambling to make every leader familiar with and capable of operating in the EMOE? I offer that it is one-part newness, one-part complexity, and all parts culture.

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TITLE:

LEVERAGING ORGANIZATIONAL CHANGE THEORY TO MAXIMIZE JOINT FORCE EFFECTIVENESS IN THE ELECTROMAGNETIC OPERATING ENVIRONMENT

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Using organizational change theory to maximize Joint Force effectiveness in the Electromagnetic Operating Environment

Author: Captain Bradley J. Young, United States Army

Thesis: Through leveraging Organizational Change Theory and applying Electromagnetic Spectrum Management Operations across the Joint Force, effectiveness can be maximized across domains in the Electromagnetic Operating Environment.

Discussion: The battlefield upon which the United States Military will fight is rapidly changing. It is possible to see that we are at a time in our history somewhat like the interwar period of the early 1900s. Innovation in society has implications for the environment in which the military will fight tomorrow. Currently, the most pervasive of these is the Electromagnetic Operating Environment (EMOE). This environment transgresses all of the physical domains and even penetrates the domains of Information and Cyber. Why is it then that the Joint Force is not scrambling to make every leader familiar with and capable of operating in the EMOE? I offer that it is one-part newness, one-part complexity, and all parts organizational culture and resistance to change.

Conclusion: While in the pursuit of providing a solution to this problem, it became too big to provide a solution in this thesis and left more questions than answers. However, this paper will identify some organizational changes that must be made to the Joint Force to enable leaders throughout the military hierarchy to effectively maneuver in the EMOE and achieve superiority against our adversaries.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Preface

During the span of the last decade I have noticed a common theme across the Joint Force that is best summed up as a lack of integration everywhere. With the rapid development certain disruptive technologies in the last couple of years it has become apparent to me that the Joint Force is not pacing technology adequately and is due to have a catastrophic failure if it cannot find a way to address the changing battlefield. The concepts of A2AD, the third offset strategy, hyper war, have pushed me to wonder where the link is between them and how can we get ahead of these challenges? The one thing that tied all of these concepts together in my mind was the Electro Magnetic Spectrum (EMS). As I thought about this relationship, I realized that while most military professionals have heard of the concepts above, and have even lauded the importance of these concepts, many did not understand the environment that was threaded through them all; the Electromagnetic Operating Environment (EMOE). How can the Joint Force expertly navigate the complex environments if they do not understand the underlying integration concept for dominance in all of them? What is stopping the proliferation of information across the force? These questions are what led to the construction of this monograph.

In the pursuit of searching for answers I have received much guidance and assistance from my mentor Dr. Kerry Fosher, and my primary instructor LtCol Mark Howard. Their viewpoints and questions pushed me to think deeper and harder throughout this process and for that I am very grateful. I hope that this paper provokes some curiosity and thought for the military professional on the EMOE as well as the barriers to rapid success that the current Joint Force environment places on organizational change. If this topic becomes a wider discussion,

maybe a coalition of the willing will take hold and push this challenge higher on the Joint Force priority list.

Welcome to the Spectrum, but you were already here…

Every piece of electronic equipment that is currently employed in the United States (U.S.) military interacts in the Electromagnetic Spectrum (EMS). Further, almost every piece of electronic equipment in the world touches and interacts in the spectrum in some manner.[1] JP 6-01 defines the EMS as, "a highly regulated and saturated natural resource. The EMS includes the full range of all possible frequencies of electromagnetic radiation."[2] Most people are not even aware that there is an invisible field of waves moving in and around every environment that they find themselves, but this lack of awareness does not diminish the importance of the effects. There actually is no place on the face of the earth that is free from the radio frequency radiation[3] which makes up the EMS. (See Figure 1.) This means that there is no operation on earth that is not free from effects of the EMS and lays the foundational concept that the Electromagnetic Operating Environment (EMOE) is everywhere and effects all environments. This is important for all military professionals to understand while preparing for operations against their adversaries. Lack of proficiency and capability in the EMOE by military professionals in any environment will disadvantage U.S. forces and ultimately lead to failure in battle because states like Russia and China are already operating in this environment in a deliberate and adept manner.

While military professionals in the Electronic Warfare (EW) and EMS management community will most likely violently agree with many of the recommendations for change in this monograph; there may also be push back on the recommendation that there should be proliferation of EMOE management and SA across the Joint Force. The core counter-argument to this recommendation will be that the Joint Force and Joint EW community are responsible for and taking care of the issue. EW and EMS professionals will claim primacy in this area as they should; they are the experts. However, this does not mean that other military professionals

should not be effectively familiar with operating in the EMOE. Further, I argue that the coalition of EMS professionals is currently not broad enough to create the urgency needed to effect the organizational change needed to address the threat. Finally, if the EW community can resist the desire to engage in rice bowling EMOE operations and share the burden with the rest of the Joint Force then it will create buy-in from which momentum can be generated to take the lead in the new digital world order. This buy-in will give way to resources and reverence for the EW and EMS professionals once the true importance of this skill set is realized. This is important because the threats to U.S. interests are the EMOE is real and increasing every day that the Joint Force does not adapt to the realities of this emerging battle space. An effective response will require a whole force approach to effect appropriately.

The Threat

State and non-state adversaries are continually challenging the United States leadership in the international world order. The 2017 National Security Strategy (NSS)[4] outlines this competitive world placing China and Russia at the top of that list. The NSS acknowledges U.S. shrinking advantage against these and other threats below the threshold of military conflict and the challenges that it poses to our national security. The area below this threshold is commonly referred to as the "Gray Zone" and it is the domain in which the EMOE is constantly exploited to meet strategic ends of competing states. This is usually accomplished through the use of EW and applied via a variety of diverse systems. Concepts such as leveraging Unmanned Aerial Vehicles (UAVs) and their electronic payloads, Software Defined Radios (SDRs), Position, Navigation, and Timing (PNT) denial, cyber spoofing, and barrage jamming are all examples of capabilities that adversaries have to affect the EMOE. A very recent example of exploitation using these tools is the current and ongoing conflict in Crimea by the Russians.

A recent report on "Russia's Electronic Warfare" by the International Center for Defence and Security sums up the threat clearly:

> Moscow is stepping up its efforts to renew and modernize the EW inventory, and this effort is complemented by changes to organization, doctrine, command structure, training and tactics, as well as techniques and procedures. The effect of those changes is evident in Russia's aggression against Ukraine, where EW forms an organic part of Russia's kinetic and non-kinetic operations—both in support of proxy forces and conducted independently.[5]

The report goes on to describe the active development of a "total package" of EW systems aimed at dominating in the EMS. The usage of UAVs and SDRs is just the beginning of future aggressive actions in the EMOE. If this is not enough of a threat, and the U.S. is looking for another front, China is operating in a similar manner in the EMOE.

A quick Google search will yield results for Chinese military capabilities that are similar to that of Russia. China is rapidly developing and proliferating UAVs with a strong focus on hardening their capabilities in the EMS. Jane's 2018 assessment of China's advanced weapons systems offers:

> Unmanned systems will also play a prominent role in the rapidly intensifying electronic warfare competition as part of effort to jam, spoof and potential encrypt/decrypt communication spectrum. As with space, control of the EM spectrum is critical to bringing to bear many of the most consequential of U.S. military capabilities.[6]

Beyond this example, China is also aggressively researching and developing Artificial Intelligence (AI) and aggressively pursuing next generation 5G cellular technology that will operate throughout the EMOE to engage a wide range of vulnerable U.S. assets. While this is

concerning on its own, more concerning is the fact that there is an extremely low barrier to entry for malignant actors that wish to wreak havoc across the spectrum to create effects in the physical and information domains.

Violent Extremist Organizations (VEOs) are generating threats in the EMOE as well; leveraging cheap, commercial off the shelf (COTS) technology that is just one click away from purchase and implementation due to the contemporary online commerce environment. The vast digital world that increased globalization and has made life so convenient, has also created new vulnerabilities which are ripe for exploitation. Non-state actors can now bring to bear similar capabilities of state actors in the EMOE without the large budgets typically associated with leveraging cutting-edge technology. Using components that can tally up to less than $1000 it allows VEOs to mass and use volume in employing these assets due to the cost efficiency. For example, there have been multiple instances of VEOs using commercial UAVs, ones that are commonly used by hobbyists, in the roles of reconnaissance, targeting, and munitions delivery. Beyond just operating in the physical domains, VEOs are increasingly operating in this new digital world order and across the spectrum. The wireless waves that transmit social media posts, feed pictures from wireless cameras, fly unmanned systems, and connect cell phones can be threats that require the U.S. military to improve its understanding of this area and maintain advantage. While there has been a recent push in the DOD to improve operations in these new domains of cyber and information operations, there is clearly a gap created when the EMOE is not elevated in importance above the other domains as it is present in and layers throughout them all. Failure to address the EMOE across the Joint Force is akin to building a house without properly grounding it and then installing expensive appliances to address the needs of the day. The appliances may function fine for a while but, the first lightning strike or power surge will fry

all of the appliances. The dynamic, irregular, and unpredictable nature of the conduct future warfare by U.S. adversaries is the surge waiting to happen.

While considering the three threats above it becomes clear that the current way of fighting against adversaries has changed. Be it Gray Zone conflict, or something else, this increasingly common way of fighting is beyond an adaptation to technology. While it may not yet be a paradigm shift in the nature of war, it is most definitely the beginning of one. Threat dictates the appropriate response in the military professional's mind[7] and conflict in the EMOE should be sounding all the alarms for military professionals. The U.S. needs to get ahead of this and dominate in the spectrum but can only do so if they can begin to identify the real problem.

The Problem

Currently, Electronic Warfare Officers (EWOs) and Cyber specialists are the experts in the EMOE. EWOs, the primary responsible agents for EMS management for the Army, total 285 personnel as of August 2018.[8] If we add the number of enlisted soldiers in this field the number increases to roughly 940 EW personnel. This is for the entire Army which has an active component end strength of 476,000 personnel.[9] Without the service specific numbers it is difficult to say[10] what this picture extrapolates to in the Joint Force but, it is probably safe to say that it looks similar. The consolidation of knowledge into this select group will not be enough to enable the larger Joint Force to be effective on the future battlefield in the EMOE based on the wide range of threat in the environment.

In order to achieve the political will of the U.S., its military must maintain superiority to its adversaries while continuing to enhance its capacity to defeat threats.[11] This means being able to gain and maintain superiority in all of the physical environments as well as the information environment which includes cyberspace.[12] The EMS transcends all of these

domains and therefore the EMOE does as well. The EMS is a resource that is pervasive in every operating environment, yet based on personal experience, most military professionals do not consider effects in the EMS when conducting actions in the physical environment. The United States Military has acknowledged EMS presence in each of the physical areas, and the information environment, by the virtue of it clearly bypassing the standard boundaries that have been set in military operations.[13] Right now, we are at a point when understanding how to manage the EMS is as critical for military members as it is to understand how to fire a rifle. The Joint Force trains all members to fire a rifle but still has experts in this field, they are called the Infantry. This same thought process will become necessary in the near-future fight as it relates to engagements in the EMS. Everyone will need to be familiar with the EMOE but there will still be primary experts in that environment, they will be the EWOs. While the DOD is discussing onboarding more experts in this area, and experts are direly needed, there needs to be a new baselining on knowledge of operating in the EMOE throughout the joint force. All military professionals should acknowledge and consider the EMOE when conducting any operation. This consideration will produce leaders who are adept at maneuvering through their primary physical environment while operating under contested and constrained EMS conditions.

Electronic Warfare (EW) and EMS integration at the operational level is currently less than optimal.[14] Operational level commands may lack situational awareness (SA) of all EMS activities in their Area of Responsibility (AOR) thus creating an environment where interference with other Command and Control (C2) systems is common and can lead to frequency fratricide. While there are procedures in place to mitigate these effects,[15] it is not always understood by the commander on the ground or at the JTF that their actions have consequences across the EMOE. A common espoused value is that the operators on the ground do not need to know about the

"beeps and squeaks," they just need to know what button to push to make things go boom. While this statement may appear crass, it is representative of priorities in combat. Returning fire and neutralizing the threat becomes paramount; secondary effects are commonly an afterthought when the bullets start flying. In the emerging warfare environment this could not be further from the truth. It will be crucial for operators to fully understand the environment that they are operating in so that they can leverage all capabilities and effects without risking frequency fratricide. In order to identify possible solutions for this operational gap there must be a synthesized approach that considers the organizational culture of the components contributing to the operational commander as well as an exploration of a technical solution that can create a usable Common Operating Picture. A full analysis of contributing factors to EMS SA management is beyond the scope of this thesis however, this monograph presents a foundation from which to explore further contributing factors to interorganizational communication, behavior, and integration as it relates to this issue. There needs to be a consolidation and distribution of basic information on fighting across the EMOE as well as a consideration to affect this topic across the Joint Staff's DOTMLPF-P[16]construct to achieve lasting and inclusive Joint results.

The EMOE Across the DOTMLPF-P

DOTMLPF-P is an acronym representing the areas of focus for creating a Joint solution to a Joint capability gap. DOTMLPF-P stands for Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy. This construct is codified is CJCSI 3101.02 and is the guidepost for creating lasting, effective joint change. While each of these areas is an independent area of focus, they all have connections to one another in some manner and within the context of EMS management and my recommended way forward most of these areas are

heavily relied upon to effect meaningful and lasting change across the Joint Force. I will briefly touch each area of the DOTMLPF-P in the following paragraphs with most detail in the Organization, Training, and the Personnel considered.

As discussed earlier in the monograph, there should be little revolutionary material in this section for EW professionals and others who deal with this problem set daily. Most likely there will be violent agreement on the proposed way forward. The question then becomes, why bother? The answer to that question is, professionals outside of the EW and EMS management communities need to understand the challenges of the EMOE so that they can advocate for wider dissemination of training and resources as well. This combined with the existential threat that our enemies pose becomes the reason for applying DOTMLPF-P to the problem set and using common language as well as common communities of practice to proliferate the idea across the Joint Force.

Doctrine

The unclassified doctrine surrounding EMS management and the EMOE is one-way and not integrated yet. This is apparent by the fact that all of the EMS related doctrine describes the interconnectedness of the EMOE with all of the physical environments, while the standard doctrine for Joint Operations, JP 3-0 and the Joint Force, JP 1-0, does not mention the EMS or the EMOE at all. While it is understandable that doctrine is not able to be updated overnight, EMOE doctrine has been in publication for the better part of the decade and beyond and it should have therefore penetrated the other foundational doctrine as well as the doctrine of their specific area. The lack of reciprocity is apparent and provides a signpost for the organizational challenges that exist. Due to the rapidly evolving nature of warfare in the EMOE, the doctrine needs to catch up so that non-experts in the EMS and EMOE can begin to be notified of its

importance through the foundational Joint doctrine. The absence of EMS and EMOE information in foundational doctrine illuminates the lack of synergy across the Joint Force on the topic.

Organization

The EMOE is monitored and affected in military operations at the Geographic Combatant Commander (GCC), which holds the authorities to manage the EMS and therefore has the most effect on the EMOE across the joint force. This responsibility is typically managed by the Joint Frequency Management Office (JFMO) established at the Combatant Command (CCMD).[17] While it is good that there is an office of responsibility assigned at the GCC level, it becomes apparent while analyzing the joint doctrine that the Joint Task Force (JTF) is the lowest level of formalized management of Joint Electromagnetic Spectrum Management Operations (JEMSMO). This creates a horizontal integration[18] issue that needs to be analyzed for effectiveness of operations. If the crucial information held at this level encounters a barrier to downward proliferation, then the operational effects can rapidly digress. Further, the doctrine that feeds understanding of JEMSMO is not linked efficiently or effectively to current joint military operations doctrine. Expertise in the subject is required in order to begin understanding where the true responsibility for managing the spectrum resides. With frequent evolutionary changes and developments in reorganization and authorities this becomes even harder to follow.

Training

Creating and implementing a comprehensive training plan to integrate EMOE training across the Joint Force will be a monumental challenge. Everyone who proposes that their mission area gain training emphasis believes that area to be the most important. This obviously cannot happen with every topic. There is not enough time in the training schedule to make every

mission area a priority and I acknowledge this fact. While acknowledging this reality of competing priorities, I still strongly recommend that the Joint Force place strong emphasis in this mission area. Looking at the pervasive and rapidly evolving nature of the threat in the EMOE, it will be necessary to train this area if the U.S. is going to be effective in the near future warfare environment. A well-known American aphorism once stated that, "An ounce of prevention is worth a pound of cure." I submit, if the U.S. does not get to the left of this issue, beginning with training, there will be a much larger cost that what the initial investment can be now. The EMOE underpins this future fight and will further require more solutions than just a change in training and SA.

Materiel

The number one question in any meeting in the Pentagon or across the Potomac on the Hill is, "What can we buy to fix this gap and how much is this going to cost?" The Materiel solution usually gets the most attention because it is usually easier to throw some money at a problem (and maybe create some jobs in the process), than it is to push across the rest of the DOTMLPF-P for solutions. While I am an advocate for less stuff and more knowledge the reality of the situation is that there will be a need to create some new situational awareness tool to assist commanders in visualizing the EMOE in real-time. There needs to be a situational awareness tool proliferated throughout the hierarchy and not just left in the EWOs hands at the GCC or JTF level. This will probably require a stripped-down version of the Defense Information Systems Agency (DISA)'s Joint program of record: Global Electromagnetic Spectrum Information System (GEMSIS), or maybe if it is intuitive enough just wide proliferation across the Joint Force. Currently per DISA's website it is provided on an as requested basis. I propose this be a mandatory push as an organic capability to Brigade and

possibly below. The GEMSIS may require some tweaking to ensure the information it is providing is useful at each echelon.

Leadership and Education

As a senior Captain in the U.S. military, I have received little to no formal education on the EMOE. I have never been educated in the management of the EMOE or introduced to the EMS beyond the necessary employment information for Radio Detection and Ranging (RADAR) systems that I operated; most military professionals are not unless it is directly a part of their career specialty. This single statement is the core of the problem addressed in this monograph. With "Joint doctrine (being) the basis for joint training" the described lack of integration in the doctrine also reflects in the lack of EMOE management training across the Joint Force. Spurred by doctrine, a comprehensive training plan in line with the tools and concepts available must be supplied to the Joint Force writ large. This is stated with a deep respect for training cost and availability across the Joint Force. No one has the "ugly baby" and everyone wants their topic placed in a position of prominence within the Professional Military Education (PME) curriculum. Curriculum in officer basic courses may prove the most logical place to inject this education. While there is already discussion about the warfighting functions and operational domains, this would be where this topic should be introduced and later expanded upon in similar education discussions.

While it is understood that there is so little space in the professional military education system as it is programmed for any add-ins to the curriculum, I argue that it is imperative to do so because the future fight will depend on achieving superiority in the EMOE before doing so in the physical environment.[19] This will require a full buy-in and culture shift to the new possibility that all military professionals must become familiar in the EMOE. Familiarization will provide

the necessary knowledge required to form a technical foundation from which leaders can now seek out expertise when confronted with challenges in the EMOE. To get this buy-in it will be necessary to get a champion (senior leader who believes in the cause) or two who can carry this concept across the finish line of implementation. Further, if we were to evoke a step of John Kotter's Eight Step Process[20] for creating organizational change, we would further seek to build a coalition of champions in the mid-level management to foster the concept after the senior champions move on and are not available to carry the water for EMOE situational awareness. This is possibly one of the biggest challenges in effecting change in the military construct because it requires the right personalities in the right positions to push the change into motion. This will be discussed in the organizational change section.

Personnel

The question for this component is who needs to accomplish these "assigned missions, tasks, and activities." The key phrase in this component is "new individual and collective skills."[21] So, who are we going to target and hold responsible for understanding and leveraging this information? This is an area that requires more research, but I posit this: At a minimum, every officer must understand the importance of the EMOE and how to interface with it as it pertains to their operating environment and adjacent. Every Non-Commissioned Officer (NCO) and Senior NCO must know how to interface with it as it directly pertains to their career field. This knowledge needs to push down to the tactical level of operations to reduce the risk of frequency fratricide by system operators as well as provide the knowledge necessary to combat enemies operating in the EMOE. More is better, but reality holds that there is not even enough time to accomplish the training that we already require our Soldiers, Sailors, Airmen, Marines, and Coastguardsmen to accomplish on a yearly basis.[22] With that statement I commit the sin of

posing a problem without a true recommended solution but this is an area that requires further thought. I recommend that there needs to be an in-depth stakeholder analysis with the purpose of identifying organizational culture targets for change. This will assist in laying the ground work for identifying which non-specialists need to interact in this space as well as how to deliver that content to them. This is a monumental task because of the volume of work that will be necessary in the analysis. Figure 3 may be a start point for this discovery process with a full expansion of the DOD block and connections to interagency providing the best area to focus on.

Facilities

While there will be some infrastructure considerations necessary for allowing the arrived at materiel solution, there should not be much needed increase in command installations and industrial facilities needed to address the proposed EMOE shortfall. As long as there is room for the proposed at system in the operations centers throughout the Joint force there should be no further requirements. As far as the industrial base is concerned, the U.S. military should continue to partner with civilian industry as much as possible to secure the future of the United States of America. Civilian industry is quicker, more flexible, and cheaper than the Joint Capabilities Integration and Development System (JCIDS) process. Perhaps there needs to be a realignment with civilian industry to develop a stronger partnership.[23] To clarify, this is not a recommendation to facilitate more of the traditional same in the military industrial base. The pivot to small, innovative solutions, is currently being leveraged to quickly react to emerging threats. A prime example is civilian industry response to UAVs. Unfortunately, the material response needs to be in line with policy or it can't be used. This brings us to the next challenge.

Policy

What is the policy for state actors implementing effects in the EMOE? Because of the extreme interconnectedness of the EMOE and its overlap with civilian space in the global commons this is a very challenging and sensitive area. Our rules of law, to forefront the Constitution as well as public opinion make this space a challenge to navigate. Because there is a lack of general knowledge on the EMS and EMOE in the public sphere it is an area shrouded in mystery and "dark figures." This creates a political environment that is supremely risk adverse, possibly for good reason. That being said, this is an area that is supremely important in the authorities provided for operating in the EMOE. The discussion of who is allowed to do what in this environment is constantly changing and evolving therefore, I will not address it further in the scope of this paper as it deserves its own dissertation.

So, we have problems; what about solutions?

While it has taken a while to get here, the mass amount of background information is absolutely necessary to have a reasonable attempt at proposing a lens for consideration of a solution. With the amount provided, it is possible to consider leveraging Joint Force systems that are in place and applying academically sound theories on organizational change. This may chart a path to creating a Joint Force that is more adept in the EMOE. Organizational change theory provides a solid tool to begin a deeper analysis of the system being considered and provides a framework to identify fulcrums that we can move to better leverage catalysts to change.

Applying Organizational Change Theory

Organizations are resistant to change. This hallmark of organizational culture is foundation from which one can identify friction points to affect. Articles of culture, values, and

vision all become semi-fixed once these components take hold. This is because, "organizational culture is socially acquired and shared knowledge that is embodied in specific and general organizational frames of reference."[24] Individuals within an organization can have specific agendas that cause them to protect information and resources and produce resistance to integration and interoperability. These individual personalities and agendas are components that can lead to the "stove pipes of excellence" that currently exist throughout the Joint Force. This is commonly also referred to as "rice bowling" where members of an organization become overly protective on subject matter that may affect their individual portfolio. Rice bowling tends to be exemplified by protectionism and control of information on any given topic considered directly related or even tangential to the main asset in the offender's portfolio. The EMOE is an excellent example of an area that is stove piped and largely inaccessible for a majority of military members. This is concerning if the previous statements about the permeation of the EMOE across all of the domains is taken to heart. How can a military leader employ forces to dominate the enemy if he or she does not understand the totality of the environment? Why would that information be difficult to access? Some of this may be due to classification issues but more so it has to do with military culture preventing the proper flow of information and lack of barrier reduction.

In order to have a discussion about integrating military culture it is first necessary to define its characteristics. While the military culture is constantly evolving on the surface there remain core components that bolster its heading. If we use Schein's "levels of organizational culture" and look at the basic assumptions and values, a picture of military core culture begins to develop.[25] (Figure 2.) In Samuel Huntington's foundational work on civil-military relations he describes the military mind as: "disciplined, rigid, logical, scientific; it is not flexible, tolerant,

intuitive, emotional."[26] This list leads one to consider how these traits make military culture resistant to change. Further it shows how, by extension, military procedures and operations are likewise. While these attributes are contrary to emotional nature of often demonstrated rice bowling these attributes provide a facet of the culture that is applied at some level and may be tapped into in order to effect organizational change. This analysis is at the macro level of military culture and does not address the compounding issues that arise from the hybrid culture of different branches and subgroups within the military.

The parties responsible for EMS management are a small part of the military population.[27] The Joint Staff has proposed a model in its doctrine for an operations cell responsible for managing the EMS at the joint level. This organization is called a Joint Electromagnetic Spectrum Operations Cell (JEMSOC). (see figure 3.). What is important to note about this organizational structure it that there are multiple interagency organizations outside of the JEMSOC that require integration. This is the reason for the Liaison Officers and functional integrators listed in the figure. External integration of interagency organizations creates a hybrid that complicates the process of understanding the culture of EMS managers as their culture now has influence from beyond the military organization alone.

In order to get a sense of the complexity of the hybrid culture, the use of mind mapping may be useful in exposing the just first layer of complexity. (See Figure 4.) A simple mind map focusing towards the thesis of this paper shows the intricacy of the EMOE, and how many surface stakeholders there could be. By assessing the stakeholders in the EMOE it becomes clearer on what cultures need to be analyzed for comparison and integration to the desired end state. While this is not a total and full assessment of all of the stakeholders for this topic, it is a good starting point to develop a model that provides functionality for assessing EMOE

stakeholders. This assessment of who has skin in the game lets us see who we need to consider though Rubinstein's model.

To assist with analyzing the components of military culture in contact with the EMOE, and the challenges of breaking through associated stove pipes, a look at Robert A. Rubinstein's military-humanitarian interoperability challenges may assist with managing the military's own challenges. While Rubinstein submits that "fostering humanitarian-military interoperability requires more than a "just enough" understanding of culture."[28], he further develops three areas of analysis whose fourth component is the integration of them all into a holistic understanding of the situation. I will attempt to analyze the challenge of proliferating the importance of the EMOE construct through this lens in order to better understand the obstacles and present a proposal on a way ahead to maximize U.S. military lethality across all domains, specifically though the maximization of dominance in the EMOE.

Rubinstein submits that deeper understanding of the organizational culture is the first step in affecting inter-organizational change.[29] For this analysis it is necessary to dive into multiple components of the military organization. First, it is important to understand the position of the EMS managers. Traditionally this has been a select group of individuals earlier defined as EWOs. These experts in the EMS and EMOE have just recently been reorganized under the Cyber branch within the Army as new contributors and components in the recently conceived Cyber Mission Teams. This move creates multiple organizational challenges which will have impacts on any future cross-pollination of EMS management goodness. Next, are the group commonly referred to as the "warfighters". While this can be a dubious term in relation to military professionals, we shall define it here as the individuals that are in harm's way during a conflict. All combat operations personnel as well as their adjacent support chain that is co-

located with them are in this category. This creates the first fissure internally that exists beyond the interagency component that provides an even greater challenge. Referring to the mind-map in figure 3, that is everything short of all inclusive, one can begin to see the cultural fissures and complex relationships that can develop between participants in the EMOE. This goes back to the discussion of who the stakeholders in the EMOE are and how much rice bowling is involved in the pursuit of their own portfolios.

Rubinstein's next requirement for fostering humanitarian-military interoperability is an analysis of the historical and situational appreciation of the social contexts within the other party is working.[30] When looking at situational appreciation and social contexts for this issue the concept of horizontal interoperability becomes important. Identifying and understanding where the military personnel sit within the overall organizational hierarchy is necessary to begin to discover what this relationship looks like. The social relationships that develop because of the social contexts are important and necessary to understand if a proposal for better integration is to be made. Further, the situational appreciation for the differences in authorities and restrictions that are a party to those authorities can build capital in the Joint and interagency environment that is inherent in the EMOE.

Appreciation of the ways that difference in power can affect collaboration is the next requirement that Rubinstein introduces to increase organizational collaboration.[31] An understanding of organizational hierarchy and where the power to affect change in that structure is crucial to identifying a point from which necessary integration of EMS theory across the military can start. If this concept is pushed from a position of weaker organizational power towards the mainstream without a champion in a position of power, then the attempt will most likely fail. While the military has become better at accepting technological change in the recent

past (think third offset strategy, cyber initiatives, advanced basing concepts), something that will need to be sold as an "everybody problem" will need a powerful champion to foster the concept and ferry it to the masses. The opposite must also be considered from the EMS management community when pushing this information to the masses. The understanding in power differential must be acknowledged to frame the information in such a way that it is received and acted upon.

Finally, Rubinstein submits that all three of the previous factors must be harmonized and taken into consideration when proposing a solution that manages the social, cultural, and power differences between organizations.[32] While successful navigation of any one of these three areas may prove successful in achieving the outcome it is clearly better to accommodate more factors to achieve an adaptable and flexible approach to moderate the culture differences of the multiple organizations. It becomes even more important when understanding who maintains the legal authorities to affect the different parts of the EMOE and how they typically operate.

So, what do we do with Rubinstein's model?

The logical solution for what to do next is to begin analysis of the friction points identified using Rubinstein's model and target them as points of exploitation for possible change. There needs to be and in-depth stakeholder analysis that clearly defines all of the actors in the system. The next challenge here is assessing the correct stakeholders that will affect the greatest amount of change in the overall system. This can be challenging based on the constantly changing power differences among organizations. Further, changes in current events, politics, and policy can each have a different effect on this power differential. Depending on what the flavor of the week is, (or offset strategy is current) the power could be massed in a different stakeholder within the system. This links back to finding the right "champion" at the right time

to push the topic forward. The other, not so good, option is to wait until the U.S. gets defeated in the EMOE and resulting physical environment. This will instantly generate a champion and possibly an executioner who will remove leadership that failed to understand that this is a looming threat. While this is less than optimal and honestly not a valid course of action, a galvanizing event such as a military loss has been an absolutely effective catalyst to change in the past.

Proposed Framework and Conclusion

Currently there is a threat to U.S. National security in the EMS. While some will say that the U.S. is leveraging a whole of government approach to include interagency participation, this does not address the issue of a lack of situational awareness for operators in the spectrum. Without situational awareness of what is happening in the EMOE military professionals will lack the necessary information to maneuver against adversaries in this critical environment. The U.S. military has the opportunity to rectify this shortfall through leveraging organizational change theory and enabling military professionals to become familiar with the EMOE even if it is not their primary operating environment. The deep analysis and research needed to target the proper drivers of organizational change as it concerns this topic is beyond the scope of this monograph however, I recommend the below framework to address this challenge.

1. There needs to be in-depth front-end analysis to decide who in the U.S. military really needs further SA in the EMOE.
2. Rubinstein's model for human-military collaboration should be applied to this problem set to create the necessary integration required to effect organizational change as it applies to SA in the EMOE.

3. There needs to be an exhaustive stakeholder analysis to determine which players hold the necessary power for effective change as well as the establishment of a EMOE enterprise or community of interest.
4. Champions both in high leadership positions as well as mid-level management need to foster the necessary integration to bring wider SA in the EMOE.
5. The change needs to be codified across the DOTMLPF-P in order to ensure that it is consistent across the Joint Force.
6. Education and Training in EMOE content needs to be identified and codified in existing Programs of Instruction for professional military education.

If the necessary and challenging work laid out in the above framework is applied, the U.S. military will have a greater chance of creating lasting change that will enable it to be effective across all domains. Anything short of these five steps will leave the solution wanting and poised to revert to the current state of a lack of integration and SA in the EMOE across the Joint Force. With the EMOE existing in all of the domains in which the U.S. military maneuvers, it will remain critical that all military professionals understand and consider this environment when maneuvering to fight and win the nation's wars.

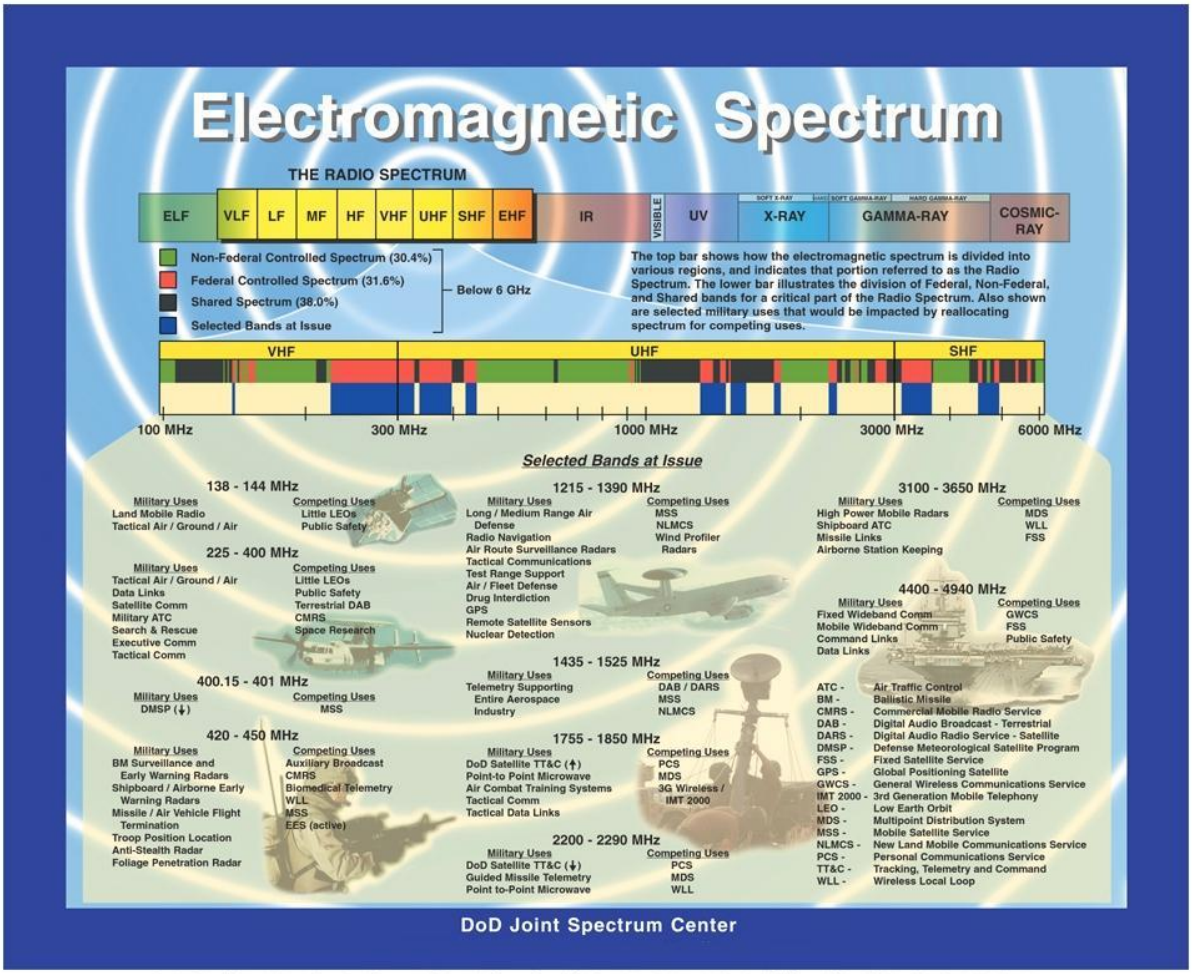

Figure 1. Chart of Electromagnetic Spectrum with military and competing uses. (Joint Spectrum Warfare Center)

Schein's Components[33]	U.S. Military's Cultural Components
Basic Underlying Assumptions	Rigid, Inflexible, Disciplined, Violence Managers, Bureaucratic, Tribal
Espoused values	Integrity, Honor, Courage, Loyalty, Respect, Professionalism, Service, Excellence, Flexibility
Artifacts	Service Emblems, Uniforms, Equipment, Publications, Doctrine

Figure 2. Schein's components of organizational culture as represented in the U.S. military

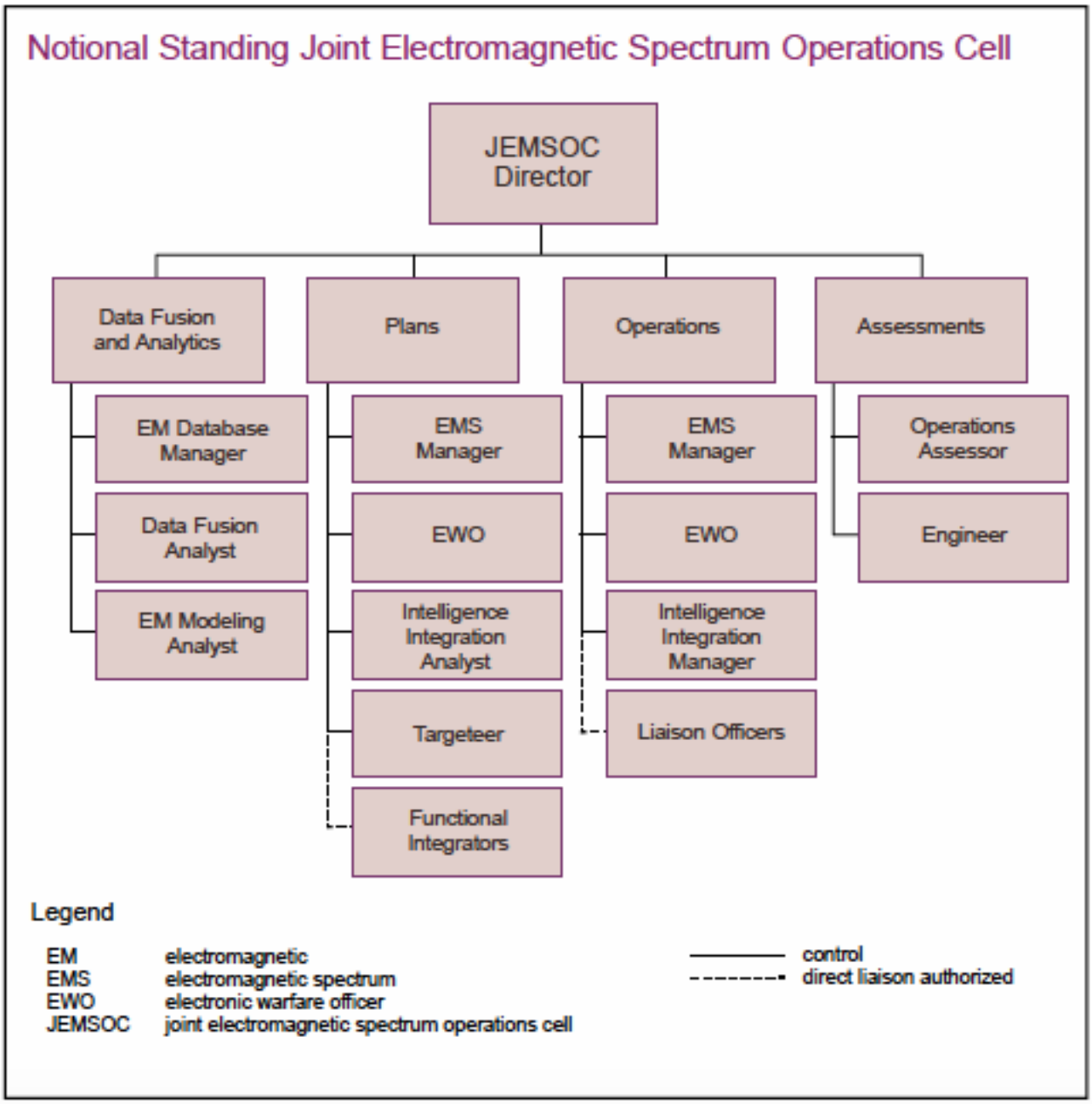

Figure 3. Notional JEMSOC Organization from JDM 3-16 pg. II-8

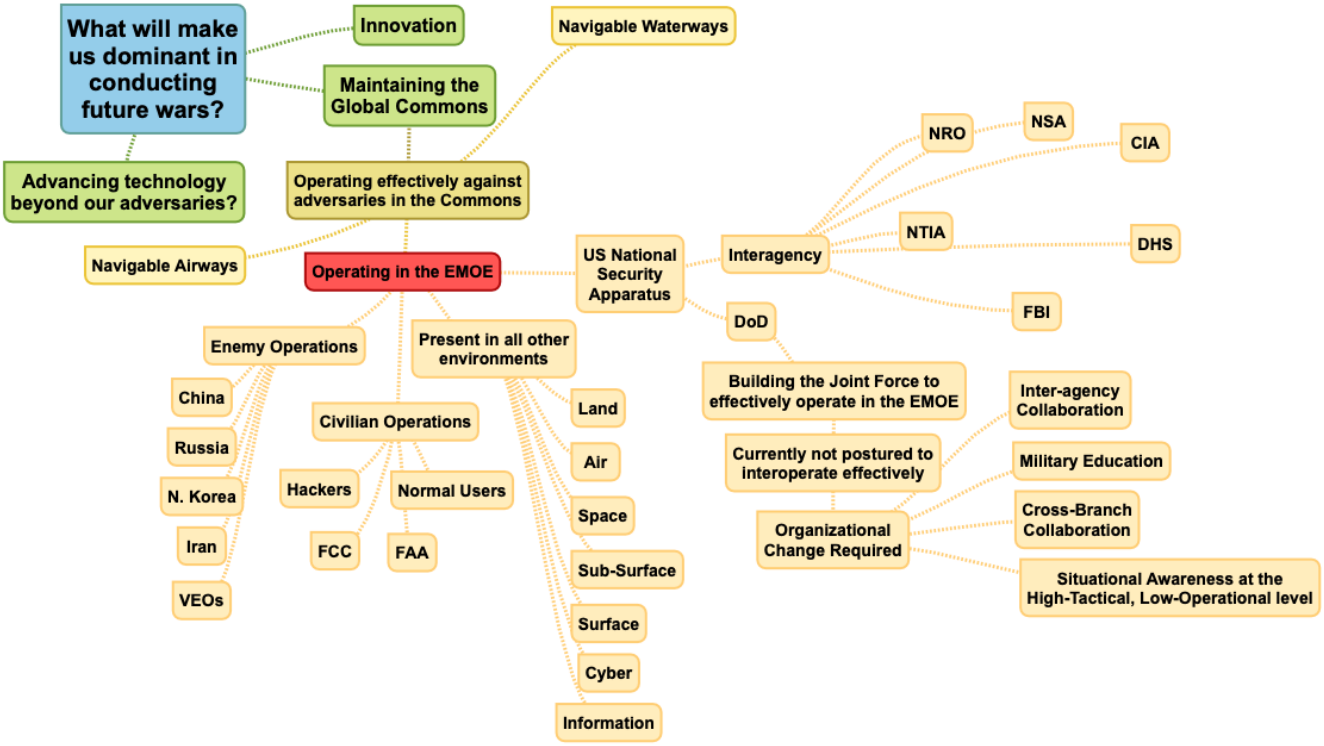

Figure 4. Mind map of first layer stakeholders in the EMOE. (Created by the Author) This is very basic and not all inclusive. There is a much wider range of international, interagency, and enemy stakeholders that touch this environment. This was designed to assist in directing thought on integrating inter-organizational change between stakeholders.

Endnotes

[1] Figure 1.
[2] JP 6-01 pg. vii.
[3] NASA. Accessed March 06, 2019. https://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html.
[4] The Whitehouse, National Security Strategy.
[5] Roger McDermott, Pg. IV.
[6] Tate Nurkin, 9.
[7] Samuel Huntington. This concept is resonant of Huntington's description of the Military Officer's responsibility to manage the security of the nation.
[8] Sydney Freeberg Jr., Breaking Defense Article
[9] Megan Myers, Army Times Article
[10] The numbers of EW and EMS management personnel across the other services is not readily available in open source reporting as it was for the Army numbers.
[11] JP 1-0 pg. i.
[12] JP 6-0 pg. I-2.
[13] JP 6-01 pg. I-4.
[14] This statement is based on the Joint Spectrum Warfare Center's posting of a JPME topic for research that outline questions describing a current gap in this area. The Desired Objectives of the Research are quoted here: "Identify benefits of improved coordination between Spectrum operations and EW activities. How is the Commander and mission impacted by improved integration and coordination of Spectrum Ops and EW activities? How does integrated Spectrum Operations and EW activities influence the Commander's knowledge of the battlespace and allow/hinder their informed decision on spectrum usage and spectrum superiority? What are effective methods to visualize the EM domain and enhance a Commander's situational awareness of the EMS battlespace?" If the current way of doing business was optimal then such a request for research would not be posed.
[15] Joint Spectrum Interference Resolution Process codified in JP 6-01 pg V-17.
[16] DOTMLPF-P stands for Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy. This construct is codified is CJCSI 3101.02 and is the guidepost for creating lasting, effective Joint change.
[17] JP 6-01 pg. x.
[18] Robert Rubinstein, 59. "what is needed for these actors to work together across their different structural locations in a mission. This raises a concern for what I call Horizontal Interoperability."
[19] Mark Pomerleau, The following quote from COL Jeffery Church, a chief of the strategy and policy division at the Army cyber directorate, explains the thought process behind this line of reasoning: "I think that you'll see in the future campaign strategy [the] No. 1 objective will be to gain and maintain EMS superiority because if you don't do that, you're not going to gain or maintain air and space superiority" in which you won't be able to maintain land and maritime superiority." The proof that this is becoming the reality of warfare is exemplified in the current conflict in Ukraine.
[20] John Kotter, 23.
[21] Joint Staff, CJCSI 3010.02E.
[22] Leonard Wong, Stephen Gerras, Lying to Ourselves: Dishonesty In The Army Profession. This paper outlines the core causes of this statement.
[23] Recent news described Google's parent company, Alphabet, withdrawal from a major partnership with the DOD in reference to AI. This is possibly a huge loss and greater risk to security than what it may seem on the surface. If peer and near-peer adversaries make advances in this area before the U.S., it is conceivable that it will threaten U.S. leadership in the International World Order through the leveraging and exploitation of this possibly disruptive technology.
[24] Alan Wilkins, 523.
[25] Edgar Schein, 24.
[26] Samuel Huntington, 60.
[27] Megan Myers, Army Times
[28] Rubinstein, 64.
[29] Rubinstein, 69.
[30] Ibid, 69.
[31] Ibid, 69.
[32] Ibid, 69.

[33] Schein, 24.

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