

**REPORT DOCUMENTATION PAGE**

*Form Approved  
OMB No. 0704-0188*

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.  
**PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

<b>1. REPORT DATE</b> (DD-MM-YYYY) 07-05-2021	<b>2. REPORT TYPE</b> Master of Military Studies (MMS) thesis	<b>3. DATES COVERED</b> (From - To) AY 2020-2021
--------------------------------------------------	------------------------------------------------------------------	-----------------------------------------------------

<b>4. TITLE AND SUBTITLE</b> Modernizing US Nuclear Deterrence: Improving Coordination of the Nuclear Weapons Community	<b>5a. CONTRACT NUMBER</b> N/A
	<b>5b. GRANT NUMBER</b> N/A
	<b>5c. PROGRAM ELEMENT NUMBER</b> N/A

<b>6. AUTHOR(S)</b> Major James J. Kavanagh, USMC	<b>5d. PROJECT NUMBER</b> N/A
	<b>5e. TASK NUMBER</b> N/A
	<b>5f. WORK UNIT NUMBER</b> N/A

<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068	<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b> N/A
------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------

<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A	<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>
	<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b> N/A

**12. DISTRIBUTION/AVAILABILITY STATEMENT**  
Approved for public release, distribution unlimited.

**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**  
The units of the US military responsible for our nuclear deterrence have developed individual plans and procedures that lack coordination and would impede a timely and joint execution of decisions from higher command authority. The US needs a new Joint Staff directorate (J10) to provide the proper staff to coordinate, train, and standardize procedures for the US nuclear community. In addition, a top rank military leader should lead this staff and provide the necessary senior level attention to these key nuclear issues. This small reform of how the Joint Staff coordinates the nuclear weapons community is a timely and critical way to address existing vulnerabilities.

**15. SUBJECT TERMS**  
Joint Staff, Nuclear Weapons, Nuclear Enterprise, Nuclear Operations, Nuclear Planning, Nuclear Reorganization, Nuclear Coordination; NMCC, NOCC, J33, J36, J10, NOD, N2C2, OTSD; Nuclear Command and Control, NC2, NC3

<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b>
<b>a. REPORT</b>	<b>b. ABSTRACT</b>	<b>c. THIS PAGE</b>			USMC Command and Staff College
Unclass	Unclass	Unclass	UU	35	<b>19b. TELEPHONE NUMBER</b> (Include area code) (703) 784-3330 (Admin Office)

*United States Marine Corps  
Command and Staff College  
Marine Corps University  
2076 South Street  
Marine Corps Combat Development Command  
Quantico, Virginia 22134-5068*

MASTER OF MILITARY STUDIES

---

**TITLE:**

MODERNIZAIING US NUCLEAR DETERRENCE:  
IMPROVING COORDINATION OF THE NUCLEAR WEAPONS COMMUNITY

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

**AUTHOR:**

MAJOR JAMES J. KAVANAGH, USMC

AY 2020-21

---

MMS Mentor Team and Oral Defense Committee Member:   Jorge Benitez, Ph.D.  

Approved: 

Date: 5/7/21

MMS Mentor Team and Oral Defense Committee Member:   Colonel Matthew Neumeyer, USA  

Approved: 

Date: 5/7/2021

*United States Marine Corps  
Command and Staff College  
Marine Corps University  
2076 South Street  
Marine Corps Combat Development Command  
Quantico, Virginia 22134-5068*

MASTER OF MILITARY STUDIES

---

---

**TITLE:**

**Modernizing US Nuclear Deterrence:  
Improving Coordination of the Nuclear Weapons Community**

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

**AUTHOR:**

**Major James J. Kavanagh, USMC**

AY 2020-21

---

---

MMS Mentor Team and Oral Defense Committee Member:

**Jorge Benitez, Ph.D.**

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

MMS Mentor Team and Oral Defense Committee Member:

**Colonel Matthew Neumeyer, USA**

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

## Executive Summary

**Title:** Modernizing US Nuclear Deterrence: Improving Coordination of the Nuclear Weapons Community

**Author:** Major James J. Kavanagh, United States Marine Corps

**Thesis:** In the era of great power competition, the US needs to revitalize its strategic nuclear deterrence due to the growing security threats from China and Russia by improving its outdated coordination capabilities for nuclear planning and provide the Joint Staff with properly trained and experienced personnel. The Joint Staff nuclear personnel need to coalesce under a single directorate to reconcile the distinct and incongruent units in the nuclear weapons community. The Department of Defense and the new directorate also require an empowered advocate to overcome parochialism and provide guidance and resolution for the various competing organizations in the nuclear weapons community.

**Discussion:** The various members of the US nuclear weapons community currently lack sufficient coordination and leadership. The nuclear-capable combatant commands have different operational understanding and procedures from each other and the Joint Staff. As the DoD's number one priority, nuclear deterrence requires a sufficient number of qualified service members to clearly understand nuclear planning and policy to fulfill their responsibility to advise the President properly. Most of these experts are currently spread out among combatant command and Joint Staff directorates. Establishing a Joint Staff directorate for nuclear planning is required to facilitate the appropriate training of personnel on the functions of Nuclear Command and Control (NC2).

**Conclusion:** To improve the effectiveness and capability of the multiple stakeholders in the US nuclear weapons community to deter the increasing threat from nuclear-capable great powers, the organizational structure the Joint Staff that deal with nuclear matters needs updating. The units of the US government responsible for our nuclear deterrence have developed internal plans and procedures that lack coordination, and the Joint Staff personnel charged with providing this much-needed coordination are too few. Furthermore, most of these personnel are drawn from non-nuclear occupations and lack the proper training and experience to properly advise and plan US nuclear operations. The creation of a J10, Directorate for Nuclear Planning, is consistent with previous historical precedents when the DoD established new agencies and realigned staffs due to changing threat environments. A new Director for Nuclear Planning on the Joint Staff can also provide the required nuclear enterprise leadership and advocacy and employ the proper staff to coordinate, train, and standardize procedures for the US nuclear community.

## 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.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

## Table of Contents

	Page
TITLE PAGE .....	i
EXECUTIVE SUMMARY .....	ii
DISCLAIMER .....	iii
TABLE OF CONTENTS.....	iv
PREFACE.....	v
I. INTRODUCTION .....	1
II. VULNERABILITIES IN THE STATUS QUO .....	5
III. STRENGTHENING COORDINATION AND EXPERTISE IN THE US NUCLEAR WEAPONS COMMUNITY .....	10
IV. CONCLUSION.....	19
GLOSSARY .....	22
ENDNOTES .....	23
BIBLIOGRAPHY.....	27

## Preface

I am an Air Command and Control Officer by trade, and while assigned to the Joint Staff, I earned my certification as an Assistant Deputy Director for Operations and Presidential Strike Advisor for nuclear warfare. I worked alongside all services and met many great individuals who performed the nuclear mission at the highest caliber; however, the majority of us on the Operations Teams performing this highly important no-fail mission did not have a nuclear related background or formal nuclear operations training.

My command and control background and digital interoperability experience led me to seek more information about the nuclear community. While off-duty, I enrolled in nuclear training, formally studied nuclear weapons, read National Military Command Center historical documents, examined the continuous changes in Chairman's procedures, and developed aspects of how the nuclear enterprise operates. This experience led to my desire to learn more about the nuclear enterprise and provided me with the knowledge for researching the nuclear mission.

The great power competition resurgence caused me to be more concerned about adversarial nuclear states and the US's need to maintain a credible and reliable nuclear deterrence. I saw a need for the military's nuclear community to have an advocate on the Joint Staff which coincided with the Secretary Jim Mattis's first line of effort, prioritizing "a safe and secure nuclear deterrent." A Joint Staff nuclear directorate could establish formal nuclear training and improved coordination between commands leading to a more efficient and capable nuclear deterrent.

I want to thank Dr. Jorge Benitez for providing guidance and research assistance on this project. Col Matthew Neumeyer, your experience and knowledge were invaluable, but mostly I appreciated your pragmatic views to contextualize unclear ideas. Brandy Lyn G. Brown, PH.D. and Andrea Hamlen-Ridgely, M.ED, I want to thank both of you for your never-ending feedback and proper English lessons. To my wife, Ticita, I would not have completed this without you.

## I. INTRODUCTION

As countries like China and Russia continue to increase nuclear stockpiles and improve delivery systems, the US must adapt its nuclear forces to this evolving threat environment.<sup>1</sup> US nuclear forces are the backbone of the strategic deterrence of the US and its allies. According to the Department of Defense's (DoD) Joint Publication 3-0 Operations, "Deterrence prevents adversary action through the presentation of a credible threat of unacceptable counteraction and belief that the cost of the action outweighs the perceived benefits.... Deterrence stems from an adversary's belief that the opponent's actions have created or can create an unacceptable risk to the adversary's achievement of objectives."<sup>2</sup>

Senior leadership acknowledges the adversarial Chinese and Russian threat closing the military gap on the US nuclear forces. During a talk at the Brookings Institution about the importance to the military of changes in technology, Chairman of the Joint Chiefs of Staff (JCS) General Mark A. Milley stated, "what's important to know and recognize as a fact is the gaps between us and potential adversaries — say China or Russia, for example — those have shortened and closed a little bit over the last 10, 15, 20 years."<sup>3</sup> The senior civilian and military leadership identified this reduction in the US military's advantage over these nuclear capable great powers. China and Russia's technological advancements over a short period have decreased the US military's advantage to such a degree that the advancements are a real threat to the US projection of military power, and therefore its global hegemony hangs in the balance.<sup>4</sup> This new near-peer military threat has reinforced the DoD's enduring mission to provide security for the nation and to deter war.<sup>5</sup> To sustain the DoD's enduring mission, it must improve Nuclear Command, Control and Computers (NC3) coordination and capabilities for US military nuclear forces. A strategic understanding of how nuclear weapons are employed requires a

senior military leader with expertise in nuclear weapons and the organizations responsible for maintaining them as our key strategic deterrence. The transference of nuclear responsibilities can be cost neutral for a new Joint Staff director. Cost neutral means no additional costs are incurred by the government for the movement of personnel. The prioritization of nuclear deterrence and all the Joint Staff nuclear responsibilities can be overseen by a single director, improving information flow across the nuclear forces.

The US has already begun updating the hardware, our nuclear weapons and their delivery systems. But unfortunately, the DoD has not begun updating the nuclear planning, policy, procedures, and key personnel in the nuclear weapons community. The complete modernization of our nuclear capabilities is necessary because many nation-states are increasing their development for nuclear delivery vehicles and uranium enrichment programs, while the US has reduced its nuclear stockpiles or stagnated in its capabilities.<sup>6</sup> The different units in the US nuclear weapons community currently lack sufficient coordination and top-down leadership to facilitate this adaptation. During joint exercises, the personnel from the different nuclear weapons units are likely to misunderstand one another's vernacular and possibly, procedures, and fail to coordinate properly. These various units are also likely to disagree over which information is briefed to the senior leaders and the President. Complete understanding of the information briefed to senior leaders, and the President is required by each nuclear command center within the Nuclear Operations Command Center (NOCC) devolution architecture. A NOCC has the ability to advise the President on nuclear options and the authorities and capability to verify and transmit orders to the nuclear forces.<sup>7</sup> Isolated and disjointed procedures and segmented perspectives are a direct result of a lack of centralized initial training.

The lack of centralized initial training results from the Joint Staff not advocating and implementing Nuclear Command, Control, and Communications (NC3) training. Centralized initial training for joint nuclear personnel would provide a fundamental and universal understanding of nuclear planning, operations, and responsibilities of all nuclear organizations. One of the responsibilities of the Joint Staff J7 Directorate for Joint Force Development is to assist in developing training for the joint warfighter. The Joint Staff nuclear personnel can submit a request to the J7 to development formal NC3 training. The assigned joint personnel from non-nuclear fields require NC3 training to conduct nuclear planning. Too few Joint Staff personnel coordinate nuclear planning, and those who do often lack sufficient background and expertise on the subject matter. From the President's military aides to the tactical nuclear operator, the nuclear chain of command must have trained and experienced personnel for persistent and survivable national command authority lines to execute a no-fail mission. In a 2017 memorandum to all Department of Defense (DoD) personnel, the Secretary of Defense gave specific guidance that his first line of effort "prioritizes a safe and secure nuclear deterrent..."<sup>8</sup> Even with the Secretary of Defense's prioritization of our nuclear deterrent, the Pentagon has been slow to modernize the training and organization of the key personnel responsible for the success of the command and control architecture of our nuclear weapons community. In order to maintain a safe and secure nuclear deterrent, the chain of command must have the ability to communicate throughout the relevant units in the nuclear community at a moment's notice.

As DoD's first priority, nuclear deterrence requires a sufficient number of qualified service members that clearly understand nuclear policy and operations to fulfill the responsibility to advise the President properly. Most of these experts are currently spread out among different

Joint Staff directorates (e.g., J3 - Operations, J5 - Strategic, Plans and Policy, and J6 - Command, Control, Communications, & Computers/Cyber), NOCCs, and smaller US military nuclear units. The Joint Staff needs more personnel with the required experience and training to maintain an efficient and effective nuclear enterprise and improve its outdated capability to coordinate nuclear planning. Currently, the majority of the joint personnel selected for these joint billets do not come from command and control or nuclear fields. A new directorate in the Joint Staff with the proper nuclear expertise is necessary to integrate and collaborate with the US military's distinct nuclear units.

The Joint Staff nuclear personnel need to coalesce under a single directorate to reconcile the US military's distinct and incongruent nuclear units. Establishing a new Joint Staff directorate is not unprecedented. Similar DoD reforms were implemented in the past due to the changing threats and security environments. In 2012, the Joint Staff reestablished the J6 Directorate, and in 2018, US Cyber Command became a CCMD because of the importance of internet technology and the need to protect the US from the emerging cyber threats.<sup>9</sup> Furthermore, in 2019 the President established the US Space Force due to the increased Chinese and Russian orbiting capabilities and counter-space weapons.<sup>10</sup> In light of the establishment of these directorates, creating a nuclear directorate is not only feasible, but overdue.

The Joint Staff needs a nuclear directorate to advise, assist, and properly coordinate our nuclear forces. This vulnerability exists because currently the nuclear-capable CCMD and the Joint Staff nuclear personnel have different operational understanding and procedures from one another.

## **II. Vulnerabilities in the Status Quo**

The 2018 Nuclear Posture Review (NPR) identified the US's requirement to modernize the Nuclear Command, Control, and Communications (NC3) systems.<sup>11</sup> NC3 provides five functions exercising Nuclear Command and Control (NC2) authorities from the President to the nuclear forces by: force management, planning, situation monitoring, decision making, and force direction.<sup>12</sup> The nuclear personnel entrusted to manage and operate the nuclear forces presents a modernization problem within NC3 because of the lack of official nuclear training for the joint forces and oversight of that training. The modernization and replacement of aging equipment is currently being addressed and funded by Congress, but the manpower and organization of the nuclear forces have not been addressed.<sup>13</sup> The Joint Staff nuclear directorate proposed in this paper would be a significant step towards modernizing and addressing the manpower and organization of the US nuclear community.

The DoD must continue assessing modernization and coordination to improve efficiency of the US nuclear community. Further substantiating this point, the US Government Accountability Office states that, "DOD and the military services have taken steps to improve oversight of the nuclear enterprise in response to the 2014 reviews but lack clear roles and responsibilities and methods for collaboration."<sup>14</sup> Unfortunately, the current system of nuclear planning, policy and procedures lack leadership, advocacy and focus.

Acquiring appropriately trained and experienced personnel to support the directorate's mission is a challenge because the pool of available personnel for these roles is limited. The Operations, Training, and Standardization Division (OTSD) lacks the staff to proficiently and efficiently conduct its tasked mission. OTSD is located within the J36 on the Joint Staff and is mandated to conduct the training and certification of the Joint Staff personnel conducting the

nuclear mission. This division is also tasked with a myriad of briefings and training for the White House, Congress, the Office of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff (CJCS), and nuclear planning and procedures personnel. This division also conducts all the staff and command evaluations for NC3 certifications to enable NOCCs to operate. The manning of the division does not meet the necessary manpower requirements to conduct the required mission essential tasks in accordance with CJSI, and this is only compounded by the understaffing of existing billets and a high turnover rate of personnel. During high turnover windows, the operations teams must move certified personnel to keep each team at minimum manning to maintain operation status.

The personnel performing OTSD nuclear mission tasks come from the Operations Teams. Operations Teams are comprised of military personnel from varying branches and military occupational skills. Consequently, OTSD is comprised of personnel that may meet some level of training requirements, nevertheless lack the knowledge and experience for a division entrusted to oversee training and certification of all NC2 personnel. In other words, OTSD may have a few personnel from the nuclear specialties, but they are not enough to provide adequate training or the ability to meet all tasks. These NC3 weaknesses were identified in 2014 by a US Government Accountability Office review of NC3 modernization efforts, and the problems continue today.<sup>15</sup> The modernization effort for NC3 in 2020 is again identified as an aging system and a “legacy of the Cold War,” but maintains its absolute necessity for national command authority.<sup>16</sup> The problem is becoming more concerning with the emerging threats from great power competitors who have been modernizing their nuclear capabilities for years.<sup>17</sup> Commanders should not be asked to operate with a limited certified staff, one person deep per position without having redundancy in manning and certifications. The no fail mission should

have a higher standard for training and certification, but as a result of no advocacy, funding is not available to support the creation and training material or supporting the manpower necessary to facilitate the training.

It is a persistent and key vulnerability that most of the Joint Staff personnel who conduct the nuclear mission are staffed by non-nuclear experts from all the Armed Services. This lack of expertise for a no-fail mission is slightly mitigated by the seniority of the service members selected to fill these positions, and required tasks are mandated by the Chairman of the Joint Chiefs of Staff Instruction 3520.01, NC2 Joint Mission Essential Task and Computer Based Training.<sup>18</sup> The limited training is conducted while on the job by inexperienced personnel. It is not safe or effective that these nuclear mission personnel are entrusted to survey global situations and conduct the highest levels of advisement without any formal nuclear training. Formal training is sometimes cost prohibitive, but the majority of the concepts are already developed and the funding for the nuclear weapons community is available.

The Congressional Budget Office planned for 326 billion dollars for the DoD nuclear forces from 2019 through 2028 and 16 billion of that is allocated for other support services.<sup>19</sup> The problem is how to appropriate some of these funds to address neglected training of the nuclear personnel. These Joint Staff nuclear personnel operate within the CJCS Current Operations Center and the Emergency Actions (EA) cell. These personnel are assigned to the J36 as nuclear operations officers, and they are dual assigned to perform missions for the J33. Each member is assigned to one of five Operations Teams led by a 1-star flag officer Deputy Director for Operations (DDO). This flag officer is the CJCS representative for daily global operations and nuclear operations. The dual-assigned missions tasked to the DDO are led by the

2-star deputy directors of the J33 Current Operations (COPS) and J36 Nuclear and Homeland Defense Operations.

OTSD is usually led by an Air Force colonel that guides the training and procedures and provides the standardization for the Operations Teams. Depending on the current global situation, one mission or procedure may take precedence over the other. The Operations Teams are then left to decide which order or procedure they must follow, guided by the DDO. Usually, the five Operations Teams' DDO cannot agree to how each Operations Team will perform, so each Operations Team has its own set of operating procedures it abides by. This self-imposed friction is a problem that cannot be overlooked and must be addressed at the highest levels of military leadership. When OTSD provides the SOPs and certifies the capability of the five Operations Teams that are led by a 1-star or 2-star flag officer, then rank becomes an issue between a colonel and a flag officer.

The team members' lack of knowledge contributes to the difference in nomenclature and procedures of the NOCCs personnel. These differences in procedures are evident every day with miscommunication between the Operations Teams. Even the slightest miscommunication or misunderstanding between teams can lead to prohibitive delays. Such miscommunication inhibits the time-critical mission and diminishes the mission focus and determination of the team members. At the very least, these delays will lead to an embarrassing ineptitude and, at the worst, a catastrophic failure to provide time-critical nuclear orders. The Joint Staff must better train its nuclear personnel on the importance of how to perform the nuclear mission in this new threat environment.<sup>20</sup>

Training to realism is one of the means effectiveness that can be measured.<sup>21</sup> Improving the technology and interoperability of NC3 is evolutionary in some respects, but training to the

standards and adapting to the environment must be incorporated into the modernization of our nuclear forces. Training realism has three components: the task performed, how the task standard is met, and the how task conditions are expected to be performed.<sup>22</sup> The first two tasks are easily performed and measured tasks, but how task conditions are expected to be performed within a degraded environment are often waved for NC2 to ensure that the first two training components are met. The NC2 robustness and redundancy anticipate a degraded environment but training the adaptability of the joint forces in a degraded NC2 environment will prove the validity of the nuclear forces' personnel's ability to perform the mission.<sup>23</sup>

The lack of training and experience of the Joint Staff nuclear personnel coupled with the misunderstanding of the systems or NC3 prevents an effective and reliable command environment. The nuclear mission is not an organizational priority due to the current operations tasks and the lack of understanding of the subject matter. Prioritizing nuclear deterrence and NC2 is identified by the President and Secretary of Defense, and therefore a focused and knowledgeable military senior leader is needed to guide the Operations Teams.<sup>24</sup> Without this senior leadership, the proper training and motivation within the community will continue to lag. A line of effort for NC3 is to maintain senior leadership's secure and robust communications to conduct all-domain operations at any time.<sup>25</sup> With the current threat environment from China and Russia, and the habitually noted aging NC3, a senior military leader is required to assemble proper strategies and reviews for committees and congressional hearings to amplify the requirements for updating and prioritizing nuclear matters.

### **III. Strengthening Coordination and Expertise in the US Nuclear Weapons Community**

In the era of great power competition and growing security threats, the US needs to improve the outdated organization of its nuclear weapons community to better coordinate nuclear planning in the DoD. The Joint Staff could solve this issue with the standing up a dedicated directorate for nuclear plans and coordination. To do this, the Joint Staff needs more service members from the nuclear forces with the necessary experience to help manage the multiple elements of the US nuclear community. The additional Joint Staff personnel assigned to perform the nuclear mission within this new directorate must receive the dedicated and proper nuclear training. Only a staff with proper nuclear training and experience combined with the experienced staff can provide a sustained level of efficient and effective direction for the nuclear forces.

In 2018, then CJCS General Joseph Dunford addressed the Joint Staff during a town hall about global integration and maintaining the competitive military advantage. He stated,

What I'm suggesting to you is because the strategic landscape has changed in such fundamental ways – again, great power competition, competitive advantage had eroded, relative inventory of capabilities compared to what capacities we need, and then the character of war changing. What I'm suggesting to you is that the implications for how we make decisions, how we prioritize and allocate the force, how we do planning, and how we develop the force today and design the force for tomorrow, all has to change because the consequences of not changing are a lack of competitive advantage in the future.<sup>26</sup>

During his talk, General Dunford emphasized a few key ideas. First, the idea of the great power competition from two major powers, China and Russia. Since the end of the Cold War, the US has not had a peer competitor to worry about and the NDS identifies some fundamental changes required to maintain a military edge. Secondly, the US competitive military advantage brought about a period of isolation and lack of reform and innovation from the US military. The ability for the US military to operate uncontested in all-domains was supported by the destruction of the

Iraqi Army and quick victory in Operation Desert Storm. Also, during this time, the US did not perceive China or Russia as significant military threats. Lastly, Gen Dunford discussed the need for the US military not to repeat these mistakes and instead adapt the current forces and prioritize the future forces. The President, Secretary of Defense, and CJCS through the NSS, NDS, and NMS have all identified the importance of deterrence and the need for a modernized nuclear force investment in new personnel, ideas, and equipment.<sup>27</sup> Codifying the Joint Staff's nuclear personnel within a single directorate begins the nuclear community's evolution from the Cold War environment into the new era of Great Power Competition, as directed by the US's senior civilian and military leadership.

Establishing a J10 Directorate for Nuclear Planning consolidates nuclear subject matter experts into a single entity to improve the nuclear forces' coordination, communication, and efficiency. This directorate can be cost neutral if accomplished with existing Joint Staff personnel and resources. Most of the nuclear and support personnel required to establish a directorate are currently located within the Joint Staff's other directorates. Restructuring the nuclear mission from the J3 to a dedicated nuclear directorate similarly yielded positive results for the US Air Force.<sup>28</sup> The Task Force on DoD Nuclear Weapons Management found serious issues with senior leadership supervision in the nuclear mission expertise, resources, and readiness.<sup>29</sup> The US Air Force decided to implement a strategic plan in manpower management, established the Air Staff A10 Nuclear Matters, and aligned its strategic deterrence and nuclear operations training and education.<sup>30</sup> The A10 and the US Air Force training pipeline continue to support the nuclear forces. Like the US Air Force, the Joint Staff has shown a diminished contribution to the nuclear deterrence process leading to decreased NC2 capabilities.<sup>31</sup> While the US Air Force has shown a progression in its nuclear forces training, capabilities, and deterrence,

the Joint Staff nuclear personnel have stagnated again without any increase in manpower, dedicated joint nuclear training, or beneficial reorganization of Joint Staff.

If the nuclear mission is moved to the J10, then the Joint Staff nuclear billets will move from their current directorates to the J10 and be more efficiently organized to fulfill the nuclear mission. These subject matter experts have the knowledge and experience that can allow for nuclear matter stakeholders easy collaboration and advocacy. The nuclear expertise also allows for proper training of NC2 personnel. Established training parameters for all NC2 personnel will give them a better understanding of the mission, and confidence to perform a no-fail mission.

It is important to remember that establishing a new command or directorate is not unprecedented. This re-organization is similar to the Joint Staff J6 movement a decade ago. Secretary of Defense Gates briefed the Pentagon press corps on the downsizing stating, "This agenda is not about cutting the department's budget. It is about reforming and reshaping priorities to ensure that, in tough budgetary and economic times, we can focus defense resources where they belong: in America's fighting forces, investment in future capabilities and, most important, on our men and women in uniform."<sup>32</sup> As the security threat within the cyber domain increased, a more capable unit in US Cyber Command was required and the Joint Staff J6 was deemed unnecessary.<sup>33</sup> But within a short two years, C4 and cyber became a requirement for all levels of commands, including the joint forces leadership and doctrinal guidance. Therefore, the J6 was reestablished in 2012 with a focus on the transforming IT as a data fusion enterprise for all aspects of DoD communications and the ability to protect the networks. This reestablishment was led by the increased dependence on network-centric DoD systems and the rapidly increasing and changing communications and cyber threats.<sup>34</sup> The continued evolution epitomizes the essential and adaptive nature of the military to the changing security environment.

The successful creation of a new J6 Directorate for C4/Cyber illustrates that the type of Joint Staff reform advocated in this study has been done before and it worked. The Joint Staff adapted its organization and personnel to a new security environment and made US national security stronger. The Joint Staff's IT personnel migrated under the J6 directorate due to the additional IT and cyber missions at no cost to the government. Similarly for the proposed J10, nuclear personnel and support staff will come from the existing Joint Staff structure so the new directorate does not require additional government funding.<sup>35</sup> The reestablishment of the J6 directorate due to the changing security and threat environments is a direct corollary to the changes seen today within national security and nuclear deterrence. Another important example is the establishment of US Space Command due to changes in US national security and the threat environment in space.

A parallel exists between establishing a new space organizations and establishing new nuclear organizations due to the overlap of NC3 early warning and communication space assets. US Space Command was originally established in 1985 as a sub-unified combatant command to operate US military space assets. It was then disbanded in 2002 when the security environment changed again after the events of 9/11, and the DoD transitioned its focus to counter-terrorism operations.<sup>36</sup> But, the increased complexity of the space environment and the multi-domain effects on national military power prompted the US Government to lay the foundation for two new space organizations: US Space Command and US Space Force.<sup>37</sup> The US Space Command's reestablishment was necessary due to the increasing reliance on space capabilities for national security and homeland defense during this era of great power competition with China and Russia.<sup>38</sup> The Chinese and Russian space weaponization and counterspace technological advancements threaten US and allied space-based assets and reduce military

effectiveness.<sup>39</sup> Vital US national interests tied to the space domain and strategic nuclear deterrence require security, surety, and superiority of our space-based assets.<sup>40</sup> The constant changes in the space environments' security led to the establishment, disbandment, and reestablishment of US Space Command over 18 years, which is another example of the flexibility needed by the US to remain competitive with China Russia.

The current functions under the J3/J36 within the Operation, Training, and Standardization Division (OTSD) and the other nuclear divisions are planning and force design responsibilities that would be consolidated under the new directorate. The current OTSD has the mandate to train and certify all NOCC personnel within the Nuclear Command and Control System (NCCS). The NCCS is a system of systems that includes providing attack warnings and assessments, disseminating messages, managing forces, and maintaining survivable communications with the President and the nuclear operators.<sup>41</sup> OTSD is understaffed and cannot perform all required CJCS duties, as evidenced by the "standardization" responsibilities tasked to the individual Operations' Teams. OTSD can be split between multiple deputy directorates within the J10 for operations, training, and standardization and can provide certifications for personnel across the NCCS. This transition of personnel is in line with the NDAA for Fiscal Year 2017 (NDAA 17), authorizing the CJCS to allocate resources and forces to address emerging threats.<sup>42</sup> On many occasions, the CJCS has noted that the idea of great power competition, notably from China and Russia, has shown that the US must adapt to these near-peer militaries in the strategic environment by properly training and allocating personnel.<sup>43</sup>

The past decade has shown China and Russia quickly advancing in military technology, testing possible nuclear deliver systems, and increasing their own nuclear stockpiles. The Joint Staff cannot wait any longer to align its nuclear staff, develop a professional joint nuclear

training program, and provide the nuclear forces a more efficient means for plans, policy, and direction. The *Nuclear Matters Handbook 2020* references a third nuclear era, identified in the 2018 NPR, with China and Russia building their nuclear capabilities - "...acknowledging the return to Great Power competition and the enduring need for the US nuclear deterrent to be effective in the face of an increasingly complex and dangerous strategic environment. The United States cannot project power against nuclear-armed adversaries without effective, reliable nuclear forces."<sup>44</sup> The power and value of the US nuclear deterrence is based on the trained personnel responsible for its mission.

The reorganized deputy directorates in the J10 should also develop a training program in concert with the NOCCs and the J7 Directorate for Joint Force Development. The CJCSs global integration responsibilities for training joint personnel to protect national interests in the most compelling strategic environment is mandated by Title 10.<sup>45</sup> Since nuclear deterrence is the DoD's priority line of effort and covers four of the five 2018 NMS mission areas, the CJCS via the J7 director has a joint training imperative to mandate training for the nuclear forces.<sup>46</sup> These nuclear courses will provide the necessary education and basic understanding of nuclear operations. Presently, a different course is required for each certification and required tasks must be performed successfully before the certification written and performance tests are administered. All NOCC personnel should be required to attend each course provided at every NOCC location by trained personnel. The joint nuclear training will ensure that all nuclear operators can communicate with the same level of understanding. This training is necessary for a no-fail mission, but it also reinforces the need for a J10 director to collaborate with the J7 director and coordinate with the NOCCs for joint training and readiness requirements.<sup>47</sup>

The NC3 and the strategies to counter adversary nuclear threats are required for the US to maintain its competitive nuclear advantage.<sup>48</sup> NC3 gives the President the ability to exercise command over nuclear weapons through “facilities, equipment, communications, procedures, and personnel....”<sup>49</sup> General Hyten’s testimony before Congress was fortified by the 2018 unclassified National Defense Strategy (NDS) stating, “Without sustained and predictable investment to restore readiness and modernize our military to make it fit for our time, we will rapidly lose our military advantage, resulting in a Joint Force that has legacy systems irrelevant to the defense of our people.”<sup>50</sup>

In addition to the need for a J10 with sufficient personnel trained in NC2, addressing the DoD’s vulnerabilities in coordination also requires a flag officer of sufficient rank to overcome parochialism and help resolve the various competing plans and procedures and training within the US nuclear community. Nuclear planning, procedures and training are unique tasks that require a broad understanding to focus and coordinate nuclear force development. This expertise necessitates senior-level leadership congruent with the other Joint Staff directorates. A senior flag officer from the nuclear field will understand the field's nuances and help overcome the current system of various uncoordinated plans and procedures for the US nuclear mission. This nuclear expert would be an advocate for the multiple units in the joint nuclear force. This senior leader would help improve coordination and collaboration between these nuclear units, as well as with civilian leadership and agencies.

This type of subject matter expert senior leadership providing advocacy for technical fields is also seen in the Joint Staff J6 Command, Control, Communication, and Computers/Cyber (C4/Cyber) director, a career Command and Control (C2) officer and C4/Cyber senior leader.<sup>51</sup> Lieutenant General Dennis Crall’s diverse and expert background has

led to his selection as the director for the Joint Staff J6, and he is the driving force behind the implementation of the Joint All-Domain Command Control (JADC2) approach and strategy. The JADC2 is currently reforming and restructuring how the joint forces C2 operates and qualitatively improves decision-making ability.<sup>52</sup> He has also facilitated the Army and Air Force's signing of a Memorandum of Understanding to coordinate acquisitions and interoperability of C2 systems for integration into the joint forces.<sup>53</sup> LtGen Crall understands the importance of strategy and posture reviews when engaging congress for funding the JADC2 approach. This is an example of the type of advocacy and expertise that the nuclear forces require to maintain relevance for nuclear deterrence.<sup>54</sup>

A J10 director will help coordinate the various US nuclear forces and provide the necessary experience and informed advice on nuclear matters needed by the CJCS, NOCCs, and senior civilian leadership. It is necessary to reform nuclear planning and procedures and develop training through this new directorate to simplify and properly coordinate the actions required from the nuclear forces and agencies. The director will advocate for nuclear guidance and coordinate the training and readiness standards for the required functional areas. Mutual understanding and matching execution are essential due to the possibility of Operations Team's personnel moving to another team. These procedures provide the team members a seamless transition for the no-fail mission requirements. The director can also help guide the entirety of the military nuclear force's future requirements by coordinating with the CCMD's, military services, agencies, and senior civilian leadership.

The Secretary of Defense has recognized that emerging global threats and the increasing complexity of the security environment are critical challenges to US national security.<sup>55</sup> The strategic approach noted in the unclassified NDS says that the US must be "strategically

predictable, but operationally unpredictable.”<sup>56</sup> US deterrence is strategic because it is built upon its nuclear capabilities and willingness to use those capabilities. The unpredictability stems from how the US will employ these capabilities. The strategic understanding of how nuclear weapons are employed requires a senior leader with the expertise and focus on nuclear operations and deterrence to lead a nuclear directorate in this new environment. The CJCS emphasized the importance of the Joint Force throughout the 2011 National Military Strategy, stating that, "... we will maintain a whole, Joint Force that retains quality people, sustains and develops the right capabilities, and maintains a sustainable tempo to effectively mitigate operational, institutional, force management, and future challenges risk."<sup>57</sup> The nuclear responsibilities from the other Joint Staff deputy directors is a cost neutral and a justifiable realignment of personnel. The coordination of nuclear matters between military leadership and civilian leadership will require a formalized strategy for approval in the NDAA.

The Vice Chairman of the Joint Chiefs of Staff (VCJCS) is the current Committee of Principals invitee to multiple nuclear matters subcommittees and working groups. The nuclear matters committees and working groups were directed by the National Security Presidential Directive 28 (NSPD-28) and are comprised of individuals from the ten NCCS departments.<sup>58</sup> These committees manage and review key matters such as NC2, survivability of systems, intelligence, surety, and incident response.<sup>59</sup> NSPD-28 also directs the two-tier flag level management to implement senior management oversight of safety and security of NC2.<sup>60</sup> The new J10 director can take responsibility for the subcommittee and working groups and provide the attention and expert advice for the senior leadership. The Joint Requirements Oversight Council (JROC) is a statutory council chaired by the VCJCS to assist the CJCS in assessing and developing joint military capabilities and identifying any capability and performance gaps.

Currently no member of the JROC is an advocate for nuclear issues other than the VCJCS, who is also a member of the Nuclear Weapons Council (NWC). The NWC is also a statute council most recently updated in the NDAA 17.<sup>61</sup>

#### **IV. CONCLUSION**

The personnel managing the command and control of US nuclear forces are inexperienced, under-resourced, and uncoordinated. The NOCCs and the Joint Staff nuclear personnel have different operating procedures, leading to misunderstandings between Operating Teams and command centers. The Joint Staff personnel coordinating nuclear operations require better training in nuclear matters. The nuclear chain of command is required to provide the President with the ability to conduct a nuclear strike at anytime from anywhere in the world, but the modernization of the NC3 and functions of the staff have been severely lacking for decades. The US can no longer operate freely within all domains, and the Secretary of Defense identified nuclear deterrent as the DoD's number one priority.<sup>62</sup> Like C4, cyber, and space, the nuclear forces must adapt to the evolving threat and security environment as countries like China, Russia and North Korea continue to modernize nuclear systems and weapons.<sup>63</sup>

The combination of great power competition and new security threats is producing an element of risk the US cannot afford to remain lax upon. It requires updated capabilities to coordinate and plan for the conduct of nuclear operations. NC3 updates are urgently needed for the communications equipment and the personnel that operate the equipment. Proper training is a necessity to plan for and execute a no-fail mission. The Joint Staff needs more people properly trained in the nuclear mission and consolidate sufficient number of such trained personnel into a single directorate can truly coordinate the various elements of the nuclear

community. This proposed J10 directorate would provide the nuclear forces and civilian leadership a single point of contact for coordination and reform. Reforming the Joint Staff to adapt to changing threats is a necessary evolution of the military and is consistent with previous re-organizations of the Joint Staff. For example, the Joint Staff reestablished the J6 Directorate, and US Cyber Command became a CCMD because of the emerging C4 and cyber threats.<sup>64</sup> Due to the space threats, US Space Command and US Space Force were established by the President.<sup>65</sup> All of these commands required a 3 or 4-star flag officer leader.

The director of the nuclear planning directorate would be the senior military leader with the subject matter expertise, experience, and knowledge to perform this nuclear mission. This equivalent rank to the other Joint Staff directors provides advocacy for the nuclear forces and coordinates nuclear matters. This expert can apply the years of experience and knowledge to the new threat and near-peer adversary militaries to continue to provide a capable deterrence.<sup>66</sup> This strategic understanding of nuclear weapons employment requires a senior military leader with the nuclear expertise. The majority of the personnel transferred to the new directorate is cost neutral, and the director position could be as well.

The lack of modernization of the NC3 system is a serious vulnerability for US national security. Authorization and funding for improving the personnel responsible for NC3 is urgently needed. The lack of training and expertise of the nuclear personnel continue to be an issue for maintaining the NC2, but this is a problem that can be solved quickly if the right reforms are approved. The key reform needed is a reorganization of nuclear operations into a single directorate in the Joint Staff to properly coordinate the different members of the US nuclear weapons community. China, Russia, and other nuclear adversaries are modernizing their nuclear programs and their strategic functions. The US needs to protect its nuclear deterrence by

reforming and improving the human element in the command, control, and communications of its nuclear weapons.

## Glossary

### **Coordinate**

To advance systematically an analysis and exchange of information among principals who have or may have a need to know certain information to carry out specific incident or accident management responsibilities.<sup>67</sup>

### **Nuclear command and control (NC2)**

Exercise of authority and direction by the President, as commander in chief through established command lines over nuclear weapon operations of military forces, as chief executive over all government activities that support those operations, and as head of state over required multinational actions that support those operations.<sup>68</sup>

### **Nuclear Command and Control System (NCCS)**

Collection of activities, processes, and procedures performed by appropriate commanders and support personnel who, through the chain of command, allow for senior-level decisions on nuclear weapons employment to be made based on relevant information and subsequently allow for those decisions to be communicated to forces for execution.<sup>69</sup>

### **Nuclear command, control, and communications (NC3)**

Facilities, equipment, communications, procedures, and personnel that enable presidential nuclear direction to be carried out.<sup>70</sup>

### **Nuclear Component**

The part of a nuclear weapon composed of fissionable or fusionable materials that contribute substantially to nuclear energy released during detonation. Nuclear components include radioactive boosting materials.<sup>71</sup>

### **Nuclear deterrent**

A desired strategic effect of the US nuclear enterprise that protects the US homeland, assures allies, and dissuades adversaries by maintaining a safe, secure, effective, and reliable nuclear weapons program.<sup>72</sup>

### **Nuclear enterprise**

Composite of DoD US nuclear forces and elements, to include the deterrent forces of Air Force nuclear-capable bombers and fighters and associated nuclear weapons, as well as ICBMs and cruise missiles; the Navy's ballistic missile submarines and associated nuclear SLBMs; the nuclear infrastructure to build, maintain, and sustain the nuclear forces; US nuclear-capable bases and scientific facilities; nuclear command and control; and military personnel, civilians, and contractors performing the nuclear mission.<sup>73</sup>

## Endnotes

- <sup>1</sup> US Department of Defense, *Nuclear Posture Review 2018* (Washington, DC, 2018), I.
- <sup>2</sup> Joint Chiefs of Staff, *Joint Operations*, JP 3-0 Change 1 2018 (Washington, DC: Joint Chiefs of Staff, January 17, 2017), VI-4, [https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3\\_0ch1.pdf](https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_0ch1.pdf)
- <sup>3</sup> Jim Garamone, "Milley Makes Case for U.S. Military Keeping Up with Global, Technology Changes," *DoD News*, December 2, 2020, <https://www.defense.gov/Explore/News/Article/Article/2432855/milley-makes-case-for-us-military-keeping-up-with-global-technology-changes/>
- <sup>4</sup> Connie Lee, "China, Russia Hypersonic Programs: Real Progress or Bluster?." *National Defense Magazine*, (July 2019), 30-32.
- <sup>5</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 1.
- <sup>6</sup> US Defense Intelligence Agency, *Global Nuclear Landscape 2018* (Washington, DC, 2018), VI. [https://dod.defense.gov/portals/1/features/2018/0218\\_NPR/img/Global\\_Nuclear\\_Landscape\\_2018\\_Final.pdf](https://dod.defense.gov/portals/1/features/2018/0218_NPR/img/Global_Nuclear_Landscape_2018_Final.pdf)
- <sup>7</sup> James J. Kavanagh, Nuclear Operations Officer, *United States Marine Corps*, Washington, DC: (2016-2020).
- <sup>8</sup> Secretary of Defense Jim Mattis, Memorandum, Guidance from Secretary Jim Mattis, Office of the Secretary of Defense, to Department of Defense, Guidance, Memorandum October 5, 2017.
- <sup>9</sup> Barry Rosenberg, "Joint Staff's New Initiatives in Cyber and Defense IT will have DoD-Wide Impact," *Defense Systems*, June 2012, <https://defensesystems.com/articles/2012/06/25/interview-mg-mark-bowman.aspx>
- <sup>10</sup> US Space Force, "US Space Force Mission," accessed October 13, 2020, <https://www.spaceforce.mil/About-Us/About-Space-Force/Mission/>
- <sup>11</sup> US Department of Defense, *Nuclear Posture Review 2018* (Washington, DC, 2018), 56.
- <sup>12</sup> Lt Gen David A. Deptula, USAF (Ret.), and Dr. William A. LaPlante, with Robert Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications*, (Arlington, VA: The Mitchell Institute for Aerospace Studies and The MITRE Corporation, February 2019), 8-9.
- <sup>13</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 5. FISCAL YEAR 2021 BUDGET REQUEST <https://armscontrolcenter.org/white-house-budget-request-for-fiscal-year-2021-nuclear-weapons-spending/>
- <sup>14</sup> US Government Accountability Office, *Defense Nuclear Enterprise: DOD Continues to Address Challenges but Needs to Better Define Roles and Responsibilities and Approaches to Collaboration*, (Washington, DC: Government Accountability Office, 2018), 2, [https://www.gao.gov/products/gao-19-29#summary\\_recommend](https://www.gao.gov/products/gao-19-29#summary_recommend)
- <sup>15</sup> Cristina T. Chaplain, *Nuclear Command, Control, and Communications: Review of DoD's Current Modernization Efforts*, US Government Accountability Office, (Washington, DC: March 18, 2014), 1, <https://www.gao.gov/assets/gao-14-414r.pdf>
- <sup>16</sup> US Department of Defense, *DoD Command, Control, and Communications (C3) Modernization Strategy*, (Washington, DC: Office of the Deputy Secretary of Defense, September 2020), 12. <https://dodcio.defense.gov/Portals/0/Documents/DoD-C3-Strategy.pdf>
- <sup>17</sup> US Department of Defense, *DoD Command, Control, and Communications (C3) Modernization Strategy*, (Washington, DC: Office of the Deputy Secretary of Defense, September 2020), 12. <https://dodcio.defense.gov/Portals/0/Documents/DoD-C3-Strategy.pdf>
- <sup>18</sup> Chairman of the Joint Chiefs of Staff, *Nuclear Command and Control Joint Mission Essential Task and Computer-Based Training*, Instruction 3520.01 November 1, 2005.
- <sup>19</sup> Congressional Budget Office, *Projected Costs of the U.S. Nuclear Forces 2019-2028*, (Office of the Director, Congressional Budget Office, 2019), 3, <https://www.cbo.gov/system/files/2019-01/54914-NuclearForces.pdf>.
- <sup>20</sup> James J. Kavanagh, Nuclear Operations Officer, *United States Marine Corps*, Washington, DC: (2016-2020).
- <sup>21</sup> Jim Greer, "Training: The Foundation for Success in Combat," (Heritage.org: Military Strength Topical Essays, October 4, 2018), <https://www.heritage.org/military-strength-topical-essays/2019-essays/training-the-foundation-success-combat>

- <sup>22</sup> Jim Greer, "Training: The Foundation for Success in Combat," (Heritage.org: Military Strength Topical Essays, October 4, 2018), <https://www.heritage.org/military-strength-topical-essays/2019-essays/training-the-foundation-success-combat>
- <sup>23</sup> Lt Gen David A. Deptula, USAF (Ret.), and Dr. William A. LaPlante, with Robert Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications*, (Arlington, VA: The Mitchell Institute for Aerospace Studies and The MITRE Corporation, February 2019), 27.
- <sup>24</sup> The White House, *The National Security Strategy of the United States* (Washington, DC, 2017), 30. US Department of Defense, *DoD Command, Control, and Communications (C3) Modernization Strategy*, (Washington, DC: Office of the Deputy Secretary of Defense, September 2020), 11. <https://dodcio.defense.gov/Portals/O/Documents/DoD-C3-Strategy.pdf>
- <sup>26</sup> Joseph F. Dunford, Jr., Global Integration – Maintaining a Competitive Advantage, Office of the Chairman of the Joint Chiefs of Staff Public Affairs, (Washington, DC, October 30, 2018), <https://www.jcs.mil/Media/News/News-Display/Article/1681761/global-integration-maintaining-a-competitive-advantage/>
- <sup>27</sup> The White House, *The National Security Strategy of the United States* (Washington, DC, 2017), 30.
- <sup>28</sup> US Department of Defense, *Report of the Task Force on DoD Nuclear Weapons Management, Phase II: Review of the Nuclear Mission* (Washington, DC: Office of the Secretary of Defense for Nuclear Matters, December 2008), 1.
- <sup>29</sup> US Department of Defense, *Report of the Task Force on DoD Nuclear Weapons Management, Phase II: Review of the Nuclear Mission* (Washington, DC: Office of the Secretary of Defense for Nuclear Matters, December 2008), 1.
- <sup>30</sup> US Department of Defense, *Report of the Task Force on DoD Nuclear Weapons Management, Phase II: Review of the Nuclear Mission* (Washington, DC: Office of the Secretary of Defense for Nuclear Matters, December 2008), 1.
- <sup>31</sup> US Department of Defense, *Report of the Task Force on DoD Nuclear Weapons Management, Phase II: Review of the Nuclear Mission* (Washington, DC: Office of the Secretary of Defense for Nuclear Matters, December 2008), xi.
- <sup>32</sup> Enterprise Innovation Institute, *Gates Announces Major Cuts at Defense*, (Georgia Tech Procurement Assistance Center, August 19, 2010), <https://gtpac.org/2010/08/19/gates-announces-major-cuts-at-defense/>
- <sup>33</sup> Enterprise Innovation Institute, *Gates Announces Major Cuts at Defense*, (Georgia Tech Procurement Assistance Center, August 19, 2010), <https://gtpac.org/2010/08/19/gates-announces-major-cuts-at-defense/>
- <sup>34</sup> Barry Rosenberg, *Joint Staff Reestablishes J6 Directive with Many New Responsibilities*, Defense Systems, (McLean, VA, May 10, 2012), <https://defensesystems.com/articles/2012/05/10/joint-staff-j6-directorate-reestablished-bowman.aspx?m=1>
- <sup>35</sup> Barry Rosenberg, *Joint Staff Reestablishes J6 Directive with Many New Responsibilities*, Defense Systems, (McLean, VA, May 10, 2012), <https://defensesystems.com/articles/2012/05/10/joint-staff-j6-directorate-reestablished-bowman.aspx?m=1>
- <sup>36</sup> Tom Roeder, "History of Space Command in Colorado Springs: Timeline," (The Gazette, December 2021), [https://gazette.com/military/history-of-space-command-in-colorado-springs-timeline/article\\_5bd0a13c-3b46-11eb-bd91-43521f574012.html](https://gazette.com/military/history-of-space-command-in-colorado-springs-timeline/article_5bd0a13c-3b46-11eb-bd91-43521f574012.html)
- <sup>37</sup> Yasmin Tadjdeh, "Space Force, New Services Future Coming into Focus," *National Defense Magazine*, August 2020, 24-26.
- <sup>38</sup> US Department of Defense, *Defense Space Strategy Summary* (Washington, DC, 2020), 1.
- <sup>39</sup> Yasmin Tadjdeh, "Space Force, New Services Future Coming into Focus," *National Defense Magazine*, August 2020, 26.
- <sup>40</sup> US Department of Defense, *Defense Space Strategy Summary* (Washington, DC, 2020), 1.
- <sup>41</sup> Headquarters US Air Force, *Nuclear Command, Control, and Communications*, AFDP 3-72 (Maxwell, AFB, AL: Curtis E. Lemay Center for Doctrine Development and Education, December 2020), 18.
- <sup>42</sup> Kathleen J. McInnis, *Fact Sheet: FY2017 National Defense Authorization Act (NDAA) DoD Reform Proposals*, (Washington, DC: Congressional Research Service, May 18, 2017), CRS-9.
- <sup>43</sup> Joseph F. Dunford, Jr., *Global Integration – Maintaining a Competitive Advantage*, Office of the Chairman of the Joint Chiefs of Staff Public Affairs, (Washington, DC, October 30, 2018), <https://www.jcs.mil/Media/News/News-Display/Article/1681761/global-integration-maintaining-a-competitive-advantage/>
- <sup>44</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 2.

- <sup>45</sup> Chairman of the Joint Chiefs of Staff, *Joint Training Policy for the Armed Forces of the United States*, CJCSI 3500.01J (Washington, DC: CJCS, January 13, 2020), A-1-A-2.
- <sup>46</sup> Chairman of the Joint Chiefs of Staff, *Joint Training Policy for the Armed Forces of the United States*, CJCSI 3500.01J (Washington, DC: CJCS, January 13, 2020), A-1-A-2, D-1.
- <sup>47</sup> Chairman of the Joint Chiefs of Staff, *Joint Training Policy for the Armed Forces of the United States*, CJCSI 3500.01J (Washington, DC: CJCS, January 13, 2020), D-1.
- <sup>48</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 6.
- <sup>49</sup> Lt Gen David A. Deptula, USAF (Ret.), and Dr. William A. LaPlante, with Robert Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications*, (Arlington, VA: The Mitchell Institute for Aerospace Studies and The MITRE Corporation, February 2019), 8.
- <sup>50</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 1.
- <sup>51</sup> Dennis A. Crall, *Biography*, Joint Chiefs of Staff, <https://www.jcs.mil/Leadership/Article-View/Article/1576819/lt-gen-dennis-a-crall/>
- <sup>52</sup> John R. Hoehn, *Joint All-Domain Command and Control (JADC2)*, CRS Report for Congress R46725 (Washington, DC: Congressional Research Service, March 18, 2021), 1.
- <sup>53</sup> Theresa Hitchens, "Services' Fear of Losing 'Control' Blocking JADC2 Progress, Experts Say," *Breaking Defense*, (2020), <https://breakingdefense.com/2020/10/services-fear-of-losing-control-blocking-jadc2-progress-say-experts/>.
- <sup>54</sup> Theresa Hitchens, "Exclusive: J6 Says JADC2 Is A Strategy; Service Posture Reviews Coming," *Breaking Defense*, (2021), <https://breakingdefense.com/2021/01/exclusive-j6-says-jadc2-is-a-strategy-service-posture-reviews-coming/>
- <sup>55</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 1.
- <sup>56</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 5.
- <sup>57</sup> US Department of Defense, *The National Military Strategy of the United States of America* (Washington, DC, 2011), 18.
- <sup>58</sup> US Department of Defense, *Nuclear Matters: A Practical Guide* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2008), 113.
- <sup>59</sup> US Department of Defense, *Nuclear Matters: A Practical Guide* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2008), 113-118.
- <sup>60</sup> US Department of Defense, *Nuclear Matters: A Practical Guide* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2008), 117.
- <sup>61</sup> National Defense Authorization Act for Fiscal Year 2017, Public Law 114-328, 10 U.S.C. §§ 130 STAT. 2340 133b § (b)(5), (2016).  
US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 89.
- <sup>62</sup> Secretary of Defense Jim Mattis, Memorandum, Guidance from Secretary Jim Mattis, Office of the Secretary of Defense, to Department of Defense, Guidance, Memorandum October 5, 2017.
- <sup>63</sup> US Department of Defense, *Nuclear Posture Review 2018* (Washington, DC, 2018), I.
- <sup>64</sup> Barry Rosenberg, "Joint Staff's New Initiatives in Cyber and Defense IT will have DoD-Wide Impact," *Defense Systems*, June 29, 2012, <https://defensesystems.com/articles/2012/06/25/interview-mg-mark-bowman.aspx>
- <sup>65</sup> US Space Force, "US Space Force Mission," accessed October 13, 2020, <https://www.spaceforce.mil/About-Us/About-Space-Force/Mission/>  
US Space Command, *Commander's Vision: Mission*, (Washington, DC: US Department of Defense), <https://www.spacecom.mil/Mission/Commanders-Strategic-Vision/>
- <sup>66</sup> US Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America*, (Washington, DC, 2018), 1.

<sup>67</sup> US Department of Defense, *Nuclear Weapon Accident Response Procedures (NARP)*, Directive 3150.8-M, February 22, 2005, Definitions, DEF 6.

<sup>68</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 332.

<sup>69</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 332.

<sup>70</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 333.

<sup>71</sup> US Department of Defense, *Nuclear Weapon Accident Response Procedures (NARP)*, Directive 3150.8-M, February 22, 2005, Definitions, DEF 23.

<sup>72</sup> US Department of Defense, *Nuclear Weapon Accident Response Procedures (NARP)*, Directive 3150.8-M, February 22, 2005, Definitions, 333.

US Department of Defense, *Nuclear Posture Review 2018* (Washington, DC, 2018).

<sup>72</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 333.

<sup>73</sup> US Department of Defense, *Nuclear Matters Handbook 2020* (Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, Washington, DC, 2020), 333.

## Bibliography

- Blair, Bruce G. *The Logic of Accidental Nuclear War*. The Brookings Institute, Washington, D.C.:1993.
- Blair, Bruce G. *Strategic Command and Control: Redefining the Nuclear Threat*. The Brookings Institute, Washington, D.C.:1985.
- Bracken, Paul J. *The Command and Control of Nuclear Forces*. New Haven: Yale University Press, 1983.
- Carter, Ashton B., Steinbruner, John D., and Zraket, Charles A. *Managing Nuclear Operations*. The Brookings Institute, Washington, D.C.:1987.
- Chairman of the Joint Chiefs Staff. *Insights and Best Practices Focus Paper: Authorities, 2<sup>nd</sup> ed.* Suffolk, VA: Deployable Training Division, Joint Staff J7, Joint Training, 2016).
- Chairman of the Joint Chiefs of Staff. *Joint Concept for Integrated Campaigning*. Washington, DC, Joint Staff, 2018.
- Chairman of the Joint Chiefs of Staff. *Joint Doctrine Note 2-19: Strategy*. 2019.  
<https://www.jcs.mil/Doctrine/Joint-Doctrine-Pubs/Joint-Doctrine-Notes/>
- Chairman of the Joint Chiefs of Staff. *Joint Operations*. JP 3-0 Change 1 2018. Washington, DC: Joint Chiefs of Staff, January 17, 2017.  
[https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3\\_0ch1.pdf](https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_0ch1.pdf)
- Chairman of the Joint Chiefs of Staff. *Joint Planning*. JP 5-0. Washington, DC: Joint Chiefs of Staff, December 1, 2020.
- Chairman of the Joint Chiefs of Staff. *Joint Training Policy for the Armed Forces of the United States*. CJCSI 3500.01J. Washington, DC: January 2020.
- Chairman of the Joint Chiefs of Staff. *Nuclear Command and Control Joint Mission Essential Task and Computer-Based Training*. Instruction 3520.01 November 1, 2005.
- Chaplain, Cristina T. *Nuclear Command, Control, and Communications: Review of DoD's Current Modernization Efforts*, US Government Accountability Office. Washington, DC: March 18, 2014. <https://www.gao.gov/assets/gao-14-414r.pdf>
- Congressional Budget Office. *Projected Costs of the U.S. Nuclear Forces 2019-2028*. Office of

- the Director, Congressional Budget Office, 2019.  
<https://www.cbo.gov/system/files/2019-01/54914-NuclearForces.pdf>.
- Crall, Dennis A. *Biography*. Joint Chiefs of Staff, <https://www.jcs.mil/Leadership/Article-View/Article/1576819/lt-gen-dennis-a-crall/>
- Department of Defense Reorganization Act of 1986*. 1st ed. Oxford University Press, 2001.  
<http://www.oxfordreference.com/view/10.1093/acref/9780199891580.001.0001/acref-9780199891580-e-2306>.
- Deptula, David A., and LaPlante, William A. with Haddick, Robert. *Modernizing U.S. Nuclear Command, Control, and Communications*. Arlington, VA: The Mitchell Institute for Aerospace Studies and The MITRE Corporation, February 2019, 8-9.
- Dunford, Jr., Joseph F. *Global Integration – Maintaining a Competitive Advantage*. Office of the Chairman of the Joint Chiefs of Staff Public Affairs. Washington, DC, October 2018, <https://www.jcs.mil/Media/News/News-Display/Article/1681761/global-integration-maintaining-a-competitive-advantage/>
- Enterprise Innovation Institute. *Gates Announces Major Cuts at Defense*. Georgia Tech Procurement Assistance Center, August 2010, <https://gtpac.org/2010/08/19/gates-announces-major-cuts-at-defense/>
- Greer, Jim. “Training: The Foundation for Success in Combat.” Heritage.org: Military Strength Topical Essays (2018), <https://www.heritage.org/military-strength-topical-essays/2019-essays/training-the-foundation-success-combat>
- Headquarters US Air Force. *Nuclear Command, Control, and Communications*. AFDP 3-72 Maxwell, AFB, AL: Curtis E. Lemay Center for Doctrine Development and Education, December 2020.
- Hersman, Rebecca K.C., Brewer, Eri, and Claeys, Suzanne. *NC3: Challenges Facing the Future System*. Center for Strategic and International Studies Debriefs: 2020. [https://csis-website-prod.s3.amazonaws.com/s3fspublic/publication/207009\\_NC3\\_Challenges\\_Facing\\_Future\\_System\\_v7.pdf](https://csis-website-prod.s3.amazonaws.com/s3fspublic/publication/207009_NC3_Challenges_Facing_Future_System_v7.pdf)
- Hitchens, Theresa. “Exclusive: J6 Says JADC2 Is A Strategy; Service Posture Reviews Coming.” *Breaking Defense* (2021), <https://breakingdefense.com/2021/01/exclusive-j6-says-jadc2-is-a-strategy-service-posture-reviews-coming/>
- Hitchens, Theresa. “Services’ Fear of Losing ‘Control’ Blocking JADC2 Progress, Experts Say.” *Breaking Defense* (2020), <https://breakingdefense.com/2020/10/services-fear-of-losing-control-blocking-jadc2-progress-say-experts/>

- Hoehn, John R. *Joint All-Domain Command and Control (JADC2)*. CRS Report for Congress R46725. Washington, DC: Congressional Research Service, March 18, 2021.
- Lee, Connie. “China, Russia Hypersonic Programs: Real Progress or Bluster?.” *National Defense Magazine*, (July 2019), 30-32.
- Lowther, Adam, and McGiffin, Curtis. *America Needs a “Dead Hand”*. War on the Rocks: 2019. <https://warontherocks.com/2019/08/america-needs-a-dead-hand/>
- Lowther, Adam. *The Big and Urgent Task of Revitalizing Nuclear Command, Control, Communications*. War on the Rocks: 2019. <https://warontherocks.com/2019/10/the-big-and-urgent-task-of-revitalizing-nuclear-command-control-and-communications/>
- Mattis, James. “Remarks by Secretary Mattis at a Troop Event in Naval Base Kitsap, Washington.” Speech. Kitsap, WA, August 9, 2017. <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1276693/remarks-by-secretary-mattis-at-a-troop-event-in-naval-base-kitsap-washington/>
- Mattis, Secretary of Defense Jim, Memorandum, Guidance from Secretary Jim Mattis, Office of the Secretary of Defense, to Department of Defense, Guidance, Memorandum October, 2017.
- McInnis, Kathleen J. *Fact Sheet: FY2017 National Defense Authorization Act (NDAA) DoD Reform Proposals*. Washington, DC: Congressional Research Service, May 18, 2017.
- Perry, William J., Collina, Tom Z. *The Button: The Nuclear Arms Race and Presidential Power from Truman to Trump*. BenBella Books, Inc., Callas, TX: 2020.
- Reece, Casey Kim. *The Rand Strategy Assessment System as a Decision Support System for Nuclear Command, Control, and Communications Net Assessment*. Naval Postgraduate School, 1989.
- Roeder, Tom. “History of Space Command in Colorado Springs: Timeline.” *The Gazette*, December 2021, [https://gazette.com/military/history-of-space-command-in-colorado-springs-timeline/article\\_5bd0a13c-3b46-11eb-bd91-43521f574012.html](https://gazette.com/military/history-of-space-command-in-colorado-springs-timeline/article_5bd0a13c-3b46-11eb-bd91-43521f574012.html)
- Rosenberg, Barry. “Joint Staff’s New Initiatives in Cyber and Defense IT will have DoD-Wide Impact.” *Defense Systems*, June 29, 2012, <https://defensesystems.com/articles/2012/06/25/interview-mg-mark-bowman.aspx>
- Rosenberg, Barry. *Joint Staff Reestablishes J6 Directive with Many New Responsibilities*.

Defense Systems. McLean, VA, May 2012,  
<https://defensesystems.com/articles/2012/05/10/joint-staff-j6-directorate-reestablished-bowman.aspx?m=1>

Tadjdeh, Yasmin. "Space Force, New Services Future Coming into Focus." *National Defense Magazine*. August 2020.

The White House. *The National Security Strategy of the United States*. Washington, DC, 2017.

US Congress. Senate. *Department of Defense Reorganization Act of 1986 HR 3622*. 99th Cong., Congressional Report 99-824. (October 1, 1986).

US Defense Intelligence Agency. *Global Nuclear Landscape 2018*. Washington, DC, 2018.  
[https://dod.defense.gov/portals/1/features/2018/0218\\_NPR/img/Global\\_Nuclear\\_Landscape\\_2018\\_Final.pdf](https://dod.defense.gov/portals/1/features/2018/0218_NPR/img/Global_Nuclear_Landscape_2018_Final.pdf)

US Department of Defense. *Defense Space Strategy Summary*. Washington, DC, 2020.

US Department of Defense. *DoD Command, Control, and Communications (C3) Modernization Strategy*. Washington, DC: Office of the Deputy Secretary of Defense, September 2020.  
<https://dodcio.defense.gov/Portals/0/Documents/DoD-C3-Strategy.pdf>

US Department of Defense. *Military and Security Developments Involving the People's Republic of China 2020, Annual Report to Congress*. Office of the Secretary of Defense, Washington, DC, 2020, <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DoD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>

US Department of Defense. *Nuclear Matters: A Practical Guide*. Office of the Deputy Assistant Secretary of Defense for Nuclear Matters. Washington, DC, 2008.

US Department of Defense. *Nuclear Matters Handbook 2020*. Office of the Deputy Assistant Secretary of Defense for Nuclear Matters. Washington, DC, 2020.

US Department of Defense. *Nuclear Posture Review 2018*. Washington, DC, 2018.

US Department of Defense. *Nuclear Weapon Accident Response Procedures (NARP)*. Directive 3150.8-M, February 22, 2005, Definitions.

US Department of Defense. *Report of the Task Force on DoD Nuclear Weapons Management, Phase II: Review of the Nuclear Mission*. Washington, DC: Office of the Secretary of Defense for Nuclear Matters, December 2008.

US Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. Washington, DC, 2018.

US Department of Defense. *The National Military Strategy of the United States of America*. Washington, DC, 2011.

US Department of Defense. *The Nuclear Matters Handbook: Expanded Edition*. Office of the Deputy Assistant Secretary of Defense for Nuclear Matters. Washington, DC, 2011.

US Government Accountability Office. *Defense Nuclear Enterprise: DOD Continues to Address Challenges but Needs to Better Define Roles and Responsibilities and Approaches to Collaboration*. Washington, DC: Government Accountability Office, 2018.  
[https://www.gao.gov/products/gao-19-29#summary\\_recommend](https://www.gao.gov/products/gao-19-29#summary_recommend)

US Strategic Command Public Affairs. *USSTRATCOM Announces Initial Operational Capability of NC3 Enterprise Center*. U.S. Strategic Command, Offutt Air Force Base, Neb.: 2019. <https://www.stratcom.mil/Media/News/News-Article-View/Article/1805006/usstratcom-announces-initial-operational-capability-of-nc3-enterprise-center/>