REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
28-05-2021	Master's Thesis	August 2020 to May 2021

4. TITLE AND SUBTITLE
Winning Future Conflicts: Designing A Framework to Assess and Evaluate the Efficacy of Joint Warfighting Concepts

5a. CONTRACT NUMBER
n/a

5b. GRANT NUMBER
n/a

5c. PROGRAM ELEMENT NUMBER
n/a

6. AUTHOR(S)
Markowski, Adria
Department of Defense Civilian

5d. PROJECT NUMBER
n/a

5e. TASK NUMBER
n/a

5f. WORK UNIT NUMBER
n/a

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Joint Forces Staff College-NDU
Joint Advanced Warfighting School
7800 Hampton Blvd.
Norfolk, VA 23511-1702

8. PERFORMING ORGANIZATION REPORT NUMBER
n/a

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
National Defense University
Joint Forces Staff College
7800
Hampton Blvd
Norfolk, VA 23511

10. SPONSOR/MONITOR'S ACRONYM(S)
NDU-JFSC

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
n/a

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution is unlimited. Not for commercial publication without the express written consent of the author.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The Joint Warfighting Concept under development aims to address how the Joint Force will overcome the future military challenges and provide a joint focal point to align Service development. Typically, the assessment and evaluation of a joint concept help ensure its proposed approach can overcome the envisioned military challenge. Determining a joint concept's efficacy means exploring the ways it mitigates risk to generate a favorable outcome both plausibly and robustly. However, there is no commonly accepted framework for assessing or evaluating the efficacy of joint concepts. Without an established framework, determining efficacy remains informal and implicit, meaning fraught with self-imposed risks. The research indicates that the consequence of informal, implicit assessment and evaluation of a concept risks misshaping the development and design of the future Joint Force. Given the challenges of the current and projected security environment, falling short of delivering an efficacious concept introduces undue operational risk to the Joint Force with strategic implications of political, social, and international risk.

15. SUBJECT TERMS
Assessment, Evaluation, Joint Concept, Joint Warfighting Concept, National Security, Great Power Competition

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a.REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Adria E. Markowski
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED UNLIMITED	65	**19b. TELEPHONE NUMBER** *(Include area code)* 757-203-5220

Page Intentionally Left Blank

NATIONAL DEFENSE UNIVERSITY

JOINT FORCES STAFF COLLEGE

JOINT ADVANCED WARFIGHTING SCHOOL

Winning Future Conflicts: Designing A Framework to Assess and Evaluate the Efficacy of Joint Warfighting Concepts

By:

Adria Markowski, Ph.D.

Department of Defense Civilian

Page Intentionally Left Blank

Winning Future Conflicts:
Designing A Framework to Assess and Evaluate the Efficacy of Joint Warfighting Concepts

by Adria Markowski, Ph.D.

Department of Defense Civilian

A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning Strategy. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

This paper is entirely my own work except as documented in footnotes (or appropriate statement per the Academic Integrity Policy).

Student:
Signature: _____
28 May 2021

Thesis Advisor:
Signature: _____
Charles M. Davis, Ph.D.
Associate Professor

Approved by:
Signature: _____
James E. Jacobs
Captain, U.S. Navy

Signature: _____
Miguel L. Peko
Director, Joint Advanced Warfighting School

Page Intentionally Left Blank

Abstract

The 2018 National Defense Strategy describes an environment that is increasingly complex and challenged by long-term, strategic competition. The *Joint Warfighting Concept* (JWC) under development aims to address how the Joint Force will overcome the future military challenges and provide a joint focal point to align Service development. Typically, the assessment and evaluation of a joint concept help ensure its proposed approach can overcome the envisioned military challenge. Determining a joint concept's efficacy means exploring the ways it mitigates risk to generate a favorable outcome both plausibly and robustly. However, there is no commonly accepted framework for assessing or evaluating the efficacy of joint concepts. Without an established framework, determining efficacy remains informal and implicit, meaning fraught with self-imposed risks. Informal and implicit frameworks for determining the efficacy of a concept are bound by the myriad interpretations that are dependent on a stakeholder's background and interests and biases. The research indicates that the consequence of informal, implicit assessment and evaluation of a concept risks misshaping the development and design of the future Joint Force. Given the challenges of the current and projected security environment, falling short of delivering an efficacious concept introduces undue operational risk to the Joint Force with strategic implications of political, social, and international risk.

Page Intentionally Left Blank

Dedication

For my family, always.

Page Intentionally Left Blank

Acknowledgements

I am exceedingly grateful to my husband and our two daughters for their love, patience, and support during the development of this thesis. They are my foundation that enables me to stand taller and the glue that holds me together. I would also like to thank my instructors, Dr. Chuck Davis, CAPT Jake Jacobs, and Jeff Turner for their time and support as they helped me communicate my vision. A big thanks to my readers, Jason Schoch, Dan Dail, Dr. Anna Renner, and Jeanne Burington for their constructive feedback. Lastly, but certainly not least, thanks to my co-workers at Joint Staff J-7 who inspire me every day to do and be better.

Page Intentionally Left Blank

Table of Contents

Page Intentionally Left Blank

Table of Figures and Tables

Page Intentionally Left Blank

Chapter I: Introduction

The 2018 National Defense Strategy (NDS) articulates the United States (U.S.) Department of Defense's (DoD's) approach to "compete, deter, and win" in the future security environment."[1] The strategy describes an environment that is increasingly complex and challenged by the "reemergence of long-term, strategic competition."[2] In order to successfully compete, the NDS identifies three lines of effort: building a more lethal Joint Force; strengthening alliances; and reforming the Department's business practices.[3]

The vision for the future Joint Force is articulated in the Chairman's Capstone Concept for Joint Operations (CCJO) 2030. It describes what the Joint Force must do to be successful in defeating potential adversaries, and it carries implications for what the Services must consider for development of the future Joint Force. What the Chairman's vison does not include is any direction on *how* the future Joint Force will address potential military challenges. The *Joint Warfighting Concept* (JWC) under development by the Joint Staff aims to answer this question by describing *how* the Joint Force will overcome the future military challenges and provide a joint focal point to align Service development.

Doctrinally, a joint concept provides a set of ideas for how the Joint Force might overcome a future military challenge and recommends how the Joint Force should develop and design the future force.[4] Joint concepts, such as the JWC, inform the Joint

[1] U.S. Department of Defense. Summary of the 2018 National Defense Strategy of The United States of America. Washington DC: Department of Defense, 2018, 1.

[2] U.S. Department of Defense, NDS, 2018, 2.

[3] U.S. Department of Defense, 2018 National Defense Strategy, 5.

[4] Chairman of the Joint Chiefs of Staff, *Draft CJCS Instruction 3100.0E: Joint Strategic Planning System*, (Washington DC, 2020), F-2.

Force about how to best approach future military challenges. The Joint Staff develops the concepts to provide solutions to military challenges as envisioned in estimates of the future joint operating environment. The assessment and evaluation of a joint concept help ensure its proposed approach can overcome the envisioned military challenge.[5] However, there is no commonly accepted framework for assessing or evaluating the efficacy of joint concepts. Subsequently, there are also no standard criteria by which to verify that the concept fulfills its intended purpose. Without an established framework, there is no overarching way to determine the efficacy of the concept. Informal and implicit frameworks for determining the efficacy of a concept are bound by the myriad interpretations that are dependent on a stakeholder's background and interests. The need for a formalized framework for assessing and evaluating the efficacy of joint concepts is evident in the development of the JWC and the deficiency raises the question: What is a suitable framework for assessing and evaluating the efficacy of joint concepts?

The purpose and motivation for developing a joint concept serves as the foundation for building a suitable assessment and evaluation framework. Such a framework must determine how well the concept overcomes the intended military challenge generating a favorable outcome, to what extent the concept has ideas that are plausible, and how well the concept can withstand realistic changes to the operating environment. An ideal framework—a suitable framework— will assess and evaluate the extent to which the concept is *effective, viable,* and *robust*.

Understanding the *effective*, *viable*, and *robust* criteria first requires a comprehension of the JWC initiative. The explanation of JWC derives from changes to

5. Chairman of the Joint Chiefs of Staff, "Joint Publication 1: Doctrine for the Armed Forces of the United States," (Washington DC, 2017), VI-10.

the recent and projected security environment. Chapter II describes the origination of the JWC initiative, highlights the purpose of joint concepts, and discusses why the JWC is a logical choice to address the military challenges identified within the future security environment. In addressing the military challenge, the concept developers seek to mitigate the risk of an unfavorable outcome and creation of a concept that is either implausible or maladaptive. The chapter concludes by highlighting the necessity of an assessment and evaluation framework to consider the efficacy of a joint concept.

Chapter III explores a joint concept's efficacy, which is determined by several criterion. Each criterion—*effective*, *viable*, and *robust*—is detailed with additional criterion questions that serve as a diagnostic of the JWC's efficacy and reveal residual risk. Employing the assessment criteria, Chapter IV determines the sufficient levels of efficacy by identifying whether the concept simultaneously achieves *effectiveness*, *viability*, and *robustness*. The characteristics of the assessment criteria work interdependently to mitigate risk.

The formalized assessment and evaluation framework applied to the JWC enables comprehensive consideration of a joint concept to determine its efficacy and identify how it might mitigate against risk. The JWC assessment and evaluation framework confers benefits when applied to other joint concepts as demonstrated in Chapter V. In a historical example, Chapter V recalls the failure of the Effects-Based Operations concept and how limited testing contributed to its infeasibility and reveals how the framework can be employed to mitigate risk. The assessment and evaluation framework closes the institutional gap between standard joint concept development and formal determinations of efficacy.

Chapter II: The Joint Warfighting Concept and the Need for an Assessment and Evaluation Framework

As the U.S. military adapts to the future strategic environment, it must have a joint approach for integrating elements across warfighting domains and the Services to contend with the complex and varying military challenges of the future.[1] The National Security Strategy identifies China and Russia as security challenges because both governments seek to reshape the world order to one consistent with an authoritarian model and not favorable to U.S. interests.[2] China's economic growth has enabled it to modernize its military to achieve regional hegemony and challenge the U.S. military advantage.[3] Likewise, Russia employs elements of its instruments of power to disrupt the North Atlantic Treaty Organization and undermine the security of democratic processes abroad as it seeks return to a great power status.[4]

As the DoD turns to addressing the military implications of the future security environment, it will require each of the Services to bring to bear their respective strengths to deliver an innovative joint approach.[5] The Services look to address the future military challenges as they exercise their statutory responsibility to man, train, and equip their respective forces. Each Service develops their own Service specific concepts to address the challenges of the future security environment as identified by the NDS and the CCJO.

---

[1] Chairman of the Joint Chiefs of Staff, "CJCSI 3030.01: Implementing Joint Force Development and Design," (Washington, DC, 2019), C-2.

[2] U.S. President, National Security Strategy (Washington DC: Government Printing Office, December 2017), 2.

[3] U.S. Department of Defense. Summary of the 2018 National Defense Strategy of The United States of America. Washington DC: Department of Defense, 2018, 2.

[4] U.S. President, National Security Strategy, 25.

[5] Nathan P. Freier & John Schaus, "INDOPACOM through 2030," Parameters 50, no. 2 (2020): 27, https://press.armywarcollege.edu/parameters/vol50/iss2/5

For example, the Navy is maturing its Distributed Maritime Operations concept to account for the challenges associated with the long-term competitive strategic environment.[6] Similarly, the Marine Corps is focused on the Marine Corps and Navy concepts of Littoral Operations in a contested Environment and Expeditionary Advance Base Operations. The focus accounts for a shift in the Marine Corps projected missions from inland and non-state actors to littoral and peer competitors in an effort to support the NDS.[7] Likewise, the Army is pursuing the operational concept of Multi-Domain Operations in order to contest an adversary in either competition or armed-conflict across multiple warfighting domains.[8] The Air Force is also looking to multi-domain operations as they seek the right combination of stand-off and stand-in forces to achieve air superiority in 2030.[9] The Services are in the process of optimizing their respective concepts through their individual lenses but those concepts do not automatically harmonize to produce a joint solution for warfighting.[10]

Joint Concepts

Doctrinally, a joint concept provides a set of ideas for how the Joint Force might overcome an envisioned military challenge, and it carries implications for how the Joint

[6] John Richardson, "A Design for Maintaining Maritime Superiority," (Washington, DC: Department of the Navy, January 2016):8, https://www.navy.mil/cno/docs/ cno_stg.pdf.

[7] Headquarters US Marine Corps, *Force Design 2030*, (Washington, DC: Headquarters US Marine Corps, March 2020), 2.

[8] Feickert, Andrew. "Defense Primer: Army Multi-Domain Operations (MDO)." Congressional Research Service: Report, January 16, 2020, 1–3. http://search.ebscohost.com.nduezproxy.idm.oclc.org/login.aspx?direct=true&AuthType=ip,url,uid&db=tsh&AN=141835240&site=eds-live&scope=site.

[9] Team, Enterprise Capability Collaboration, and US Air Force. "Air Superiority 2030 Flight Plan." (2016), 10, https://www.airforcemag.com/PDF/DocumentFile/Documents/2016/Air%20Superiority%202030%20Flight%20Plan.pdf.

[10] Nathan P. Freier & John Schaus, "INDOPACOM through 2030," 31.

Force should develop and design the future force.[11] Joint concepts address a future military challenge identified within the future operating environment by developing innovative ideas that either propose a new operational approach, a different way to employ the Joint Force capabilities, or identify future capabilities to mitigate recognized gaps.

Concept developers must possess sufficient understanding of a particular security challenge to properly address it. Concept developers rely on the current understanding of the future security challenges as detailed in the Joint Operating Environment (JOE). The JOE provides a projection of the future security environment and identifies implications to the Joint Force based on the current trends in the security environment.[12] The JOE therefore helps frame the future military problem that concept developers seek to address. Concept developers also leverage intelligence estimates from multiple sources within the intelligence community and emulations of the future security environment to better understand the implications of these estimates.

The development of joint concepts provides the opportunity to consider the future security environment, as framed by the JOE, intelligence estimates, emulations, and the CCJO, while remaining, reasonably, unconstrained by current policies or technology.[13] In that way, the concept developers generate new ideas unhampered by fading paradigms. The resulting ideas form the basis of a new approach to address the operational problem and identify those associated capabilities necessary to enable the approach. Joint concepts

[11] Chairman of the Joint Chiefs of Staff, *Draft CJCS Instruction 3100.0E: Joint Strategic Planning System*, (Washington DC, 2020), F-2.

[12] Chairman of the Joint Chiefs of Staff, "Joint Operating Environment," ii.

[13] Chairman of the Joint Chiefs of Staff, "Joint Publication 1: Doctrine for the Armed Forces of the United States," (Washington DC, 2017), VI-9.

therefore influence the force employment, development, and design time horizon as the Joint Force advances. Force development serves as a bridge between force employment and force design as it seeks to adapt and improve today's Joint Force performance in a two-to-seven-year timeframe by capitalizing on current innovations as informed by the longer-term considerations of force design. The longer-term considerations of force design seek to innovate the Joint Force five-fifteen years in the future.[14] The joint concept development process informs investment decisions across the force employment, development, and design time horizon to account for the future security environment, and, in the interim, it proposes solutions for mitigating the associated military challenges in the meantime. The intent of a joint concept, such as the JWC, sets the scope for what the assessment and evaluation framework should consider.

Contextualizing the JWC

The JWC is integral in developing solutions to enable the Joint Force to overcome the challenges identified in the National Military Strategy (NMS). The uncertainty of the future security environment creates multiple possible scenarios for the concept developers to consider. As the NMS describes, the Joint Force should be capable of a boxer's stance to contend with the various challenges posed by the future security environment.[15] To do so requires a paradigm shift in the scenarios used for force planning. A recent study by the RAND Corporation noted that previous force planning efforts have followed a "Two Regional Wars" construct.[16] The study states that the Two

[14] Chairman of the Joint Chiefs of Staff, "CJCSI 3050.01: Implementing Global Integration," (Washington, DC, 2018), C-14.

[15] Chairman, "CJCSI 3050.01," B-5.

[16] David Ochmanek, Peter A. Wilson, Brenna Allen, John Speed Meyers, and Carter C. Price, U.S. Military Capabilities and Forces for a Dangerous World: Rethinking the U.S. Approach to Force Planning. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR1782-1.html.

Regional War construct is no longer sufficient for force planning given the rise of two major powers, Russia and China, and requires a revalidation of the different types of force planning constructs.[17] The research calls for a stressing scenario reflective of the military challenges of the future security environment and a Joint Force that has the proper capabilities in the correct capacity to meet the demands of potential future conflicts.

The developers of the JWC envision a Joint Force that overcomes the most stressful challenges within the most demanding scenarios. Theoretically, planning against multiple stressing scenarios would enable the Joint Force to adopt the resilience and agility of a boxer's stance, that is the ability to be both take or doge a number of hits. Additionally, a boxer's stance means adaptively counterattacking a given adversary. For a given adversary, to determine what constitutes victory in a stressing scenario, JWC developers determine the best use of force to end hostilities in an outcome favorable to the U.S.

As the JWC developers seek the best approach for solving the problems of the most stressing scenarios, they must identify necessary force locations, organizational structure, capabilities, and legal authorities. The variables are interdependent and have non-linear impact on the Joint Force's ability to end the conflict on terms agreeable to the U.S. Understanding the relationship between the variables, as they impact the efficacy of the joint concept, enables planners to identify the factors that most contribute to the efficacy of an operational approach. As the JWC developers explore variations of posture in the region of one of the two major adversaries, how does posture influence the Joint

[17] David Ochmanek et al., "U.S. Military Capabilities and Forces for a Dangerous World," xi.

Force's ability to end conflict? What would enable posture such as access, basing, and overflight and how do variations of access, basing, and overflight affect different advanced capabilities? The answers to the questions provide the necessary insight as the JWC developers construct an operational approach that successfully leverages hard power to coerce or compel a return to the status quo. The developers must therefore calculate the best mix of the set of planning variables such as the force posture, force mix, force design, advanced capabilities, and authorities that would enable the Joint Force to be successful. The successful JWC leverages the operational logic proposed by the concept developers to employ the force and its advanced capabilities to address the projected problem in a way that is plausible but not overly sensitive to an ever-changing security environment.

Need for a Framework

In the absence of a framework that includes evaluation and assessment, the Department risks employing concepts that are crippled by undue levels of risk in three broad areas: unfavorable outcomes, implausible operational approaches, and maladaptive to changes in the future security environment. The efficacy of the JWC is not measured in a binary way but as a gradient of failure and success. Since rarely is a real-world result binary, is the concept "good enough" if its efficacy falls somewhere between the two extremes of failure and success? Between overwhelming success and complete failure, "good enough" may be contingent on a stakeholder's perspective. Without a common framework there is no objective guidance that comprehensively considers not only each stakeholder's perspective but the underlying factors that contribute to the concept's efficacy. Determining the extent of the concept's success requires a common assessment

and evaluation framework that measures the efficacy of the joint concept with comprehensive consideration of the multi-stakeholder perspectives. Different audiences have varying perspectives on what advantages and disadvantages the joint concept might confer as the developers attempt to solve the military challenge. Without a framework to comprehensively consider the validity of each perspective, a concept runs the risk of focusing too narrowly on the perspective of the most persuasive stakeholder.

The numerous perspectives of the efficacy of the JWC reflect the complexity of the military challenges. In seeking to overcome the military challenges, the concept developers aim to reduce the risk of an unfavorable outcome in which the concept is mismatched with the future security environment. During development, the developers strive to validate planning assumptions that include predictions about technology availability or the feasibility of proposed solutions to reduce the risk of employing an implausible concept. Incidentally, the concept developers seek to reduce the risk of a maladaptive concept, over-engineered to a specific scenario. The consideration of any singular risk to the efficacy of the JWC, while perhaps valid, suffers from a reductionist perspective and does not adequately consider the complexity of determining the efficacy.[18] An assessment and evaluation framework provides the foundation to deliberately prioritize and account for each type of risk the joint concept should consider such that the solution it recommends is comprehensive and widely acceptable. Without

[18] Dietrich Dörner, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations* (New York: Metropolitan Books, 1996), 91-92.

such a framework to assess and evaluate a joint concept there is no mechanism for understanding success or failure or their gradations holistically.[19]

[19] In his article, Bratton makes a similar argument for developing a conceptual framework for defining coercion. Patrick Bratton. "When is Coercion Successful?" Naval War College Review 58, no. 3 (Summer 2005).

Chapter III: Designing the Framework: Assessment Criteria

The previous chapter includes a broad description of the problem the JWC intends to overcome, but it does not identify the risk to efficacy for an untested joint concept. Analysis finds that an overarching framework assessment and evaluation criteria reveals *effectiveness*, *viability*, and *robustness*. A comprehensive set of criteria is the keystone to any assessment framework. The criteria development is dependent on what stakeholders collectively view as success and accounts for the three broad areas of risk to the efficacy of a joint concept introduced in the previous chapter. The assessment criteria, illustrated in Figure 1, serve as a foundation for determining the efficacy of the JWC during development.

Figure 1. Criteria for the Assessment & Evaluation Framework

Assessment Purpose

When properly integrated into development, assessment provides a constructive feedback cycle about the strengths and vulnerabilities of the concept with respect to a set

of criteria or guiding principles of what the concept must accomplish. The criteria frame the multiple perspectives to holistically assess the efficacy of the concept as opposed to mistakenly over emphasizing any singular perspective. As the future security environment becomes known, so too will the actual (not estimated) efficacy of the JWC. By establishing a framework during development, the JWC has a sustainable structure for continuous assessment to ensure its implications for force development and design are still relevant.

A review of the doctrine, strategy, and business literature revealed three criteria, *effectiveness, viability,* and *robustness*. *Effectiveness* criteria answers the question: "*Do the ideas work?" Viability* criteria answers the question: "*are the ideas plausible and within the time horizon?" Robustness* criteria answers the question: "*Do the ideas still work if there are changes to the operating environment?"*

Effectiveness

The *effectiveness* criteria determine the extent to which operational logic for warfighting presented in the JWC is successful. In his 2018 perspective, David Ochmanek, described criteria to determine which new, innovative concepts addressing operational challenges should receive support.[1] One of the criteria Ochmanek described was that the proposed concept should be technically and operationally effective.[2] Other sources provide additional detail to what effectiveness means in an assessment context. The course of action (COA) validation criteria listed in the Joint Publication (JP) 5-0 describe the term "suitability" to determine when a course of action developed in

[1] David Ochmanek, *Improving Force Development Within the U.S. Department of Defense: Diagnosis and Potential Prescriptions*. (Santa Monica, CA: RAND Corporation, 2018), 10, https://www.rand.org/pubs/perspectives/PE302.html.

[2] Ochmanek, "Improving Force Development," 10.

planning accomplishes the mission within the commander's guidance.[3] Likewise, the strategist, Harry Yarger uses the term "suitability" to determine if a strategy accomplishes the desired strategic effects.[4] The nuance that Yarger's criteria adds that is not in the JP 5-0 COA validation criteria is the emphasis on whether the strategic outcome is favorable or not favorable. Yarger uses "suitability" to determine if a strategy generates strategic effects or in other words if the strategy is *effective*. A joint concept is suitable when it generates the expected effects of a favorable outcome and that ability is effectiveness.

Private sector methods also provide insight into potential assessment criteria. Johnson, Scholes and Whittington present strategy assessment criteria from a business academic perspective. The authors of the book *Exploring Corporate Strategy* explain that suitability of a strategy is the extent to which it leverages and employs the existing capabilities within an organization and meets the expectations of stakeholders.[5] From their term "suitability," Johnson, Scholes, and Whittington highlight two key criteria for effectiveness, utilization and meet expectations. In describing utilization, they reference an organization's ability to best leverage the capabilities an organization has with respect to the estimated future trends. Similarly, the JWC considers current and future Service capabilities and their best employment and integration of capabilities to achieve an effective joint operational approach. The business strategists describe suitability to also mean meeting the expectations of stakeholders. Likewise, the JWC requires meeting the

[3] Chairman of the Joint Chiefs of Staff, "Joint Publication 5-0: Joint Planning," Washington DC, 2020, III-32.

[4] Harry R. Yarger, *Strategic Theory for the 21st Century: The Little Book on Big Strategy* (Carlisle: Strategic Studies Institute, 2006), 70.

[5] Gerry Johnson , Kevan Scholes, and Richard Whittington, *Exploring Corporate Strategy Seventh Edition*. (New York: Prentice Hall Financial Times, 2006), 358.

expectations of military senior leadership as articulated in the NDS and NMS to be *effective*.

Upon a review of the literature, a few themes emerge that the effectiveness criteria should consider: meeting expectations of senior leadership, generating favorable outcomes, and the utilization of organic organizational capabilities.[6] The expectations of senior leadership for the JWC include the guidance directing the development of the JWC that are consistent with achieving the boxer's stance and relevant challenges described by the NMS. The Office of the Secretary of Defense (OSD) for Policy develops campaign outcomes for planning scenarios that describe the favorable outcomes the JWC should consider. The utilization of organizational capabilities in military terms ranges across Service capabilities. To be *effective*, the JWC optimally employs and integrates the available and future capabilities of the Services in the development of a joint operational approach. Therefore, the *effectiveness* of the JWC is contingent upon the degree to which it addresses the relevant NMS challenges and demonstrates achievement of a set of relevant campaign outcomes with respect to the way it employs and integrates the joint force capabilities. The following four questions capture the considerations and provide guideposts for determining the *effectiveness* of the JWC.

1. *To what extent does the joint warfighting operational logic of the JWC contribute to addressing the relevant NMS challenges?*
2. *How well does the joint warfighting operational logic of the JWC achieve the campaign outcomes?*

[6] The three themes of meeting expectations of senior leadership, generating favorable outcomes, and the utilization of organic organizational capabilities are derived from a synthesis of multiple literature sources. Ochmanek, "Improving Force Development," 10; Yarger, Strategic Theory, 70; Chairman, "Joint Publication 5-0: Joint Planning," 2020, III-32; Johnson, *Exploring Corporate Strategy Seventh Edition,* 358.

3. *How well does the joint warfighting operational logic of the JWC employ force posture, mix, design, and advanced capabilities to achieve the campaign outcomes?*
4. *To what extent does the joint warfighting operational logic of the JWC integrate force posture, mix, design, and advanced capabilities to achieve the campaign outcomes?*

The JWC alone will not solve the entirety of the relevant NMS challenge; however, it will address portions of it. In answering the first question, an assessor determines the scope of what the JWC addresses through the lens of the original guidance directing the development of the JWC. As assessors determine how well the JWC meets the NMS challenges scoped through the JWC guidance, they also identify the risk generated by the difference between what the JWC actually accomplishes and its desired outcome. Assessors also determine the significance of the gap between the resulting, actual outcome and the desired outcome. The outcomes the JWC generates during testing provide an estimation of the extent to which it addresses the NMS challenge and the JWC guidance.

The campaign outcomes OSD-P provides in planning scenarios help describe favorable outcomes for a given problem set. While the scenario campaign outcomes are more specific than the NMS challenges, they are strategic in nature and require a great deal of analysis to operationalize the campaign outcomes in a way that is measurable in a testing environment (e.g. wargaming). An additional challenge to using the scenario campaign outcomes is that several outcomes could be related to the military challenge. Some of the campaign outcomes may prove to be duplicative. In the event there are duplicative campaign outcomes, grouping the duplicative outcomes by theme reduces the duplicative work by operationalizing by theme. Additionally, the benefit of identifying

themes focuses the assessment of effectiveness through clarifying the favorability of an outcome.[7]

Determining the achievement of a favorable outcome through the aggregation of the themed campaign outcomes presents a number of challenges. While each themed campaign outcome describes a piece of a favorable outcome, the determination of the overall favorability proves challenging. One technique useful to determine the overall favorability is screening criteria describing different levels of favorability for an outcome. The degree to which a JWC generated outcome achieves each of the themed campaign outcomes, balanced against incurred risk, determines the favorability of a JWC generated outcome.[8]

As an example, if a campaign outcome is a return to the status quo after conflict, it should be characterized so that there is agreement by the stakeholders as to what is meant by the status quo. While not as broad as the NMS challenges, the campaign outcomes still need additional specificity to ensure clarity regarding what constitutes a favorable outcome based on campaign outcome achievement in a testing environment. In tandem with characterizing the campaign outcomes, the ideas within the operational logic of the JWC should be linked to how it contributes to the achievement of the campaign outcomes. Using the same example, if the operational logic recommends strengthening partnerships and alliances, how would a link to achieving the campaign

[7] The Joint Staff J-7 analysis team found multiple duplicative campaign outcomes of the ten under assessment. Attempting to characterize each of the ten campaign outcomes in a way that would be measurable proved to be overly cumbersome for little assessment benefit. In the process of characterizing each campaign outcome, the analysts discovered four major themes amongst the outcomes that provided an overall description of the outcome for the JWC. The result was four themes that focused the assessment of effectiveness in determining the favorability of the resulting outcome.

[8] The Joint Staff J-7 analysis team used screening criteria for initial determination of the overall favorability for the themed campaign outcomes.

outcome of returning to the status quo be formulated or expressed in a testing environment? The connection between the operational logic and the campaign outcomes identifies what aspects are imperative to influencing a favorable outcome.

By understanding the association between the operational logic and the achievement of the campaign outcomes, the third and fourth criteria questions provide insight into which available means of force posture, force mix, design, advanced capabilities, and the authorities can be employed and integrated. If testing shows there is some merit to the notional example of strengthening alliances and partnerships to returning to the status quo, what are the best means to ensure accuracy? Is it through a novel use of a capability or advanced capability? Is it through a change in force posture? Alternatively, is it some combination of all of the relevant capabilities, postures, partnerships, etc.? Whatever the case, the five variables of force posture, mix, design, advanced capabilities, and authorities are the resulting implications to force development and design and combined with the operational logic are the key to *effectiveness*.

As one of the three assessment criteria, the *effectiveness* of the concept provides insight into the resulting outcome favorability as the developers seek to overcome the military challenges of their problem set. The favorability of the outcome is dependent on the extent to which the operational approach of the concept exacts the campaign outcomes and contributes to overcoming the NMS challenges. The resulting *effectiveness* and the ways and means in which the operational logic pursues a favorable outcome directly impacts the other two assessment criteria, *viability* and *robustness*.

Viability

The second assessment criteria, *viability*, determines the plausibility of the ideas within the concept in terms of its affordability, validity of assumptions, feasibility of functional capabilities, and political risk. Literature on force development, doctrine, strategy, and business strategy provides useful considerations to develop the viability criteria.

While Ochmanek recommends that a concept should be feasible and affordable, he does not expand on what constitutes feasible or affordable.[9] Yarger and the JP-5 COA validation criteria provide more clarity to affordability considerations. Determining the affordability of a strategy is as challenging as determining affordability for a concept. Affordability is relative to the time horizon the resources are required for, as Yarger suggests that a strategist determines feasibility based on whether the strategy can be done within the available resources.[10] Likewise, the course of action validation criteria in the JP 5-0 uses feasibility and acceptability to determine whether a mission can be accomplished within the established time, space, and resource limitations while balancing cost and risk with advantage gained.[11]

The criteria Yarger presents have much overlap in regards to executing the strategy within available resources and balancing the cost against the outcome, similar to the COA validation criteria. The applicability of both criteria suggests that the *viability* criteria consider the affordability of resources over a relative time horizon. Unsurprisingly, estimating the affordability of a concept that uses a combination of

[9] Ochmanek, "Improving Force Development," 10.
[10] Yarger, *Strategic Theory,* 70.
[11] Chairman, "Joint Publication 5-0: Joint Planning," 2020, III 41-42.

innovative approaches and future advanced capabilities is problematic, but still constitutes a necessary criterion of the concept's *viability*. Both criteria use available resources with respect to time as a condition for affordability. Affordability for the JWC is relational to the availability of resources given the current long-term resource investments of the Joint Force. The *viability* of the concept considers its alignment or divergence to the current investments of the Joint Force as currently envisioned.

Given the uncertainty of the future security environment, concept developers make educated assumptions to enable continued development. Concept developers use assumptions similarly to joint operational planners. The JP-5 provides three characteristics of a valid assumption: logical, realistic, and essential for planning.[12] Yarger also addresses the impact of assumption validity in terms of the outcome. As part of Yarger's risk criteria for strategy, he estimates the risk of an invalid assumption based on its impact to the strategy. Yarger additionally recommends the consideration of the internal or external factors influencing the strategy and how their change might impact the strategy's success.[13] Taken together, the plausibility of the assumption being validated is dependent on the internal and external factors that make it logical and realistic. The *viability* of the JWC should consider the plausibility of the valid assumptions underpinned by its dependence on external factors outside the Joint Force's control.

The business scholars, Johnson, Scholes, and Whittington also use the term feasibility. The authors define feasibility as determining, "whether an organization has

[12] Chairman, "Joint Publication 5-0: Joint Planning," 2020, III-17.
[13] Yarger, *Strategic Theory,* 71.

the resources and competencies to deliver a strategy."[14] Their definition of feasibility enhances the JP 5-0 definition by including competencies. Joint Force competencies are an important factor when considering the feasibility of a concept. The basic ideas of feasibility suggested by the scholars are consistent with the JP 5-0. However, their additional consideration of competencies applies to the availability of advanced capabilities and their implications for the joint functions. The use of advanced capabilities may provide great utility in achieving the desired outcome measured by the *effectiveness* criteria. The *viability* of the concept hinges on the plausible availability of the technology to support the availability of advanced capabilities the concept might leverage. If the concept leveraged nascent technology that would be unavailable in the projected time horizon of 2030, the concept would run the risk of being infeasible.

Likewise, the JWC has implications for each of the joint functions, particularly command and control, logistics, fires, and information. The JWC developers rely on supporting concept developers to provide the subject matter expertise for how their supporting concept enables the JWC. The term "competencies" is apt as it applies to the joint functions the Joint Force leverages. If any of the supporting concepts are unable to support the JWC, the result is a potentially infeasible JWC. The JWC *viability* criteria should consider both the availability of advanced capabilities and the feasibility of the joint functional implications.

The *viability* of the JWC also depends on the level of political and escalatory risk it might incur. The acceptability criteria of the JP 5-0 COA validation criteria states that the advantage gained should be balanced by risk.[15] Additionally, a strategist determines

[14] Johnson, *Exploring Corporate Strategy Seventh Edition,* 371.
[15] Chairman, "Joint Publication 5-0: Joint Planning," 2020, III-42.

acceptability by weighing the costs of the strategic ends against the ways and means the strategy pursues. A significant difference between Yarger's and the JP 5-0 validation criteria is that the criteria for determining a valid strategy do not include risk, which is treated separately and "determined through assessment of the probable consequences of success and failure."[16] Yarger also likens identifying risk to determining the changes to the strategic environment as either more or less favorable.[17] Strategy can be defined as the cog that interconnects policy to military activities, requiring a symbiotic relationship in the pursuit of a state's strategic ends.[18] As such, political risk would be a less favorable outcome in terms of assessing a strategy. For the JWC, the political risk that the senior civilian leadership are willing to accept should be considered in determining its *viability*. Likewise, Johnson, Scholes, and Whittington consider risk by stating that the expected outcome is balanced against the risk and stakeholder reactions.[19] For the JWC, the stakeholder reactions would be akin to the political risk a strategic leader is willing to accept, determined as a function of the concept's *effectiveness*.

The *viability* criteria should measure the extent to which the JWC plausibly overcomes its military challenge with respect to affordability, validity of assumptions, feasibility of advanced capabilities and joint functions, and level of political risk all balanced against advantage gained. The assessment criteria for *viability* are in the answers to the following questions:

1. *To what extent is the joint warfighting operational logic of the JWC aligned/divergent to the envisioned trajectory of the Joint Force?*

[16] Yarger, *Strategic Theory,* 70.
[17] Yarger, *Strategic Theory,* 70.
[18] The definition of strategy used here was derived from Colin Gray's definition of strategy, "Strategy is a bridge that relates military power to political purpose; it is neither military power per se nor political purpose." Colin Gray, *Modern Strategy* (Oxford: Oxford University Press, 1999), 17.
[19] Johnson, *Exploring Corporate Strategy Seventh Edition,* 361.

2. *To what extent are the assumptions of the joint warfighting operational logic of the JWC constrained by external factors not controlled by the Joint Force (e.g., policy decisions, Allies and Partners' dependence)?*
3. *To what extent is the joint warfighting operational logic of the JWC dependent on advanced capabilities reasonably available and affordable?*
4. *How reasonable are the functional support implications of the joint warfighting operational logic of the JWC?*
5. *What is the extent of risk (e.g. political, escalatory, force) posed by the joint warfighting operational logic of the JWC?*

The first criteria question determines how the force development and design implications of the JWC compare to current force development and design efforts. The motivation for the JWC is to conceptualize the way the Joint Force will fight in the 2030 timeframe and subsequently implies the capabilities the Joint Force might need. The more divergent the resulting JWC force development and design implications are from the current future DoD investments may impact the affordability of the concept. As an example, if the Department has significantly invested in a particular technology but the JWC conceptualizes a Joint Force that uses an alternative, the affordability of the shift in resources might not be feasible. However, by including the comparison of the JWC force development and design implications to current DoD investments, the criteria ensure that senior leaders are aware of a more comprehensive picture to best inform the force development and design discussion.

The second criteria question serves as a lens to identify the validity of the assumptions the JWC developers make, specifically those that are not controlled by the Joint Force. Continuing the previous example, if part of the developers' logic is to strengthen alliances and partnerships, does the concept depend on action taken by an ally or partner to make the concept successful? While the Department may be able to influence and shape the environment, there is no guarantee that a free-thinking ally or

partner will respond as predicted. Assumptions about ally and partner involvement should be reasonable and based on historic and current trends. Additionally, if any assumptions of the operational logic will require major policy changes, those implications must be captured and brought into the discussion. Assumptions that are outside the control of the DoD do not necessarily make the JWC infeasible and in fact might stimulate a productive conversation about how current policies and agreements might have to change to ensure the viability of the concept. However, if the validity of several assumptions is outside of the Department's control, the viability of the concept would be at risk due to the plausibility of several of its planning assumptions being invalid.

The third criteria question combines the lens of feasibility and affordability for the use of advanced capabilities. While the future time horizon allows for some leniency in terms of technological availability, the JWC's use of advanced capabilities must consider what might be reasonably available. Joint concepts generally have more liberty to be aspirational about the technologies available, which then provides an opportunity to inform force development and design efforts. However, if technologies are either so exorbitant in cost or nearly impossible to manifest by the projected concept time horizon, the joint concept might be rendered infeasible. The criteria thus ensure that the discussion includes findings that detail how feasible the availability of a particular technology is and how affordable the resulting technological investments are.

The fourth criteria question considers the feasibility of the JWC with respect to the supporting joint functions such as logistics, information, command and control, and fires. The concept developers create an operational approach for addressing the military challenge leveraging a projection of the joint functions. If their projection of the

supporting concepts proves to be unsupportable, the JWC risks being infeasible due to implausible supporting concepts. As a common example, if the JWC is dependent on the expeditionary movement of forces and equipment across vast distances, there would be subsequent implications to the joint function for sustainment. If the supporting concept determines that the logistical requirements are unsupportable, then the concept risks being inviable due to infeasible logistical and sustainment support.

The fifth criteria question focuses on the political and escalatory risk associated with the JWC. Political risk could include diplomatic relations but also include the risk to force balanced against the risk to mission. The criterion focused on determining the level of risk provides another form of cost that the concept might incur and contributes to its determination of *viability*. For instance, if the operational logic of the JWC includes highly escalatory actions, a senior leader may be unwilling to accept the associated risk, rendering the concept inviable. The concept's estimated political and escalatory risk is part of the criteria and a conversation with the decision maker.

Together each of the criteria for *viability* is meant to provide a comprehensive assessment that informs a senior leader about the JWC's affordability, validity of assumptions, feasibility of advanced capabilities and joint functional support, and level of political and escalatory risk. The factors that might cause the concept to be infeasible pose vulnerabilities and may detract from benefits of the concept's *effectiveness*. Balancing the *effectiveness* with the *viability* of the concept, provides a more comprehensive picture to allow the decision maker to understand the potential risks the concept might pose to its own success.

Robustness

From the NDS and the NMS challenges, there are two different strategic scenarios the JWC must consider. In addition to two different adversaries, however, there is also variability within each of the strategic scenarios that the JWC must address. The assessment criterion of *robustness* measures the sensitivity of the concept to uncertainty. In describing his criteria for a technically and operationally feasible, affordable, and effective concept, Ochmanek includes "in the face of an adaptive enemy," which means that the criterion must account for variability in the environment and potential adversary actions or responses to actions.[20] In the evaluation and assessment frame this far, there is an absence of criteria that focus primarily on the continuing *effectiveness* and *viability* of a joint concept when subjected to major variations in the strategic environment.

The challenge with the JWC is manifold, especially given the goal of adaptability required to meet the boxer's stance. As the developers seek to address the variability of the future environment, an assessment should account for the variability's impact on the concept's efficacy. Robust optimization is a branch of operations research that provides a method for contending with the variability of a future environment given a state of deep uncertainty.[21] The idea of robust optimization is to seek a solution that performs sufficiently well across multiple scenarios rather than determining the optimal solution for only one instance. The robust approach is useful for determining the solution that fares well across a range of variations in the future security environment.

[20] Ochmanek, "Improving Force Development," 10.

[21] Typical mathematical programming models used by operations researchers seek optimality and employ sensitivity analysis, post-optimality to determine the impact of data uncertainties as discussed by Mulvey, Vanderbei, and Zenios, "Optimization of Large-Scale Systems," 264.

Analysts at RAND have applied the idea behind robust optimization to decision making in what they call Robust Decision Making.[22] Their method uses a spectrum of future conditions and models the performance of various strategies to see which ones fail and which meet their goals. The testing "serves as a stress-test of strategies and helps decision makers identify 'robust' strategies, that is, those that perform reasonably well regardless of what the future brings and identify the key tradeoffs among potential robust strategies."[23] For the JWC to be *robust*, the developers would have to ensure the operational logic for warfighting can still be efficacious despite changes to the future security environment. The following criteria for robustness capture each level of variability.

1. *To what extent are the effectiveness and viability impacted when there are changes to the future security environment for a given adversary?*
2. *To what extent is the joint warfighting operational logic transportable to another adversary?*

As the first criteria question indicates, the *robustness* of the concept is a function of the other two criteria of *effectiveness* and *viability*. The criteria serve as an indicator of how sensitive the operational approach described by the JWC is to any changes in the scenario. As an example, if the efforts to strengthen alliances and partnerships do not result in access, basing and overflight, does testing indicate that the JWC is still *effective* and *viable*? As part of the criteria, an assessor must also identify the parameters of the security environment that have the greatest uncertainty and potential for impact on any concept. Access, basing, and overflight is certainly a candidate that fits as a critical

[22] Lempert, Robert, Drake Warren, Ryan Henry, Robert Button Jonathan Klenk, and Kath Giglio, *Defense Resource Planning Under Uncertainty: An Application of Robust Decision Making to Munitions Mix Planning*. (Santa Monica: RAND Corporation, 2016), pg. xii.

[23] Lempert, *Defense Resource Planning Under Uncertainty*, pg. xii.

parameter. Identifying a set of the critical parameters and testing the performance of the JWC over variations of the critical parameter settings provides insight into the *robustness* of the JWC for a given threat scenario.

The second criteria question serves to identify how applicable the operational logic of the JWC is in another threat scenario, as a measure of its agility and adaptivity. The transportability of the operational logic of the JWC is a function of the *effectiveness* and *viability* of the JWC for another threat scenario. The intent is not to find a panacea of logic or a one size fits all solution, but instead to ensure that the concept is not overly tailored to a single scenario that reduces the future Joint Force's agility and adaptivity as the boxer's stance requires. The *robustness* criteria thus identify what implications to the variables of force posture, design, mix, and advanced capabilities and the operational logic of the JWC are such that the concept is *effective* and *viable* in a different threat scenario. By considering the most stressing scenarios and striving for *robustness*, the force development and design efforts will focus on one Joint Force designed to address both threat scenarios as opposed to tailoring to only one.

The *robustness* criteria provide insight into how the *effectiveness* and *viability* of the JWC withstand changes within a given threat scenario and across different threats. The inclusion of *robustness* in the assessment is a method for contending with the variability and uncertainty of the future security environment.

Assessment Criteria Conclusion

The assessment criteria of *effectiveness*, *viability*, and *robustness* serve as a diagnostic to determine how well the JWC meets each criterion of balancing advantage, cost, risk, and variability. Shaping the discussion around these criteria enables the

systematic reflection of the advantages the JWC might provide, balanced against its potential disadvantages and the resulting risk. The criteria provide a sense of how well a concept might generate a favorable outcome if it is *effective* and whether it generates a favorable outcome with feasible projections, such as logistic availability or technology availability. Additionally, through the criteria analysts can determine whether the concept is *effective* for one or multiple scenarios. With a comprehensive presentation of findings, the decision maker can weigh the insights of how the JWC might still need to improve or perhaps have a better chance of mitigating risk. Taken together, the results of the assessment framed around the criteria of *effectiveness, viability,* and *robustness* serve as a foundation for determining the level of concept efficacy that lead to determination of sufficiency.

Chapter IV: Designing the Framework: Evaluation Measures

Since assessment criteria is only diagnostic in nature, the assessment criteria do not provide an indication of whether the concept is *sufficiently* efficacious or good enough to pass go/no-go judgment. Leadership can determine *sufficiency* based on the combined assessment criteria of *effectiveness, viability,* and *robustness* leading to go/no-go judgements. The extent to which the JWC is efficacious is the degree to which it is sufficiently addresses the challenges of a strategic and operational environment.

Evaluation Purpose

The purpose of the evaluation criteria is to determine whether the JWC sufficiently meets a threshold of efficacy to move forward to shape force development and design efforts. The assessment criteria of *effectiveness, viability,* and *robustness* provide diagnostic information but do determine not whether the concept achieves sufficient efficacy to move forward as a recommendation. The evaluation criteria must determine, in the aggregate, whether the operational logic of the JWC meets a go/no-go criteria that judges the concept to be sufficient. To obtain efficacy, the concept must simultaneously be *effective*, *viable*, and *robust* as depicted in Figure 2 as an intersection of all three criteria. The assessment criteria described are interdependent with one another. As a concept proves to be extremely effective, the risk of generating an unfavorable outcome is reduced, as the *effectiveness* circle in Figure 2 indicates. However, the concept might prove to be more *effective* at the cost of its *viability* such that the validity of its assumptions might prove to be implausible. The two circles for the *effectiveness* and *viability* criteria would then be shown apart with a null intersection. Additionally, the decreased *viability* would result in a smaller blue circle with a larger

black shadow representing the increased risk of implausibility. The evaluation of the JWC must holistically account for the extent to which the JWC intersects the three assessment criteria simultaneously as the developers seek efficacy. By intersecting the three criteria, the concept will reduce the risk of resulting in a less favorable outcome, making implausible assumptions or being maladaptive. The narrative detailing the assessment and evaluation results are the core of the recommendations to the decision maker to accept or improve the JWC.

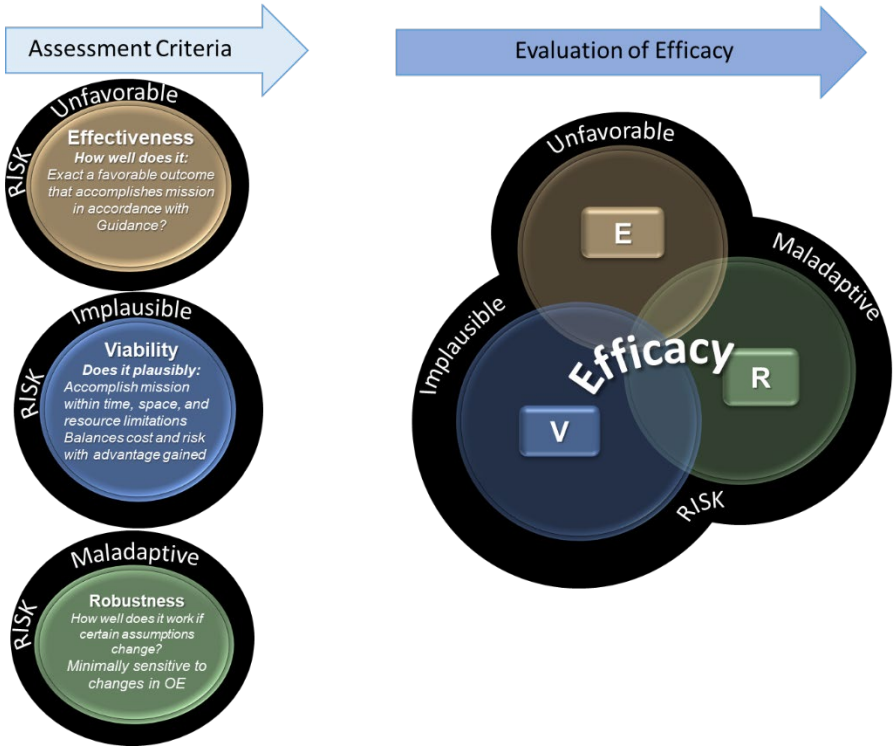


Figure 2. Assessment Criteria & Evaluation of Efficacy Measures

Evaluation Measures

Upon completion, the JWC must demonstrate whether the ideas present an operational logic for warfighting that *sufficiently* overcomes the military challenge within the complexity of its future strategic environment. The foundations of the assessment

framework focus on the assessment criteria that are key to determining the degree of efficacy of the JWC, or *sufficiency*. The evaluation criteria answer the question, "is it enough?" *Sufficiency*, meaning "good enough" entails determining the acceptable threshold of efficacy.

In Ochmanek's list of criteria, proposed concepts must meet each of the criteria of feasibility, affordability, and effectiveness, almost in a binary fashion, requiring judged concepts to meet all criteria or be rejected.[1] Likewise, the course of action validation criteria presented in the JP 5-0, require each of the criteria to be met in order for the COA to be valid.[2] Similarly, Yarger states that a strategy is valid if it meets all of the criteria of suitability, feasibility, and acceptability.[3] In addition to the criteria, Yarger also adds a separate condition for risk to consider the potential impacts of the success or failure of the strategy.[4] Yarger's consideration of risk comes close to the heart of determining what is "good enough" in the context of a resulting outcome's success or failure. Nevertheless, each of the criteria seems to stop short of presenting a comprehensive non-binary determination of *sufficiency.*

Bratton discusses the importance of non-binary outcomes for a different type of assessment framework. Similar to Yarger's consideration of risk, Bratton suggests considering the outcomes as positive or negative as opposed to binary successes and failures.[5] He further elaborates on the use of marginal changes in terms of reaching a goal as a way of using a scaled set of criteria as an alternative to a binary scale.[6] Industry

[1] Ochmanek, "Improving Force Development," 10.
[2] Chairman, "Joint Publication 5-0: Joint Planning," 2020, III 41.
[3] Yarger, *Strategic Theory,* 70.
[4] Yarger, *Strategic Theory,* 70.
[5] Bratton. "When is Coercion Successful?," 114.
[6] Bratton. "When is Coercion Successful?," 114.

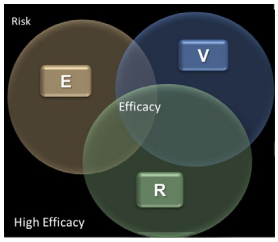
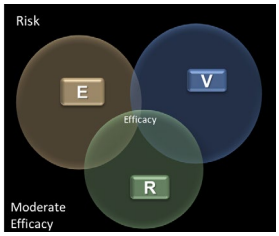
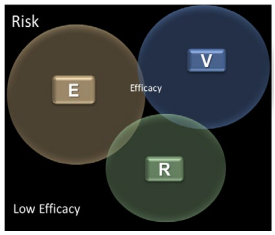
uses a series of developmental gates that must be passed through before a product continues along its development path of idea conception to market delivery. The gates serve as go/no-go decision points based on a set of screening criteria.[7] Applied to the JWC, the screening criteria provide a discrete and qualitative method to evaluate the degree of the concept's efficacy. The assessment criteria of *effectiveness*, *viability*, and *robustness* serve as screening criteria, determining the *sufficient* level of efficacy.

Building on Yarger's inclusion of risk, Bratton's call for non-binary determinations, and industry's screening criteria, the evaluation measures should determine the efficacy of the JWC in terms of the favorability of the outcomes it is able to achieve, as derived from the *effectiveness* assessment criteria, with mitigations against the risk and cost, as derived from the *viability* and *robustness* assessment criteria.[8] The evaluation measures require a scaled level of efficacy that are dependent on the *effectiveness, viability,* and *robustness* of the concept as described in Table 1.

[7] Susan Hart, Erik Jan Hultink, Nikolaos Tzokas, and Harry R. Commandeur. "Industrial Companies' Evaluation Criteria in New Product Development Gates." Journal of Product Innovation Management, January 1, 2003, 23. http://search.ebscohost.com.nduezproxy.idm.oclc.org/login.aspx?direct=true&AuthType=ip,url,uid&db=edsbig&AN=edsbig.A100623083&site=eds-live&scope=site.

[8] The JWC screening criteria is a derivation of multiple sources. Yarger, *Strategic Theory,* 70; Bratton. "When is Coercion Successful?," 114; Hart, et al., "Industrial Companies' Evaluation Criteria," 23.

Table 1: Evaluation Measures

Rating	Measures
High Efficacy 	The operational logic of the JWC is *effective*, *viable*, and *robust* in that it can simultaneously achieve a favorable outcome for two or more scenarios and most assumptions are plausibly valid with acceptable levels of risk.
Moderate Efficacy 	The operational logic of the JWC is *effective*, *viable*, and *robust* in that it can simultaneously achieve a favorable outcome for one or two scenarios and most assumptions are plausibly valid with mitigated levels of risk.
Low Efficacy 	The operational logic of the JWC is *effective*, less *viable*, and less *robust* in that it cannot simultaneously achieve a favorable outcome for more than one scenario and is overburdened by several assumptions that are not plausibly valid with unmitigated risk.
No Efficacy 	The operational logic of the JWC neither *effective*, *viable*, or *robust* in that it is unable to simultaneously achieve a favorable outcome for any scenario and is overburden by several assumptions that are not plausibly valid incurring undue risk.

The rating of *No Efficacy* for the JWC, as listed at the bottom of Table 1, describes a situation in which the concept is not simultaneously *effective*, *viable*, or

robust. Additionally, a rating of *No Efficacy* would also include the case of poor performance across each of the assessment criteria of *effectiveness*, *viability*, and *robustness*. Not achieving a favorable outcome for any scenario indicates that the concept proved to be ineffective and not robust. The *viability* of the concept would be in question if several assumptions proved to be either invalid due to technological unavailability, policy changes that were highly unlikely, or a high risk to force. The compounding invalid assumptions coupled with ineffective logic creates an absence of any intersecting criterion, incurring undue risk and resulting in *No Efficacy.* The resulting null intersection and larger shadowed region is illustrated in the bottom row of Table 1; the three circles apart and smaller, highlight a lack of intersection and the shadowed regions show increased risk of being unfavorable, implausible, and maladaptive.

A rating of *Low Efficacy* for the JWC, as illustrated second from the bottom in Table 1, describes the various situations where the JWC might simultaneously achieve two of the three assessment criteria but not all three. In the *Low Efficacy* scenario, the JWC might be *effective* and *robust* for one scenario—illustrated by their intersection, though not *viable*—illustrated by the lack of intersection, potentially due to an overburdening of invalid assumptions. Likewise, the JWC might simultaneously be *effective* and *viable*, demonstrated by their intersection, but not adaptive to any changes to the security environment, thus not *robust*. A case of *Low Efficacy* is thus one where the concept might achieve two criteria simultaneously but not all three.

The rating of *Moderate Efficacy,* as shown in the second figure from the top in Table 1, describes a situation in which the JWC generates favorable outcomes reflective of its *effectiveness* and is also *viable*, but because it is minimally *robust* the JWC achieves

all three criteria simultaneously for only one or two different scenarios, as illustrated by the small intersection of the three criteria. The JWC has slightly larger intersections between *robustness* and *effectiveness*, and between *effectiveness* and *viability*, mitigating some of the risk relative to each. As an example, the JWC might simultaneously achieve *effectiveness* and *viability* despite the potential that the JWC could include one or two assumptions that may prove to be invalid but do not render the concept inviable. Other assumptions might prove reasonably valid given certain investments or changes to policy achievable by the time horizon of the JWC implementation. Overall, while the concept might have limitations in each of the assessment criteria of *effectiveness*, *viability*, or *robustness* it ultimately has *Moderate Efficacy* as depicted by the limited overlap.

The rating of *High Efficacy* shown in the top row of Table 1, describes a situation in which the JWC demonstrates *effectiveness*, *viability*, and *robustness* simultaneously, depicted by a large intersection of the three penumbral circles showing reduced levels of risk through their significant and holistic intersection. The concept proves to be *effective* for multiple scenarios as described by the *robustness* criteria. The assumptions of the JWC are plausibly valid. The simultaneous intersection of all three criteria mitigates the risk in aggregate and the JWC would have *High Efficacy.*

Evaluation Measures Conclusion

The evaluation measures provide the comprehensive judgement on the performance of the JWC in a way that provides recommendations based on the assessment and evaluation framework. The assessment criteria provide a diagnostic of the extent the concept is *effective*, *viable*, and *robust*. The efficacy of the concept depends on

the extent of the simultaneous achievement of the three criteria. A concept reaches a sufficient level of efficacy when it obtains, even minimally, an intersection of all three.

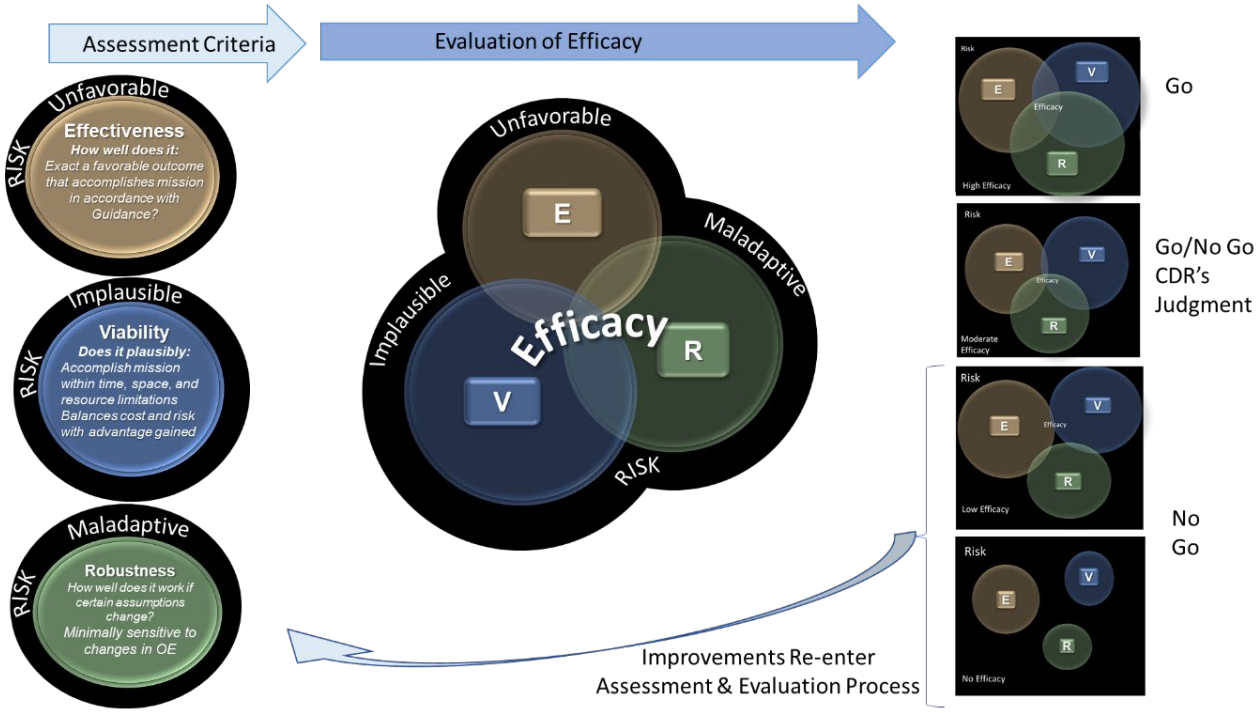


Figure 3. Assessment & Evaluation Framework

Figure 3 depicts the Assessment & Evaluation Framework comprehensively. When the JWC reaches at least a moderate level of efficacy, the JWC is recommended to move forward. Otherwise, as the figure demonstrates, the JWC having low or no efficacy is recommended for improvement and returns to the development process, leveraging the assessment and evaluation results for improvement.

While the evaluation measures can structure senior leader discussions based on the systematic, simultaneous consideration of the three criteria of *effectiveness, viability,* and *robustness*, the senior leaders ultimately, and rightly, have the final determination for the go/no-go judgment for accepting the concept. The framework serves its purpose to structure the discussion in such a way that the assessment and evaluation of the concept

comprehensively accounts for the complexity associated with the problem sets JWC is seeking to solve.

Chapter V: Universal Applicability of the Framework

Application of the assessment and evaluation framework highlights its utility in regard to JWC leading to points of applicability to other joint concepts. The JWC is a joint concept development task intended to determine *how* the Joint Force will address a variety of threats and the military challenges of 2030. The JWC effort is intended to shape force development and design contingent on the implications derived from the joint warfighting operational logic it presents. The joint concept development process, without an objective process to determine the efficacy of the joint concept, is at risk of producing a concept with an unfavorable outcome that might be implausible or maladaptive. The framework provides a systematic method for assessing and evaluating the JWC to determine whether the concept achieves a sufficient level of efficacy. Joint concept development benefits from the integration of assessment and evaluation by receiving tailored feedback to improve its efficacy. The JWC continues to improve through constant dialogue and a rich conversation resulting from the observations and insights obtained throughout the application of the framework during concept development.

The JWC intends to address how the Joint Force will fight in 2030. Yet, without an assessment and evaluation framework, there is no formalized method for supporting claims to the JWC's efficacy. Due to its comprehensiveness, the JWC is the ideal stress-test for a universal joint concept assessment and evaluation framework.[1] The three criteria of the framework essentially ask *does it work?; is it plausible?;* and *does it still work if conditions change?* A joint concept defines, addresses, and provides solutions to

[1] The Joint Staff J-7 Analysis team evaluated the first year of the JWC's development using an initial version of the assessment framework and demonstrated universal applicability during testing.

military challenges.[2] By defining a joint concept, it logically aims to achieve some favorable outcome associated with the challenge at hand in a manner that mitigates risk. The level of efficacy evaluated through the three assessment criteria of *effectiveness, viability*, and *robustness* are, though they may differ in their application as compared to the JWC, applicable to concepts more generally.

The JWC addresses a broad, complex problem set in the 2030 timeframe and requires a comprehensive assessment and evaluation framework to appropriately determine its efficacy. Due to the JWC assessment and evaluation framework's comprehensive nature, it confers applicability to more focused concepts such as, the *Joint Concept for Robotic and Autonomous Systems* (JCRAS). JCRAS focuses on determining how the Joint Force will employ robotics and autonomous systems to achieve an outcome of "gaining and maintaining operational advantage in a future operating environment."[3] The military challenge JCRAS addresses is the innovative employment of emergent technology to exact a favorable outcome or gain advantage. JCRAS is subject to challenges and elements of risk similar to the JWC and other joint concepts, such as stakeholder bias, unfavorable outcomes, implausibility, or maladaptivity. As a narrower scoped concept, JCRAS could be assessed and evaluated using the same JWC assessment and evaluation framework that determines efficacy through *effectiveness*, *viability*, and *robustness*.

Applying the assessment and evaluation framework, the assessment criteria serve as the diagnostic that informs the evaluation of the concept's efficacy and how well it

[2] Chairman, "Joint Publication 1: Doctrine for the Armed Forces of the United States," 2017, VI-9.
[3] Chairman of the Joint Chiefs of Staff, "Joint Concept for Robotic and Autonomous Systems," (Washington DC, 2016), 5.

mitigates risk. By considering the *effectiveness* criteria, an analyst determines the extent to which the outcome or gained advantage for JCRAS is achieved and what, if any, residual risk of undesired outcomes exists. Additionally, through the application of the *effectiveness* criteria, an analyst identifies the best linkage between Human-RAS employment or integration to demonstrate a favorable outcome or best potential advantage. Through the application of an objective and comprehensive consideration of *effectiveness*, an analyst links a JCRAS operational approach to producing a favorable outcome through the employment of capabilities. The result provides the concept developers and senior leaders a holistic vision of *how* and *why* the concept is *effective*.

Comparably, the application of the *viability* criteria provides comprehensive consideration of the factors contributing to the concept's risk of implausibility. JCRAS provides an operational approach to the employment of emergent technology or a future advanced capability. The concept's *viability* depends on the affordability, validity of assumptions, the feasibility of advanced capabilities and joint functions, and the political risk. JCRAS contends with similar *viability* challenges as the JWC. Assessing JCRAS *viability* and understanding its associated risks allow concept developers to achieve a better understanding of the relationship between the operational approach and its ability to mitigate the risk of implausibility.

Likewise, the criteria for *robustness* are still applicable as the concept addresses the future operating environment. JCRAS is comparable to the JWC, contending with the same challenges of projecting the future security environment subject to variability. The *robustness* criteria thoroughly examine the impact to the *effectiveness* and *viability* of the concept in multiple conditions. The application of the *robustness* criteria enables an

understanding of the future security environment conditions that reduce the efficacy of the concept and to what extent the concept mitigates the risk of being maladaptive.

The motivation for introducing a formal assessment and evaluation framework underscores the importance of ensuring that future joint concepts are sufficiently efficacious. Determining a joint concept's efficacy means exploring the ways it mitigates risk to generate a favorable outcome both plausibly and robustly. The consequence of not comprehensively and formally assessing and evaluating a concept risks misshaping the development and design of the future Joint Force and threatens the organization's credibility. As joint concepts take on a greater role in shaping capability development and force design, a formalized framework assists in increasing the tangibility of a conceptually complex task.[4] With a comprehensive framework, the risks joint concepts might introduce are identified during development and not during implementation such as what occurred with the Effects-Based Operations (EBO) Concept.

In his USJFCOM Commander's Guidance for EBO, then General Mattis cites several issues with the concept across the Services to the point that he asks, "Is EBO even a viable operating concept?"[5] As evidence of the failures of the concept, Mattis gives the example of the Israel Defense Forces' (IDF) use of EBO during a conflict and how their "overreliance on EBO concepts was one of the primary contributing factors for their defeat."[6] Even so, there were ideas within EBO that improved the *effectiveness* of mission analysis and were incorporated into joint doctrine.[7] While aspects of the

[4] Chairman of the Joint Chiefs of Staff, *Draft CJCS Instruction 3100.0E: Joint Strategic Planning System*, (Washington DC, 2020), F-2.

[5] Mattis, James, "USJFCOM Commander's Guidance," *Parameters* (Autumn, 2008): 22, https://apps.dtic.mil/dtic/tr/fulltext/u2/a490619.pdf.

[6] Mattis, "USJFCOM Commander's Guidance," 20.

[7] Mattis, "USJFCOM Commander's Guidance," 23.

operating concept proved to be *effective*, given the few ideas retained in doctrine, the concept incurred significant risk to its *viability* thus obviating any benefit it may have conferred. Mattis acknowledges that "if we made one mistake, it was that we fast-tracked some operational concepts and allowed them to gain inappropriate influence while unproven by history, experimentation, and current operations."[8] Learning from the EBO concept, the Joint Staff is spending considerable energy to thoroughly test, assess, and evaluate the JWC.[9]

The analysis efforts culminate through the application of a formalized assessment and evaluation framework. Applying the framework begins with assessing the *effectiveness, viability,* and *robustness* of the concept as a diagnostic of a concept's efficacy before implementation. The resulting assessment of each of the criteria serves as the basis for evaluating the concept's efficacy or intersection of *effectiveness, viability,* and *robustness*. The resulting efficacy leads to the determination of the concept's *sufficiency* and underwrites the go/no go judgements. The go/no go judgements are at the core of ensuring failed concepts are not implemented. As Mattis identified the disadvantage of fast-tracking a concept, if he had evidence of EBO's lack of *sufficient* levels of efficacy, EBO would likely have been judged insufficient for implementation.

In an interdependent world of decreased margin of error, implementing insufficient concepts results in consequences felt globally as was the case for the IDF employing EBO. The undue risk of EBO contributed to the IDF's defeat in a war with

[8] Mattis, "USJFCOM Commander's Guidance," 23.

[9] The Joint Staff has initiated the Global Hunter wargame series that focuses experimentation on the JWC and Supporting Joint Concepts. Chairman of the Joint Chiefs of Staff, *Draft CJCS Instruction 3100.0E*, F-3.

1,500 people in Israel wounded and an estimated 300,000 displaced Israelis.[10] The efficacy of a concept achieved at the intersection of *effectiveness*, *viability*, and *robustness*, requires innovation and grappling with complex issues. Given the challenges of the current and projected security environment, falling short of delivering a sufficiently efficacious concept introduces undue operational risk to the Joint Force with strategic implications of political, social, and international risk.

[10] "Factbox: Costs of war and recovery in Lebanon and Israel," Reuters Staff, July 9, 2007, https://www.reuters.com/article/us-lebanon-war-cost/factbox-costs-of-war-and-recovery-in-lebanon-and-israel-idUSL0822571220070709.

Appendix 1: Assessment Criteria

Assessment Criteria	Questions
Effectiveness	1. *To what extent does the joint warfighting operational logic of the JWC contribute to addressing the relevant NMS challenges?* 2. *How well does the joint warfighting operational logic of the JWC achieve the campaign outcomes?* 3. *How well does the joint warfighting operational logic of the JWC employ force posture, mix, design, and advanced capabilities to achieve the campaign outcomes?* 4. *To what extent does the joint warfighting operational logic of the JWC integrate force posture, mix, design, and advanced capabilities to achieve the campaign outcomes?*
Viability	1. *To what extent is the joint warfighting operational logic of the JWC aligned/divergent to the envisioned trajectory of the Joint Force?* 2. *To what extent are the assumptions of the joint warfighting operational logic of the JWC constrained by external factors not controlled by the Joint Force (e.g., policy decisions, Allies and Partners' dependence)?* 3. *To what extent is the joint warfighting operational logic of the JWC dependent on advanced capabilities reasonably available and affordable?* 4. *How reasonable are the functional support implications of the joint warfighting operational logic of the JWC?* 5. *What is the extent of risk (e.g. political, escalatory, force) posed by the joint warfighting operational logic of the JWC?*
Robustness	1. *To what extent are the effectiveness and viability impacted when there are changes to the future security environment for a given adversary?* 2. *To what extent is the joint warfighting operational logic transportable to another adversary?*

Bibliography

Bratton, Patrick. “When is Coercion Successful?” Naval War College Review 58, no. 3 (Summer 2005).

Chairman of the Joint Chiefs of Staff. “CJCS Instruction 3010.02D: Guidance for Development and Implementation of Joint Concepts.” Washington DC, 2013.

Chairman of the Joint Chiefs of Staff. “CJCS Instruction 3030.01: Implementing Joint Force Development and Design.” Washington DC, 2019.

Chairman of the Joint Chiefs of Staff. “Draft Joint Instruction 3100.0E: Joint Strategic Planning System.” Washington DC, 2020.

Chairman of the Joint Chiefs of Staff. “Joint Concept for Robotic and Autonomous Systems.” Washington DC, 2016.

——. “Joint Doctrine Note 1-15: Operation Assessment,” Washington DC, 2015.

——. “Joint Operating Environment: 2035,” Washington DC, 2016.

——. “Joint Publication 1: Doctrine for the Armed Forces of the United States,” Washington DC, 2017.

——. “Joint Publication 5-0: Joint Planning,” Washington DC, 2020.

Dörner, Dietrich. *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*. New York: Metropolitan Books, 1996.

Feickert, Andrew. “Defense Primer: Army Multi-Domain Operations (MDO).” Congressional Research Service: Report, January 16, 2020, 1–3. http://search.ebscohost.com.nduezproxy.idm.oclc.org/login.aspx?direct=true&AuthType=ip,url,uid&db=tsh&AN=141835240&site=eds-live&scope=site

Freier, Nathan and John Schaus. "INDOPACOM through 2030." Parameters 50, no. 2 (2020): 27-34. https://press.armywarcollege.edu/parameters/vol50/iss2/5.

Gray, Colin. *Modern Strategy*. Oxford: Oxford University Press, 1999.

Hart, Susan, Erik Jan Hultink, Nikolaos Tzokas, and Harry R. Commandeur. “Industrial Companies’ Evaluation Criteria in New Product Development Gates.” Journal of Product Innovation Management, January 1, 2003. http://search.ebscohost.com.nduezproxy.idm.oclc.org/login.aspx?direct=true&AuthType=ip,url,uid&db=edsbig&AN=edsbig.A100623083&site=eds-live&scope=site.

Headquarters US Marine Corps. Force Design 2030. Washington, DC: Headquarters US Marine Corps, March 2020.

Johnson, Gerry, Kevan Scholes, and Richard Whittington. *Exploring Corporate Strategy Seventh Edition*. New York: Prentice Hall Financial Times, 2006.

Lempert, Robert, Drake Warren, Ryan Henry, Robert Button Jonathan Klenk, and Kath Giglio, *Defense Resource Planning Under Uncertainty: An Application of Robust Decision Making to Munitions Mix Planning*. Santa Monica: RAND Corporation, 2016.

Mattis, James. “USJFCOM Commander’s Guidance.” *Parameters* (Autumn, 2008): 18-25. https://apps.dtic.mil/dtic/tr/fulltext/u2/a490619.pdf.

Mazarr, Michael J., Katharina Ley Best, Burgess Laid, Eric V. Larson, Michael E. Linich, and Dan Madden. “The U.S. Department of Defense’s Planning Process.” Santa Monica, CA: RAND Cooperation, 2019. https://www.rand.org/content/dam/rand/pubs/research_reports/RR2100/RR2173z2/RAND_RR2173z2.pdf

Mulvey, John, Robert Vanderbei, and Stavros Zenios. “Optimization of Large-Scale Systems,” *Operations Research*, Vol. 43, No. 2 (Mar.-Apr., 1995): 264-281.

National Quality Forum, “Measure Evaluation Criteria and Guidance for Evaluating Measures for Endorsement,” (Washington, DC, 2016), 7.

Ochmanek, David, *Improving Force Development Within the U.S. Department of Defense: Diagnosis and Potential Prescriptions*. Santa Monica, CA: RAND Corporation, 2018. https://www.rand.org/pubs/perspectives/PE302.html.

Ochmanek, David, Peter A. Wilson, Brenna Allen, John Speed Meyers, and Carter C. Price, *U.S. Military Capabilities and Forces for a Dangerous World: Rethinking the U.S. Approach to Force Planning*. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR1782-1.html.

Reuters Staff. “Factbox: Costs of war and recovery in Lebanon and Israel.” July 9, 2007. https://www.reuters.com/article/us-lebanon-war-cost/factbox-costs-of-war-and-recovery-in-lebanon-and-israel-idUSL0822571220070709

Richardson, John M. A Design for Maintaining Maritime Superiority. Washington, DC: Department of the Navy, January 2016. https://www.navy.mil/cno/docs/cno_stg.pdf.

Team, Enterprise Capability Collaboration, and US Air Force. "Air Superiority 2030 Flight Plan." (2016), 10, https://www.airforcemag.com/PDF/DocumentFile/Documents/2016/Air%20Superiority%202030%20Flight%20Plan.pdf.

U.S. Department of Defense. *Summary of the 2018 National Defense Strategy of The United States of America*. Washington DC: Department of Defense, 2018.

U.S. President, *National Security Strategy*. Washington DC: Government Printing Office, December 2017.

Yarger, Harry R. *Strategic Theory for the 21st Century: The Little Book on Big Strategy*. Carlisle: Strategic Studies Institute, 2006.

Vita

Prior to attending the Joint Advanced Warfighting School and upon completion, Dr. Adria Markowski serves as a War Plans Analyst with the Joint Staff J-7 Force Development and Design Directorate within the Futures and Concept Deputy Directorate. In her role, Dr. Markowski provides analytical and assessment support to concept development by developing assessment frameworks.

Prior to her role with the Joint Staff, Dr. Markowski served as an Operations Research Analyst for Naval Forces Europe/Naval Forces Africa/ SIXTH Fleet (Jun 2015-Aug 2018); Combined Arms Center-Training, Army Training Support Center (Aug 2008-Jun 2015); The Naval Safety Center (Aug 2007-Aug 2008); and the Surface Deployment and Distribution Command-Transportation Engineering Agency (May 2003-Aug 2007).

Dr. Markowski has a Bachelor of Science in Mathematics and a Bachelor of Science in Business Administration (concentration in Finance) from Christopher Newport University (2005). She has completed a Master of Science degree from The College of William & Mary in Computer Science with a concentration in Computational Operations Research (2008). She earned a Doctor of Philosophy degree in Industrial and Systems Engineering from Virginia Polytechnic Institute and State University (2011).