Long-Range Precision Fires: Toward a New Paradigm

A Monograph

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Abstract

Long-Range Precision Fires: Toward a New Paradigm, by Maj Jonathan "Blue" Morse, 52 pages.

Since the revolutionary advent of airpower, the US has been wedded to the paradigm of leveraging air and maritime Long-Range Precision Fires (LRPF) to achieve decisive effects. Despite evolutions in long-range capabilities, including the development of the cruise missile in the 1980s, the US has only further cemented this paradigm through highly successful operations in Desert Storm, Desert Fox, Iraqi Freedom, and subsequent Flexible Response Options (FRO) from 2003 to present. Yet since Desert Storm, adversaries have been carefully observing US operational success and reorienting their doctrine, prioritizing rapid technological advancements that specifically target US bilateral dependency. In light of these new challenges in the operational environment and the recent prominence of Multi-Domain Operations (MDO), this monograph explores the problem of the LRPF paradigm through leveraging the theoretical lens of systems thinking, architectural design, and John Boyd's *Destruction and Creation*. Using Gharajedaghi's "mapping the mess" as a framework for *searching, mapping,* and *telling the story*, this monograph proposes that the current LRPF paradigm is insufficient for the emergent operational environment and that a paradigm shift must occur that is informed by balance, time, and phasing.

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Abbreviations

A2/AD	Anti-Access Area Denial
ACC	Air Component Command
ACTS	Air Corps Tactical School
ALCM	Air-Launched Cruise Missile
ATACMS	Army Tactical Missile System
ATO	Air Tasking Order
BM	Ballistic Missile
CALCM	Conventional Air-Launched Cruise Missile
CDCM	Coastal Defense Cruise Missile
CFACC	Combined Forces Air Component Command
CINC	Commander-in-Chief
COG	Center of Gravity
CONUS	Continental US
CRBM	Close-Range Ballistic Missile
DSMAC	Digital Scene Matching Area Correlator
EBS	Expeditionary Bombs Squadron
EW	Early Warning
F2T2EA	Find, Fix, Target, Track, Engage, Assess
FLOT	Forward Line of Troops
FRO	Flexible Response Option
FSCL	Fire Support Coordination Line
GDP	Gross Domestic Product
GLBM	Ground-Launched Ballistic Missile
GLCM	Ground-Launched Cruise Missile

HDBT	Hard and Deeply Buried Target
I&W	Indications and Warning
IADS	Integrated Air Defense System
INF	Intermediate-Range Nuclear Forces Treaty
IRBM	Intermediate-Range Ballistic Missile
JASSM	Joint Air-to-Surface Standoff Munition
JFC	Joint Force Commander
KMPR	Korea Massive Punishment & Retaliation Plan
LRA	Long-Range Artillery
LRPF	Long-Range Precision Fires
MDO	Multi-Domain Operations
MEZ	Missile Engagement Zone
MLRS	Multiple Launch Rocket System
MRBM	Medium Range Ballistic Missile
NDS	National Defense Strategy
nK	North Korea
OIF	Operation Iraqi Freedom
OODA	Observe, Orient, Decide, Act
PLA	People's Liberation Army
PME	Professional Military Education
PRC	People's Republic of China
R&D	Research and Development
RCS	Radar Cross-Section
ROK	Republic of Korea
SALT	Strategic Arms Limitation Talks
SOF	Special Operations Forces

SRBM	Short-Range Ballistic Missile
TERCOM	Terrain Contour Matching
TLAM	Tomahawk Land Attack Missile
UGF	Underground Facility
USAF	US Air Force
USN	US Navy
USFK	US Forces Korea
WMD	Weapons of Mass Destruction

Introduction: Thesis

> Human life, even the entirety of human nature, is nothing but war of the future against the present.
>
> —Helmuth von Moltke, *War and Peace*

> By focusing on itself, architecture has entered an unavoidable paradox that is more present in space than anywhere else: the impossibility of questioning the nature of space and at the same time experiencing a spatial praxis.
>
> —Bernard Tschumi, *Architecture and Disjunction*

Since the advent of airpower in the beginning of the 20th century, the US has been captivated by the ability to achieve long-range effects in pursuit of tactical to strategic level objectives. Yet, this infatuation with range and weapon effects is as old as warfare itself, predating airpower advocates. This is seen in 1346 at the decisive English victory over the French at the Battle of Crécy, where the increased range of the longbow singlehandedly "ended the long supremacy of feudal cavalry," leaving 1,500 "lords and knights" dead on the field.[1] However, it was with the birth of airpower that the nature of range itself inherently changed, as Billy Mitchell asserted when he prophesied that distances would be "measured in hours and not in miles."[2]

What made early airpower particularly unique was not merely its increased range, but the *method* used to deliver its effects. In *Command of the Air* Douhet writes, "Now it is *possible* to go far behind the fortified lines of defense … It is air power which makes this possible."[3] On 12 June 1918 when the 96th Aero Squadron flew the "first American bombing raid" over Étain,

[1] I.B. Holley Jr, *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States During World War 1; A study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* (Hamden: Archon Books, 1971), 4. Sir Charles Oman described the Battle of Crécy as "a revelation to the Western World."

[2] William Mitchell, *Winged Defense* (New York: The Knickerbocker Press, 1924), 95.

[3] Giulio Douhet, *The Command of the Air* (New York: Coward-McCann, 1942), 9.

France, the paradigm linking the method of airpower and deep strike was consummated.[4] Following the Second World War, sea power became a major element to this paradigm when through the aircraft carrier the "role of ships became firstly one of carrying air power to sea."[5] This joint paradigm of air and maritime means in projecting long-range effects still remains today, as seen in the 14 April 2018 strike against Syria through the combination of US Air Force (USAF) and US Navy (USN) assets.[6] In *Ideas and Weapons* I.B. Holley writes, "It follows then that the methods used to select and develop new weapons and the doctrines concerning their use will have an important bearing upon the success or failure of armies – and of nations."[7]

The truth of Holley's statement was reinforced during the development of the cruise missile, which Richard Betts claims is the "most revolutionary" change in the US force posture since the atomic bomb.[8] Eric Arnett in *Sea-Launched Cruise Missiles and U.S. Security* describes this technological innovation as "a grail sought by U.S. policymakers and technologists for at least fifty years."[9] However, in Betts' *Cruise Missiles: Technology, Strategy, & Politics*, he describes how the cruise missile was viewed by the services as an evolutionary rather than a revolutionary change: "As with most new weapons, the cruise missile is being fitted … into existing operational concepts."[10] Thomas Kuhn in *The Structure of Scientific Revolutions*

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[4] James J. Hudson, *Hostile Skies: A Combat History of the American Air Service in World War 1* (New York: Syracuse University Press, 1968), 86.

[5] Vice Admiral Sir Arthur Hezlet, *Aircraft and Sea Power* (New York: Stein and Day Publishers, 1970), 322.

[6] Dan Parsons, "Air Force Shows Off Stealthy Long-Range JASSM-ER for First Time in Syria Strikes," Defense Daily, accessed 01 December 2020, https://www.defensedaily.com/air-force-shows-off-stealthy-long-range-jassm-er-first-time-syria-strikes/air-force/.

[7] I.B. Holley Jr, *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States During World War 1; A study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* (Hamden: Archon Books, 1971), 5.

[8] Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington: The Brookings Institution, 1981), 8.

[9] Eric H. Arnett, *Sea-Launched Cruise Missiles and U.S. Security* (New York: Praeger Publishers, 1991), xvii.

[10] Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington: The Brookings Institution, 1981), 8.

describes this natural predisposition toward established paradigms when he writes how practitioners in the scientific community attempt to "force nature into the preformed and relatively inflexible box that the paradigm supplies," while being "often intolerant of those [theories] invented by others."[11]

Regardless of the potential revolutionary changes inherent in emergent cruise missile technology, the US began Operation Desert Storm using the preexisting bilateral air and maritime paradigm of Long-Range Precision Fires (LRPF).[12] The Joint Force leveraged USAF and USN long-range systems like the AGM-86 Conventional Air-Launched Cruise Missile (CALCM) and the Tomahawk Land Attack Missile (TLAM) to kick off the first phase of the air campaign. At approximately H-hour plus six minutes, thirty-five CALCMs and fifty-four TLAMs struck forty-five strategic targets in Baghdad, causing one witness to liken the display to a firework show at Disney World multiplied by a hundred.[13] This highly successful model was repeated with increased scope and scale during Operation Desert Fox in 1998 and Operation Iraqi Freedom in 2003. Additionally, variations of these USAF and USN LRPF systems were used in a myriad of Flexible Response Options (FROs) from 2003 to the present. Yet, the enduring legacy of this paradigm is most clearly displayed in General Mark Milley's recent comments regarding future DoD funding: "I love the Army … but the fundamental defense of the United States and the ability to project forward will always be for America naval and air and space power."[14]

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[11] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: The University of Chicago Press, 1962), 24.

[12] Ibid., 23, 102. Kuhn defines a paradigm as the accepted model, pattern, or conceptual network through which scientists view the world. In this monograph it will be used to describe the "accepted model" through which the US views the application of Long-Range Precision Fires (LRPF).

[13] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 172.

[14] Paul McLeary, "CJCS Milley Predicts DoD Budget 'Bloodletting' To Fund Navy," Breaking Defense, accessed 02 January 2021, https://breakingdefense.com/2020/12/cjcs-milley-predicts-dod-bloodletting-to-fund-navy-priorities/.

However, since Desert Storm, adversaries have been observing this paradigm of leveraging USAF and USN LRPFs to achieve decisive effects. While the US has largely focused on counterinsurgency operations since 2003, opponents have reoriented their doctrine, focusing on rapid technological advancements that specifically target the bilateral dependency of the current paradigm.[15] For example, China has prioritized the development of weapons designed to threaten USN and USAF force projection, thereby mitigating the underlying ability of the Joint Force to project LRPFs and seize the initiative.[16] In North Korea Kim Jong-Un shifted from a conventional force archetype to increased asymmetric fire capabilities aimed at achieving "escalation dominance" while significantly disrupting the LRPF paradigm.[17] David Kilcullen in *The Dragons and the Snakes: How the Rest Learned to Fight the West* asserts that the "systems that won the Gulf War so quickly and brought Western powers such unprecedented battlefield dominance in the quarter century since then are no longer working. Our enemies … have adapted, and unless we too adapt our decline is only a matter of time."[18]

In light of the new operational environment and the recent prominence of Multi-Domain Operations (MDO), which emphasizes effects "across all warfighting domains,"[19] this monograph reevaluates the traditional LRPF paradigm. Its purpose is to explain and explore the problem in the bilateral nature of this paradigm. Rather than arguing for a specific antidote, this monograph focuses on problem exploration, remembering R.L. Ackoff's words that "we fail more

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[15] James Mattis, "Summary of the 2018 National Defense Strategy of the United States of America" (Washington, DC: Department of Defense, 2018), 3, accessed 02 October 2020, https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

[16] Col Qiao Liang and Col Wang Xiangsui, *Unrestricted Warfare* (Vermont: Echo Point Books & Media, 1999), 182.

[17] Michael J. Mazarr, Gian Gentile, Dan Madden, Stacie L., Pettyjohn, & Yvonne K., Crane *The Korean Peninsula: Three Dangerous Scenarios* (Santa Monica, CA: RAND Corporation, 2018), 20.

[18] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (Cambridge: The MIT Press, 1996), 27.

[19] US Department of the Air Force. Air Force Doctrine Note 1-20, *USAF Role in Joint All-Domain Operations* (Washington, DC: Government Publishing Office, 2020), 1.

often not because we fail to solve the problem we face, but because we fail to face the right problem."[20]

This hypothesis proposes that the current LRPF paradigm is insufficient for the current operational environment and that a paradigm shift must occur, where in the words of Admiral Harry Harris, former USINDOPACOM commander, "No one military service dominates and no domain has fixed boundaries."[21] Put simply, this proposition comes down to redundancy where the Joint Force is able to gain and maintain the initiative by presenting multiple dilemmas against an adversary that is "not given the time to identify and mass his forces or supporting fires … because of the ambiguity of the situation presented to him and the rapidity with which it changes."[22]

This monograph is organized into five sections that frame the problem using Jamshid Gharajedaghi's three-phase process for formulating the mess: *searching*, *mapping*, and *telling the story*.[23] Section one lays out the theoretical lens through which the topic will be considered, briefly analyzing the disciplines of *systems thinking* by Gharajedaghi, *architectural design* by Klaus Krippendorff, Bernard Tschumi, and Le Corbusier, and *destruction and creation* by John Boyd. Section two searches the mess by analyzing the historical foundation of the LRPF paradigm, beginning with its birth in early airpower theory, evolution during the wars in Iraq, and utilization in Flexible Response Options (FROs). Section three maps the mess by ordering and framing the assumptions inherent in the LRPF paradigm. Section four tells the story by discussing the threat to these assumptions, centering specifically on the changes in the operational

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[20] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 159.

[21] Megan Eckstein, "'Multi-Domain Battle' Concept to Increase Integration Across Services, Domains," USNI News, accessed 01 December 2020, https://news.usni.org/2016/10/04/multi-domain-battle-concept-increase-integration-across-services-domains.

[22] U.S. Department of the Army, *Field Service Regulations, Operations, FM 100-5* (Washington, D.C.: Government Printing Office, 1986), 15.

[23] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 160.

environment presented by China and North Korea. Finally, section five concludes using Robert Leonhard's *Fighting by Minutes: Time and the Art of War* to frame a range of potentialities toward a new LRPF paradigm.

Section 1: The Theoretical Lens

> Increasing specialization has created a 'system of parallel trenches' in the quest for innovation. Everyone is digging deeper into their own trench and rarely standing up to look in the next trench over, even though the solution to their problem happens to reside there.
>
> —David Epstein, *Range*

> Humans somehow fail to recognize situations outside the contexts in which they usually learn about them.
>
> —Nassim Taleb, *Antifragile*

Before making sense of the LRPF paradigm, this section lays out the theoretical lens through which this problem is explored. Frans Osinga in *Science, Strategy and War: The Strategic Theory of John Boyd* argues that "we can't just look at our own personal experiences or use the same mental recipes over and over again; we've got to look at other disciplines and activities and relate or connect them to what we know from our experiences and the strategic world we live in."[24] Hence, this monograph leverages the disciplines of *systems thinking* by Jamshid Gharajedaghi, *architectural design* by Klaus Krippendorff, Bernard Tschumi, and Le Corbusier, and *destruction and creation* by John Boyd.

Systems Thinking: Jamshid Gharajedaghi

In *Systems Thinking: Managing Chaos and Complexity*, Gharajedaghi argues that chaos and complexity are not characteristics of a new reality, rather "features of our perceptions and understanding."[25] Put simply, we see the world as chaotic and complex only because we use inadequate language to describe it. In chapter eight he uses a framework titled "Formulating the Mess" to help counter these self-imposed obstructions that prevent a system from "facing its

[24] Frans P.B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York: Routledge Taylor & Francis Group, 2007), 85.

[25] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 25.

current reality."[26] The three-phase process of *searching*, *mapping*, and *telling the story* will be the framework used to explore the "intractable phenomenon" of the LRPF problem.

Gharajedaghi describes *searching* as "watching how a system actually behaves, learning its history, and understanding why it does what it does."[27] This monograph focuses on the "systems analysis" method of inquiry within the *searching* phase. This method of inquiry emphasizes the structural, functional, and behavioral aspects of the system. For the LRPF problem exploration, this analysis is shaped by examining the historical backdrop of the LRPF paradigm, which begins with the revolutionary birth of airpower and culminates in the most recent FROs.

The second step of *mapping* involves analyzing the "deep-rooted assumptions that are at the core" of the system.[28] In his chapter titled "Design Thinking," Gharajedaghi asserts that system properties are based on explicit or implicit sets of assumptions. While these assumptions tend to remain unchallenged in conventional practice, design thinking involves challenging them. Gharajedaghi states, "As long as the assumptions underlying the action are explicit, there exists the chance to learn from experience and improve the quality of our practice."[29] Consequently, section three of this monograph explores the underlying assumptions of the LRPF paradigm.

Finally, step three titled *telling the story* is the "early warning system" that "reveals the undesirable future implicit in the current state."[30] Gharajedaghi writes that "the mess should be presented as a consequence of past success, not as a result of failure."[31] Therefore, section four shows how the overwhelming success of the LRPF paradigm has paradoxically given birth to the

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[26] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 159.

[27] Ibid., 160.

[28] Ibid., 165.

[29] Ibid., 135.

[30] Ibid., 166.

[31] Ibid., 166.

present challenges in the operational environment. These challenges are seen in how China and North Korea have challenged the assumptions of the LRPF paradigm, thereby creating an undesirable future for US operations.

Architectural Design: Klaus Krippendorff, Bernard Tschumi, & Le Corbusier

In addition to systems thinking, this monograph leverages a theory of architectural design that challenges the classic dictum "form follows function." Coined by Louis Henry Sullivan, "form follows function" is built on the conviction that once the function of an artifact is understood, its form naturally emerges from that understanding.[32] Unfortunately, as Klaus Krippendorff writes in *The Semantic Turn: A New Foundation for Design*, this dictum fails to critically question "what a function was, where a function came from, and who or what defined the function in question."[33] This lack of questioning leads architectural designers to embrace artifacts without questioning the strategic context behind their original function.

For example, Krippendorff writes that tableware designers never questioned eating practices, while radio developers assumed the whole system of radio transmission and programming to be a given. Krippendorff argues that the strategic implications of this lack of questioning are severely limiting: "Taking the larger whole for granted is, of course, a way to limit a design problem and get it done, but it is also a way to submit to prevailing conceptions that restricted spaces for design."[34]

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[32] Klaus Krippendorff, *The Semantic Turn: A New Foundation for Design* (New York: Taylor & Friends, 2006), 298. Conversely, "form follows function" asserts that "if the form of an artifact had little to do with the function it was meant to serve, its function had not been understood well enough to start with."

[33] Ibid., 6, 298. Krippendorff accuses designers of "blind submission to a stable functionalist social order, which is anachronistic to the kind of society experienced today."

[34] Ibid., 6, 298. Breaking radically from the functionalist tradition in design, Krippendorff asserts that "humans do not respond to the physical properties of things – to their form, structure and function – but to their individual and cultural meanings."

Hence, Bernard Tschumi in *Architecture and Disjunction* writes that "form follows function" becomes replaced by "form follows form," as there is seemingly "no necessary causal relationship between function and subsequent form."[35] He goes on to assert that this disjunction creates a gap between social reality and the utopian dream, leaving those genuinely concerned with architectural advancement in "disillusion and dismay."[36] In *Towards a New Architecture*, Le Corbusier echoes Tschumi when he contests that "there is great disagreement between the modern state of mind, which is an admonition to us, and the stifling accumulation of age-long detritus … the problem is one of adaptation."[37]

This monograph capitalizes on this alternative counter to "form follows function" by using it as a method of inquiry to question how the tactical functions and operational forms of the LRPF paradigm are becoming disjointed from strategic necessity. Similar to Le Corbusier's "man of today," the LRPF paradigm "is conscious on the one hand of a new world," yet finds itself "living in an old and hostile environment."[38]

Destruction and Creation: John Boyd

USAF Colonel John Boyd is commonly regarded as the one of the most revolutionary American military theorists of all time.[39] While he is most famously known for the OODA loop (Observe, Orient, Decide, Act), his commitment to immersing himself into a broad range of disciplines in order to "roam freely, listen carefully, and consume omnivorously," is veritably his

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[35] Bernard Tschumi, *Architecture and Disjunction* (Cambridge: The MIT Press, 1996), 115, 118. "Typological studies have begun to discuss the critical 'effect' of ideal building types that were historically born of function but were later displaced into new programs alien to their original purpose."

[36] Ibid., 27.

[37] Le Corbusier, *Towards a New Architecture*, translated from the thirteenth French edition and with an introduction by Frederick Etchells (New York: Dover Publications, 2014), 288.

[38] Ibid., 288.

[39] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 15. Boyd's equivalent of $E = MC^2$ is the OODA loop. The OODA loop asserts that organisms are able to survive and prosper by "enhancing their freedom of independent action or establishing symbiotic relationships through timely adaptation to a constantly changing environment."

most enduring legacy.[40] One of his most conspicuous yet unrecognized contributions came in his sixteen-page essay titled *Destruction and Creation*. Franklin "Chuck" Spinner, a key member of Boyd's military reform movement, recalls his mentor's bouts of agony and ecstasy over developing this essay: "During this period, Boyd would disappear for months at a time, barely sleeping. He would reemerge only to give briefings that were windows into madness – presentation slides crammed with ideas, questions, contradictions. He was searching for something deeper than anything he had found before, and he wasn't there yet."[41]

Emerging from what Grant Hammond describes as a "roiling sea of tempest," Boyd developed a "deceptively simple" yet sacred text involving "scientific, mathematical, and logical verification for principles Boyd knew intuitively to be true."[42] One of the key outputs of this essay is Boyd's trinity: the synthesis of Gödel, Heisenberg, and the second law of thermodynamics.[43] Best summarized by Osinga, Boyd's trinity supports the idea that "we cannot determine the character or nature of a system within itself. Moreover, attempts to do so lead to confusion and disorder – mental as well as physical."[44] Likewise, Hammond describes the trinity as supporting the notion that any "inward-oriented and continued effort to improve the match-up

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[40] David Epstein, *Range: Why Generalists Triumph in a Specialized World* (New York: Riverhead Books, 2019), 228.

[41] Eugene Jarecki, *The American Way of War: Guided Missiles, Misguided Men, and a Republic in Peril* (New York: Free Press, 2008), 181.

[42] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 118.

[43] Ibid., 118-120. The second law of thermodynamics states that "all observed natural processes generate entropy … the tendency is for entropy to increase in a system that is closed or cannot communicate with external systems or environment." Heisenberg's "Uncertainty Principle" asserts that "uncertainty, rather than certainty, lies at the base of our physical universe and theoretical understanding of it." Godel's "Incompleteness Theorem" implies that "in order to determine the consistency of any new system, we must construct or uncover another system beyond it."

[44] Frans P.B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York: Routledge Taylor & Francis Group, 2007), 95, 131. Boyd opens *Destruction and Creation* with the following words: "To comprehend and cope with our environment we develop mental patterns or concepts of meaning. The purpose of this paper is to sketch out how we destroy and create those patterns to permit us to both shape and be shaped by a changing environment."

of a concept with observed reality will only increase the degree of mismatch."[45] In harmony with Tschumi's theory that "by focusing on itself" architecture enters into an unavoidable paradox of spatial praxis, Boyd's trinity recognizes that a system can only survive by looking outside itself.[46]

Therefore, in order to learn and adapt, one must be able to destroy. "If humans aren't willing to break the bonds of convention and destroy the old definitions, perceptions, and ways of doing things, then we are not likely to create a truly novel breakthrough, concept, product, or methodology to produce change."[47] This monograph uses Boyd's trinity as a tool to challenge the "rigidities of thought" inherent in the LRPF paradigm. As Lawrence Freedman writes, it is "necessary" to make sense of new forms of theory by "challenging concepts of systems tending to equilibrium and pointed instead to chaos."[48]

[45] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 120.

[46] Bernard Tschumi, *Architecture and Disjunction* (Cambridge: The MIT Press, 1996), 28.

[47] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 118.

[48] Lawrence Freedman, *Strategy: A History* (New York: Oxford University Press, 2013), 197.

Section 2: History of Long-Range Precision Fires Paradigm

> The success of an overseas invasion depends upon the ability of the naval and air forces to accomplish in an initial phase of action a condition of superiority…
>
> —Air Corps Tactical School (ACTS), *Air Warfare-Tentative*, 1938

> The United States relies on the Air Force, and the Air Force has never been the decisive factor in the history of warfare.
>
> —Saddam Hussein, 30 August 1990

The Evolution of Long-Range Precision Fires in the 20th Century

The history of the modern LRPF paradigm began with the revolutionary birth of airpower.[49] While the radius of strategic aviation in World War 1 was at times no more than 25,000 yards in advance of friendly troops, early airpower theorists kept looking ahead to the future application of airpower.[50] Michael Matheny in *Carrying the War to the Enemy: American Operational Art to 1945* notes that during the interwar period, airpower theorists recognized the unique nature of airpower's ability to deliver effects across the "strategic, operational, and tactical" levels of war.[51]

However, airpower is only one tenet of this early LRPF paradigm.[52] The famous naval theorist Sir Julian Corbett writes that power projection is one of seapower's most important

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[49] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 31. "Instead of looking backward at World War 1, he [Mitchell] began to look ahead to logical projections of air power capabilities."

[50] I.B. Holley Jr, *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States During World War 1; A study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* (Hamden: Archon Books, 1971), 47. "Billy" Mitchell wrote that airpower "would have an independent mission very much as independent cavalry used to have" when it would be used to "carry the war well into the enemy's country."

[51] Michael R. Matheny, *Carrying the War to the Enemy: American Operational Art to 1945* (Norman: University of Oklahoma Press, 2011), 120.

[52] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 170. General Jacob L. Devers, commander of the Army Ground Forces during World War 2, recognized this "strategic role of the air which must be successfully conducted before the Infantry and Artillery can close with the enemy."

elements.[53] Yet, Matheny writes that airpower became one of the primary means of seapower's ability to accomplish this power projection.[54] Martin Creveld in *The Age of Airpower* further accentuates this maritime revolution when he notes that after Japan surrendered, "the carrier's importance was underlined by the American prohibition to Japan ever to build them again."[55]

This bilateral air and maritime LRPF paradigm experienced a further "evolution" in the 1970s when a "breakthrough in guidance and propulsion" introduced the cruise missile.[56] This modern LRPF capability was largely embraced by the services, with the USAF and USN deploying thousands of air-launched cruise missiles (ALCMs) and Tomahawk Land Attack Missiles (TLAM).[57] However, despite this mass mobilization, the cruise missile was criticized as a "weapon in search of a mission" as the services struggled to find applications within existing operational frameworks.[58] Similar to Tschumi's observation that modern architectural space was being conformed to the "paradigm of the ancient precedent," the cruise missile found itself transfigured into the existing LRPF paradigm.[59] Nevertheless, owing to the "declining capacity"

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[53] Michael R. Matheny, *Carrying the War to the Enemy: American Operational Art to 1945* (Norman: University of Oklahoma Press, 2011), 128. Matheny describes "power projection" as "the most critical strategic requirement for the United States in the early twentieth century, as it would remain."

[54] Ibid., 120, 147, 149. Matheny writes that "nothing would revolutionize war at sea like the advent of naval aviation" where, similar to airpower, it possesses the ability to "contribute at all levels of war – tactical, operational, and strategic."

[55] Martin Van Creveld, *The Age of Airpower* (New York: Public Affairs Books, 2011), 258.

[56] Eric H. Arnett, *Sea-Launched Cruise Missiles and U.S. Security* (New York: Praeger Publishers, 1991), 3-5. Eric Arnett defines the cruise missile as simply "an armed missile that is neither a ballistic missile nor a rocket," taking advantage of aerodynamic lift tantamount to "unpiloted airplanes." These cruise missiles leverage the advances of terrain contour matching (TERCOM) and digital scene matching area correlator (DSMAC) technology to mitigate the limitations of inertial navigation systems (INS).

[57] While a ground-launched version of the Tomahawk was briefly deployed in Europe, it was banned by the Intermediate-Range Nuclear Forces (INF) Treaty.

[58] Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington: The Brookings Institution, 1981), 6. The services did not "leap to adopt the cruise missile" due in part to the difficulties in the "logical relation between technological advance … and employment doctrine."

[59] Bernard Tschumi, *Architecture and Disjunction* (Cambridge: The MIT Press, 1996), 47.

of bombers to penetrate the latest Integrated Air Defense Systems (IADS), cruise missiles became foundational to the LRPF paradigm entering Operation Desert Storm.[60]

Long-Range Precision Fires in Operation Desert Storm, Desert Fox, and Iraqi Freedom

Instant Thunder, the Desert Storm air campaign, was designed by USAF Colonel John Warden to dislocate the Iraqi leadership and communications so that any offensive Iraqi operations out of Kuwait was infeasible.[61] Colonel Warden constructed his air campaign on the theory that a "properly sequenced and massed air attack" would dismantle enemy air defenses and command and control systems in a single stroke, "leaving the nation-state and its fielded forces defenseless against aggressive exploitation."[62]

Instant Thunder, particularly the first day of the Air Tasking Order (ATO), was built on the foundation of the USAF and USN LRPF paradigm.[63] Baghdad, with an IADS density seven times that of Hanoi during Linebacker II, was deemed "so dangerous" that USAF and USN cruise missiles and stealth aircraft were the only acceptable options for planners.[64] Hence, at 0238 on 17

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[60] John Birkler, *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy* (Santa Monica: RAND Publications, 1996), 13. RAND asserts that a secondary factor in increased cruise missile dependence is the growing American sensitivity to combat casualties in a Post-Cold War environment, "which will result in a greater premium on stealthy platforms or platform-munition combinations permitting standoff launch."

[61] Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell Air Force Base: Air University Press, 1995), 99. This strategic campaign followed Warden's concept of the Five Strategic Rings: isolate the leadership, degrade key production, disrupt the infrastructure via transportation attacks, 'turn' the population and troops against the regime, and destroy Iraq's offensive and defensive military forces. Although General Schwarzkopf did not appreciate the analogy, Colonel Warden likened Instant Thunder to the Schlieffen Plan: "Just as that plan refused engagement of most of the fielded French army … similarly, Instant Thunder was designed to 'flank' the Iraqi fielded forces (by flying over and around them) and then to 'envelop' Iraq by attacking key strategic nodes … inflicting systemic paralysis."

[62] Ibid., 102.

[63] US Department of Defense, Joint Staff, Joint Publication (JP) 3-30, *Joint Air Operations* (Washington, DC: Government Publishing Office, 2019), xvii. "The air tasking order (ATO) articulates the tasking for joint air operations for a specific execution timeframe, normally 24 hours."

[64] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 169. The defenses of Baghdad were said to be denser than the most heavily defended Eastern European target at the height of the Cold War.

January 1991 the first TLAMs were launched by fleets in the Persian Gulf and Red Sea, followed by CALCMs from seven B-52s against high-value Iraqi communication, power generation, and air superiority facilities.[65] Williamson Murray and Robert Scales in *The Iraq War* write that at exactly 0300 "all hell broke loose over Baghdad … instantly Iraq's communications with the outside world went down."[66]

Following the opening hours of Instant Thunder, an aggressive air exploitation was unleashed with a "full orchestration of Allied land-and-sea based air power."[67] While Instant Thunder failed to singlehandedly coerce Iraq to leave Kuwait, it succeeded in "undermining the key tenets of Iraq's military strategy: the willingness of the frontline units to fight and the ability of the reserve forces to counterconcentrate."[68] These "spectacular results" succeeded in validating the LRPF paradigm, which leaned heavily on air and maritime standoff capabilities in the opening minutes.[69]

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[65] Walter J. Boyne, *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why* (New York: Tom Doherty Associates, 2003), 30. There were two major firsts in modern military history during the opening hours of Instant Thunder. For the B-52s, this was the longest air combat mission in history at that time, while the launching of CALCMs was the first use of a space-linked weapon in war.

[66] Williamson Murray & Robert H. Scales Jr., *The Iraq War: A Military History* (Cambridge: The Belknap Press of Harvard University Press, 2003), 2. "When CNN's live television feed from Baghdad died, a huge cheer went up from American planners in Riyadh."

[67] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 166, 201. The first twenty-four hours yielded 1,300 combat sorties. USAF Chief of Staff General Merrill McPeak stated that there was no time following the first day of Instant Thunder in which "the Iraqi ground forces were not under heavy attack … every day, all day, and every night, a constant parade of shooters." On February 21st General Colin Powell remarked, "Air power is the decisive arm so far, and I expect it will be the decisive arm into the end of the campaign, even if ground forces and amphibious forces are added to the equation."

[68] Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (New York: Cornell University Press, 1996), 246. Over 43 days Instant Thunder yielded 109,876 sorties and 84,200 tons of munitions.

[69] Walter J. Boyne, *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why* (New York: Tom Doherty Associates, 2003), 31. "The results were so spectacular that they caused a complete reexamination of strategy by the Soviet military, who in August 1991 had tried to seize power. There was a recognition that they could no longer compete with the United States, and the Soviet Union dissolved with a whimper – and not a nuclear bang – on December 25, 1991. Even the allies in the coalition were startled at the comparative advances made by the U.S. forces, and many were forced to recognize that they were in fact so far behind that they were, to a greater or less degree, 'noninteroperable' with U.S. forces."

This paradigm was tested again in 1998 during Operation Desert Fox, the four-day air campaign aimed at disrupting Saddam Hussein's weapons of mass destruction (WMD), research and development (R&D), and delivery capabilities. To ensure tactical surprise, General Anthony Zinni, the CENTCOM Commander-in-Chief (CINC), leveraged only in-theater LRPF assets.[70] Hence, on the evening of 16 December, USN ships and submarines in the Gulf launched 250 TLAMs against WMD time-sensitive targets, strategic IADS facilities, and Early Warning (EW) surveillance radars.[71] Following the first evening, B-52 bombers from Diego Garcia launched 90 CALCMs against larger R&D facilities.

In *Cradle of Conflict: Iraq and the Birth of Modern U.S. Military Power*, Michael Knights writes that Desert Fox was a "stunning success from a military-technical point of view, underlining how far twenty-four-hour US precision-strike capabilities had traveled since the liberation of Kuwait."[72] In just four days, Desert Fox executed the largest cruise missile salvo in history, launching 325 TLAMs and ninety CALCMs, compared to the 288 TLAMs and thirty-five CALCMs launched during the entire forty-three days of Desert Storm.[73] General Zinni noted that "by using in-theater assets only, we achieved tactical surprise," catching "a lot of stuff that would normally have been moved."[74] Knights writes that this tactical surprise, executed with overwhelming mass, enabled the US to "operate inside Iraq's decision cycle for the first time since 1991."[75]

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[70] Michael Andrew Knights, *Cradle of Conflict: Iraq and the Birth of Modern U.S. Military Power* (Annapolis: Naval Institute Press, 2005), 200. JTF-SWA Commander Plummer explained, "Every time we deploy F-117s, it's a very visible statement, we give up any tactical surprise."

[71] These strikes were immediately followed by F-14Bs and F/A-18s from the USS *Enterprise* and were restricted to targets in southern Iraq due to limited tanker and defensive counterair support.

[72] Ibid., 200.

[73] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 298.

[74] Anthony Zinni, interview by Michael Knights, 2003.

[75] Michael Andrew Knights, *Cradle of Conflict: Iraq and the Birth of Modern U.S. Military Power* (Annapolis: Naval Institute Press, 2005), 201. Knights writes that "the permanent presence of a U.S. carrier battle group in the Gulf had given the United States a powerful ability to 'sucker punch' Iraq with little

This highly successful LRPF paradigm saw its next performance six years later on 20 March 2003 during Operation Iraqi Freedom (OIF) when in the opening hour of the air campaign 320 TLAMs and eighty CALCMs struck targets in Baghdad and the surrounding central and northern areas of Iraq.[76] Greg Hooker argues that while "shock and awe might well have been impossible to impose on an enemy inured to US military strikes during more than a decade of confrontation," the results were decisive.[77] Anthony Cordesman writes that the coalition's ability to paralyze enemy operations through the use of "precision air and missile power" at the outset of hostilities, juxtaposed with the segmented thirty-eight-day "battle of tactical attrition" in the Gulf War, was unprecedented.[78] One of the most notable aspects of the campaign was its increased investment in the LRPF paradigm.[79] For example, in the first twenty-four hours of the campaign, OIF launched 600 USAF and USN cruise missiles, over eighty percent of the total used in the forty-six days of Desert Storm and Desert Eagle.[80]

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warning, and the missiles had registered historically unprecedented launch and arrival rates. Roughly two thirds of the C2, WMD concealment, and WMD-production facilities targeted were destroyed or severely damaged." This capability became a major factor that would influence future operational planning.

[76] Williamson Murray & Robert H. Scales Jr., *The Iraq War: A Military History* (Cambridge: The Belknap Press of Harvard University Press, 2003), 73, 88. Murray and Scales assert that because the ground offensive, or "G" Day, preceded the air campaign, or "A" Day, "the air campaign has received far less attention than did the air effort in 1991." Nevertheless, General Tommy Franks, Commander of CENTCOM, described the air campaign as "unlike any other in history, a campaign characterized by shock, by surprise, by the employment of precise munitions on a scale never seen, and by the application of overwhelming force."

[77] Walter J. Boyne, *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why* (New York: Tom Doherty Associates, 2003), 71.

[78] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics, and Military Lessons* (Washington: Center for Strategic and International Studies, 2003), 76.

[79] Walter J. Boyne, *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why* (New York: Tom Doherty Associates, 2003), 71. Boyne describes this mass of effects when he concludes that "even the real-time video presentation of the bombing of key targets in Baghdad did not capture the extent and intensity of air operations, which had reached more than 1,000 sorties on the second day of the war and were sustained at or above that level."

[80] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics, and Military Lessons* (Washington: Center for Strategic and International Studies, 2003), 66.

Long-Range Precision Fires since OIF

Regarding success in the scientific field, Thomas Kuhn asks, "Is it really any wonder that the price of significant advance is a commitment that runs the risk of being wrong?"[81] Following the overwhelming success in Iraq, the US possessed a full throttle commitment to the LRPF paradigm, as evidenced in the ensuing FROs and heightened tensions on the Korean Peninsula in 2017.[82] Since 2003, the majority of the kinetic FROs utilized by US decision makers have involved the LRPM paradigm, employing over 300 air and maritime standoff munitions against targets in Somalia, Yemen, Libya, Iraq, and Syria.[83]

Aside from FROs, this paradigm also continues to influence operational planning. This was evidenced in 2017 when in response to heightened tensions on the Korean Peninsula, General Vincent Brooks, Commander of the US Forces Korea (USFK), approved the transfer of ten Joint Air-to-Surface Standoff Munitions (JASSM), the USAF replacement to the CALCM, to the F-16s at Kunsan AB, Republic of Korea (ROK).[84] Having this asset in theater enabled the combined ROK and US Air Component Command (ACC) to hold critical time-sensitive North Korean Ballistic Missile and WMD facilities at risk. Similar to General Zinni's consideration for using in

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[81] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: The University of Chicago Press, 1962), 101.

[82] US Department of Defense, Joint Staff, Joint Publication (JP) 5-0, *Joint Planning* (Washington, DC: Government Publishing Office, 2017), F-5. An FRO is defined as an "operational- to strategic-level concept of operation that is easily scalable, provides military options, and facilitates rapid decision making by national leaders in response to heightened threats or attacks against the US homeland or US interests."

[83] Dana W. White, "Department of Defense Press Briefing by Pentagon Chief Spokesperson Dana W. White and Joint Staff Director Lt. Gen. Kenneth F. McKenzie Jr. in the Pentagon Briefing Room," US Department of Defense, accessed 01 December 2020, https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1493749/department-of-defense-press-briefing-by-pentagon-chief-spokesperson-dana-w-whit/. US Marine Corps General Kenneth McKenzie, the Director of the Joint Staff, lauded the most recent 2018 combined TLAM and AGM 158 JASSM strike against Syria's chemical weapons capabilities as "precise, overwhelming, and effective." However, these kinetic examples do not include the myriad of non-kinetic strategic messaging FROs involving air and maritime assets like bomber overflights and Carrier Strike Group (CSG) deployments.

[84] Alex Lockie, "US and Japanese Fighters Are Getting Missiles Ideal for Striking North Korea," Business Insider, accessed 01 December 2020, https://www.businessinsider.com/us-air-force-jassm-f-16-south-north-korea-pyongyang-2017-6. The JASSM is the USAF replacement to the CALCM. It's 2,000lb blast/fragmentation warhead makes it ideal for strikes against high-value, well-defended targets.

theater assets during Desert Fox, having JASSM on the peninsula enabled operational surprise and flexibility without having to wait for Guam-based bombers or 7th Fleet naval assets.[85]

[85] Franz-Stefan Gady, "US Deploys 10 Long-Range Air-To-Ground Missiles to South Korea," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/us-deploys-10-long-range-air-to-ground-missiles-to-south-korea/. Moving JASSM to the Korean Peninsula significantly tightened the targeting kill chain, sending a deliberate message to deter North Korean military action in accordance with the Korea Massive Punishment & Retaliation (KMPR) plan.

Section 3: Long-Range Precision Fires Paradigm Assumptions

> One must never fail to recognize that it is difficult to free oneself from a concept once it is conceived and to throw overboard an entire operations plan once it appears that the presuppositions on which it is based are no longer valid.
>
> —German General Staff Ride 1905/06

> Only by discovering and interpreting our deep-seated assumptions can we see ourselves in a new way.
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> —Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*

There are five key assumptions that underlay the current LRPF paradigm.[86] While identifying the logic behind these assumptions is critical, David Metts writes that "even the most logical processes can result in disaster if they are founded upon false or faulty assumptions."[87] As Browne and Keeley assert in *Asking the Right Questions: A Guide to Critical Thinking*, when analyzing assumptions, one is identifying the link between a reason and conclusion. "If this link is flawed, the reason does not necessarily lead to the conclusion."[88] The logical links between the assumptions in the LRPF paradigm are rooted in history, theory, and doctrine. Understanding these links sets the stage for unraveling the changes in the operational environment imposed by emergent threats and the ensuing range of future potentialities.[89]

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[86] Apollo M. Nkwake, *Working with Assumptions in International Development Program Evaluation* (New York: Springer-Verlag, 2013), 93. Apollo Nkwake writes that "assumptions are the foci for any theory and thus any paradigm" and are critical in describing the "phenomenon at hand."

[87] David R. Mets, *The Air Campaign: John Warden and the Classical Airpower Theorists* (Maxwell Air Force Base: Air University Press, 1999), 12.

[88] M. Neil Browne & Stuart M. Keeley, *Asking the Right Questions: A Guide to Critical Thinking* (New Jersey: Pearson Prentice Hall, 2007), 81.

[89] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 135. Regarding systems analysis, Gharajedaghi writes that "the choices in the existing set usually share one or more properties based on an explicit or implicit set of assumptions or constraints produced by the actors' previous experience with similar situations."

Assumption #1: Players

The LRPF paradigm assumes that the USAF and USN are the primary players amenable for achieving long-range effects beyond the Fire Support Coordination Line (FSCL).[90] While this may seem like a conspicuous point, it is a critical place to begin because it is foundational to subsequent assumptions. The logic behind this assumption is largely rooted in airpower's ability to operate in the third dimension to achieve effects well beyond the Forward Line of Troops (FLOT), a unique capability in the early 19th Century that distinctly separated it from land operations. The theory supporting this bilateral assumption began two years prior to America dropping its first bombs in combat when in 1915 Billy Mitchell surmised the dual power projection roles of air and naval forces in his *Survey of America's Aviation Needs*.[91]

In Giulio Douhet's opening chapter of *The Command of the Air*, he writes that aeronautics has opened up a new field of action "radically different" from any other field in its ability to expose the enemy's territory with "utmost ease."[92] Admiral William Moffett, the recognized architect of American naval aviation, extended this "radically different" field of action to the seas with his theories regarding a "true air navy" in the interwar years.[93] Fifty years later technology further "corrected" any deficiencies in this bilateral form when John Warden

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[90] US Department of Defense, Joint Staff, Joint Publication (JP) 3-09, *Joint Fire Support* (Washington, DC: Government Publishing Office, 2019), GL-7. JP 3-09 defines the Fire Support Coordination Line (FSCL) as "a fire support coordination measure established by the land or amphibious force commander to support common objectives within an area of operation, beyond which all fires must be coordinated with affected commanders prior to engagement and, short of the line, all fires must be coordinated with the establishing commander prior to engagement."

[91] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 31.

[92] Giulio Douhet, *The Command of the Air* (Washington, D.C., Air Force History and Museums Program, 1998), 3, 192.

[93] William F. Trimble, *Admiral John S. McCain and the Triumph of Naval Air Power* (Annapolis, Naval Institute Press, 2019), 288. Admiral John McCain helped take Moffett's ideas to World War 2 when by the end of the conflict the aircraft carrier, which at the start was primarily a means for sea control, became "capable of projecting power over unprecedented distances."

proposed his air campaign would achieve independent "decisive effects" against Iraqi Centers of Gravity (COG).[94]

Doctrine is also implicit in providing a logical basis for this bilateral assumption in the LRPF paradigm. USAF's *Volume 1: Basic Doctrine* begins by adducing that airpower, "with its speed, range, and three-dimensional perspective," operates "fundamentally different from other forms of military power."[95] It contends that this fundamental difference is made manifest in its effective use of the third dimension, where "airpower can simultaneously strike directly at the adversary's centers of gravity, vital centers, critical vulnerabilities, and strategy."[96] Joint Doctrinal Publication 3-03 *Joint Interdiction* further accentuates this concept by adding the maritime component: "Some capabilities or weapons used for interdiction operations cross Service boundaries. Cruise missiles are one such weapon which can be launched from aircraft, ships, and submarines … and provide a potent employment option to the joint force."[97] Hence, this doctrinal framework, combined with the aforementioned historical and theoretical precedents, shapes the logical conclusion that the air and maritime domains are the key LRPF players.

Assumption #2: Offensive

Colin Gray asserts that one of the characteristics of the American way of war is that it is "aggressive and offensive" in nature.[98] This characteristic is also a fundamental assumption in the

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[94] David R. Mets, *The Air Campaign: John Warden and the Classical Airpower Theorists* (Maxwell Air Force Base: Air University Press, 1999), 59.

[95] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015).

[96] Ibid.

[97] US Department of Defense, Joint Staff, Joint Publication (JP) 3-03, *Joint Interdiction* (Washington, DC: Government Publishing Office, 2016), II-8.

[98] Colin S. Gray, *Irregular Enemies and the Essence of Strategy: Can the American Way of War Adapt?* (US Army War College: Strategic Studies Institute, 2006), 41-42. Gray writes, "As was the case with Iraq's seizure of Kuwait in 1990, the principal guardian of the status quo, the United States, had no military choice other than aggressive offensive action." He concludes by saying that "the American way was truly awesome in its ability to kill people and break things."

LRPF paradigm.[99] In *The Paths of Heaven: The Evolution of Airpower Theory*, Colonel Phillip Meilinger writes, "The speed of aircraft relative to ground forces plus the ubiquity of aircraft … equaled offensive power."[100] In John Warden's *The Air Campaign*, he writes that the offense, "by far the stronger form of air war," was foundational to his Desert Storm air campaign.[101]

This theoretical emphasis of offensive air operations is deeply rooted in doctrine. For example, the 1926 Training Regulation No. 440-15, *Fundamental Principles for the Employment of the Air Service*, farcically uses the term "offensive" four times in its opening premise.[102] Even current USAF doctrine reverberates this assumption when it states, "Airpower is best used as an offensive weapon … although all military forces have offensive capabilities … [airpower] provides joint force commanders (JFCs) a resource with global reach to directly and rapidly seize the initiative."[103] USN doctrine further underscores the bilateral nature of the LRPF assumption when it states that power projection from the maritime domain includes a broad spectrum of long-range "offensive military operations" available to the JFCs.[104] Christian Brose writes that with

[99] Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell Air Force Base: Air University Press, 1995), 114. Douhet asserts that airpower is inherently offensive, being able to strike when and where it wants.

[100] School of Advanced Airpower Studies, *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell Air Force Base: Air University Press, 1997), 9.

[101] John A. Warden III, *The Air Campaign* (New York, toExcel Press, 2000), 150. Warden writes that the "plan was based on offensive operations; the overall thrust of operations in the first hours of the war was to begin inducing strategic paralysis in Iraq."

[102] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015). Training Regulation No. 440-15 begins with the following statement: "Upon the outbreak of war the *offensive* power of the Air Service should be ready for instant use, and the *offensive* in the air should be assumed immediately. During this period of hostilities *offensive* aerial operations will exert an important influence upon the future conduct of the campaign. It should be used *offensively*."

[103] Ibid.

[104] United States Navy, *Naval Doctrinal Publication 1: Naval Warfare* (Dept. of the Navy, Office of the Chief of Naval Operations and Headquarters, 2010), 29.

war as a "perpetual contest between offense and defense," the US in a post-Cold War world has globally dominated in its ability to project power and fight offensively.[105]

Assumption #3: Basing

The logic regarding basing is cardinal to the LRPF paradigm, which assumes that air and naval assets will be able to operate from secure basing outside the range of enemy threat systems. This assumption finds many of its roots in World War 2, particularly in the Pacific Theater where US bombers were able to launch from secure island bases to strike targets in mainland Japan. The LRPF paradigm enables USAF bombing assets like the sixty-five-year-old B-52 to remain operationally relevant while generating from secure basing outside of enemy Missile Engagement Zones (MEZ). Forrest E. Morgan writes in the RAND publication titled *Crisis Stability and Long-Range Strike: A Comparative Analysis of Fighters, Bombers, and Missiles*: "Substantial numbers of standoff and penetrating bombers could be deployed to regional bases to generate a deterrent threat but kept well away from the opponent's defended airspace to mitigate the threat of surprise attack."[106] This is perfectly illustrated in the Continuous Bomber Presence (CBP) mission, which from 2004-2020 has seen an unremitting rotation of B-52 & B-1 Expeditionary Bomb Squadrons (EBS) to Anderson AFB, Guam.[107]

USAF doctrine underscores the importance of secure basing by recognizing that fixed bases are "especially vulnerable" because they must withstand enemy air, ground, and cyberspace

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[105] Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York: Hachette Books, 2020), 94. Brose's assertion is transparent in the historical precedent that every application of the modern LRPF paradigm has been offensive in nature.

[106] Forrest E. Morgan, *Crisis Stability and Long-Range Strike: A Comparative Analysis of Fighters, Bombers, and Missiles* (Santa Monica: RAND Publications, 2013), 80.

[107] Diana Correll, "The Air Force has stopped its Continuous Bomber Presence mission in Guam," Air Force Times, accessed 01 December 2020, https://www.airforcetimes.com/news/your-air-force/2020/04/21/the-air-force-has-stopped-its-continuous-bomber-presence-mission-in-guam/. At the time of the CBP implementation, this island airfield provided a safeguarded basing option for bombers to generate well outside potential US Indo-Pacific Command (USINDOPACOM) threats, while still being close enough to provide credible LRPF options.

attacks while simultaneously sustaining prolonged friendly operations against the enemy.[108] This doctrinal consideration has only increased the USAF's dependency on "greater standoff," which not only directly reduces the "exposure of flight crews" to enemy defenses, but indirectly reduces the threat to the airbases from which those crews operate.[109] It also increases dependency on the maritime side of the LRPF paradigm, as Arnett asserts in his Pacific scenario of *Sea-Launched Cruise Missiles and U.S. Strategy*: "The Commissions on Long-Term Integrated Strategy cited the utility of SLCMs in the Pacific theater of a superpower war stemming from the distances between islands and uncertainty about US access to bomber bases."[110]

The maritime aspect of the basing assumption also finds its roots in World War 2 where US carriers operated hundreds of miles off the Japanese coast relatively secure from enemy threats.[111] Robert Futrell writes that the carrier continued to prove itself a "very effective cold war instrument" during the 1958 conflict in Lebanon, providing a safe base of operations in a region where overflight rights and landing fields presented limited options.[112] This operational autonomy married to the modern LRPF paradigm continues to make USN assets a key long-range instrument.[113]

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[108] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015).

[109] John Birkler, *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy* (Santa Monica: RAND Publications, 1996), xv.

[110] Eric H. Arnett, *Sea-Launched Cruise Missiles and U.S. Security* (New York: Praeger Publishers, 1991), 96.

[111] William F. Trimble, *Admiral John S. McCain and the Triumph of Naval Air Power* (Annapolis, Naval Institute Press, 2019), 274. Trimble notes that on August 13th, despite deteriorating weather conditions, the carriers were able to launch 1,167 offensive sorties, deliver 380 tons of bombs, and fire 2,175 rockets.

[112] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 616.

[113] Ibid., 616. This is evidenced in the three previously mentioned air campaigns in Iraq which saw a combined total of 624 TLAMs launched in the opening hours of the ATO from naval vessels positioned outside the MEZ.

Assumption #4: Tempo

Another major assumption in the LRPF paradigm is its ability to dictate the tempo of operations.[114] The logic behind this assumption, which is a byproduct of the offensive assumption, is largely rooted in USAF history and doctrine which states "offensive action, or initiative, provides the means for joint forces to dictate operations."[115] The LRPF paradigm asserts that by dictating the tempo it will be able to maximize the "effectiveness of friendly capabilities" while inhibiting the adversary in order to "operate beyond the enemy's ability to react."[116] Colonel Treadway describes this tempo-setting capacity as a "remarkable leap" over the traditional American way of war, which was historically premised in "overwhelming firepower supported by overwhelming logistics."[117]

The goal of controlling operational tempo is rooted in the assumption that the LRPF paradigm will be able to mass effects at the outset of hostilities and thereby seize the initiative.[118] In *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, David Fadok writes that operating at a rapid tempo improves "one's adaptability in war by minimizing one's own friction," simultaneously imposing maximum friction and mental disorder on the enemy.[119] This formula for success was repeated in the subsequent air operations in Iraq with increased intensity

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[114] William Mitchell, *Winged Defense* (New York: The Knickerbocker Press, 1924), 203. Mitchell famously wrote that once airplanes have seized the initiative, "nothing can stop their operations."

[115] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015). USAF doctrine goes on to say that "airpower is unique in its ability to dictate the tempo and direction of an entire warfighting effort regardless of the scale of operation."

[116] US Department of Defense, Joint Staff, Joint Publication (JP) 5-0, *Joint Planning* (Washington, DC: Government Publishing Office, 2017), IV-37.

[117] Eugene Jarecki, *The American Way of War: Guided Missiles, Misguided Men, and a Republic in Peril* (New York: Free Press, 2008), 163-164.

[118] Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell Air Force Base: Air University Press, 1995), 104. Mann writes that during Desert Storm this massing of effects at H-hour enabled coalition air forces to grasp the initiative "at all levels" and thereby exploit Iraqi operations throughout the remainder of the campaign.

[119] David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis* (Maxwell Air Force Base: Air University Press, 1995), 14-16.

and effect.[120] It is also baked into current operational planning assumptions which view the LRPF paradigm as largely synonymous with airpower as it is "increasingly the first military instrument brought to bear against an enemy in order to favorably influence the overall campaign."[121]

Assumption #5: Effects

Christian Brose writes that while shooting lethality has improved considerably over time, its success has always been a function of three factors: "the range of fire (how far militaries can shoot), the accuracy of fire (how well they can hit what they are shooting at), and the effect of fire (how much damage they can do)."[122] The logic behind these three factors of range, survivability, and weapons effectiveness is integral to understanding the LRPF paradigm.

The range of the cruise missile is what precipitated the shift from the original LRPF paradigm, which largely depended on the flagitious Stanley Baldwin phrase that "the bomber will always get through."[123] As RAND writes in *The Role of Precision Strike in Future Campaign Strategy*, the evolution in IADS technology, combined with the sheer density of strategic target areas, began to rule out "specific platform-munition combinations," opening the need for long-range cruise missile suppression.[124] The second Strategic Arms Limitation Talks (SALT) determined that any cruise missile with a range in excess of 600 kms, or approximately 375 miles,

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[120] John A. Warden III, *The Air Campaign* (New York, toExcel Press, 2000), 159. Warden writes that after the first few minutes of the war, the Iraqis "were doomed thereafter."

[121] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015). Hence, this paradigm is a key focal point in the planning and execution of the opening hour of the ATO, particularly.

[122] Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York, Hachette Books, 2020), 172.

[123] Stanley Baldwin, "Fear is a Very Dangerous Thing: Baldwin in the Commons 1932," Emerson Kent, accessed 01 December 2020, https://www.emersonkent.com/speeches/the_bomber_will_always_get_through.htm.

[124] John Birkler, *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy* (Santa Monica: RAND Publications, 1996), 13.

qualifies as a strategic long-range system.[125] Hence, the TLAM, with an operational range of over 1100 kms (690 miles), fits well into this category. However, despite the initial JASSM's extreme survivability, its limited range of only 370 kms (230 miles) put it inside the MEZ of advanced IADS systems like the S-400. This demanded an immediate upgrade to the JASSM-ER (Extended Range), expanding its range to more than 800 kms (500 miles) and significantly "increasing the margin of safety for a large bomber or small fighter."[126] The range of both these air and naval systems has more than entrenched the conceptual network behind the current LRPF paradigm.

It's worth noting that based on limitations imposed by the 1987 Intermediate Range Nuclear Forces (INF) Treaty, from which the US withdrew in 2019, Ground-Launched Cruise Missiles (GLCMs) are limited to a maximum range of 500 kms (310 miles).[127] Currently, there are zero operational GLCMs in the US Army, with the only Ground-Launched Ballistic Missile (GLBM) being the MGM-140 Army Tactical Missile System (ATACMS), which has a range of approximately 300 kms (186 miles).[128]

Survivability of the cruise missiles is the second major tenet that supports the weapons effectiveness assumption behind the LRPF paradigm. While the range of the system enables the survival of the air or maritime breathing platform, the cruise missile itself must also survive en route to the target.[129] This was a key consideration built into the design of the JASSM, whose

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[125] Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington: The Brookings Institution, 1981), 100. The Strategic Arms Limitation Talks consisted of two rounds of bilateral conferences and treaties by the United States and the Soviet Union on the issue of arms control limitation.

[126] Kyle Mizokami, "The Pentagon's New Strike Missile Just Saw Its First Combat," Popular Mechanics, accessed 01 December 2020, https://www.popularmechanics.com/military/weapons/a19843076/syria-attack-jassm-er-new-long-range-strike-missile/.

[127] Shannon Bugos, "US Completes INF Treaty Withdrawal," Arms Control Association, accessed 01 December 2020, https://www.armscontrol.org/act/2019-09/news/us-completes-inf-treaty-withdrawal.

[128] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 300. Despite their relatively short range, the first ATACMS fired in Desert Storm were used "sparingly but with great effect," with all thirty-three missiles fired either completely destroying or achieving a functional kill on their targets.

[129] Eric K. Graben, *What Don't We Need Anymore? U.S. Land-Based Strategic Weapons Modernization and the End of the Cold War* (London: University Press of America, 1992), 91. Eric Graben

"stealthy airframe," or low radar cross-section (RCS), enables it to evade dense IADS and well defended, fixed high value targets.[130]

In Graben's book *What Don't We Need Anymore*, he uses unclassified analytical models that consider factors like aircraft drag, air density, engine thrust, and cross-sectional area, to determine the overall "penetration probability" of air-breathing bombers.[131] He then compares this air-breathing data to legacy cruise missiles like the TLAM or CALCM, which approximate a "penetration probability" somewhere between the B-1B and the B-2. However, when examining the next generation of smaller RCS cruise missiles like the JASSM, the "penetration probability" supersedes even the B-2 percentages.[132] Graben's data, combined with the historical and theoretical precedent, cements the survivability assumption of the LRPF paradigm.

The final factor in the LRPF paradigm relates to weapon effectiveness, or the ability of the cruise missile to achieve the desired effect when it arrives on target.[133] One of the problems recognized early with cruise missiles is their inability to achieve effects against Hard and Deeply Buried

succinctly describes the importance of radar cross-section (RCS): "[RCS] is an important factor in determining an air-breathing weapons penetration probability … the smaller the RCS, the harder it is for a defensive radar to detect the weapon, and the more difficult it is for attacking AAMs and SAMs, which are radar-guided to hit the incoming weapon."

[130] Franz-Stefan Gady, "US Deploys 10 Long-Range Air-To-Ground Missiles to South Korea," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/us-deploys-10-long-range-air-to-ground-missiles-to-south-korea/.

[131] Eric K. Graben, *What Don't We Need Anymore? U.S. Land-Based Strategic Weapons Modernization and the End of the Cold War* (London: University Press of America, 1992), 169. For example, he shows how legacy bombers like the B-1B possess an overall penetration probability of 60%, versus the much higher 90% of the B-2 stealth bomber.

[132] Ibid., 91. Because there are no figures for the probability of penetration for cruise missiles, Graben substitutes comparative data from other air-breathing systems to determine the Air Defense Probabilities for cruise missiles. What Graben does not take into account, which would further increase the survivability, are the varying mitigation techniques mission planners build into cruise missile profiles to further enhance their survivability - like terrain masking, altitude selection, and flight path deconfliction.

[133] John Birkler, *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy* (Santa Monica: RAND Publications, 1996), 28. John Birkler writes that some cruise missiles have "little capability against very hard shelters," requiring manned aircraft with Laser-Guided Bombs (LGBs) to get very close to the target.

Targets (HDBTs) like bunkers, buried command posts, and Underground Facilities (UGFs).[134] Compounding this impotence is weather, which can have an adverse effect on the terminal guidance of cruise missiles in their final approach to the target.

Armed with a penetrator/blast fragmentation warhead, the JASSM mitigates many of the issues behind the HDBT conundrum.[135] Additionally, cruise missile planners further alleviate this problem by exploiting critical aim points on selected targets to achieve functional kills.[136] Regardless of these mitigation measures, John Birkler writes that the "principal constraint in attacking deeply buried targets continues to be the lack of penetrating warheads delivered by standoff weapons."[137] However, the excellent historical track record of the LRPF paradigm enables one to overlook this anomaly, crystalizing the perception of good weapons effectiveness.

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[134] Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington: Smithsonian Institution Press, 1992), 171. Hallion highlights this obstacle in Desert Storm when he writes that because "TLAMs lacked the ability to attack hardened targets," F-117s were required against the toughest air defense sites.

[135] Franz-Stefan Gady, "US Deploys 10 Long-Range Air-To-Ground Missiles to South Korea," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/us-deploys-10-long-range-air-to-ground-missiles-to-south-korea/.

[136] John Birkler, *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy* (Santa Monica: RAND Publications, 1996), 15. A functional kill, or "F-Kill," renders a targeted system unable to fulfill its primary function without necessarily destroying the system itself.

[137]Ibid., 33.

Section 4: The Threat to the Long-Range Precision Fires Paradigm

> Success is the greatest trap for the novice who properly implements the OODA Loop.
>
> —Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War*

> Success in playing the game changes the game; the tenacity in playing the old game converts success to failure.
>
> —Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*

In *The Blitzkrieg Legend*, Karl-Heinz Frieser makes the startling assertion that the highly successful and overpublicized German blitzkrieg was not based on any previously determined doctrine, rather it was an "improvisation born of necessity."[138] Frieser writes that this improvisation came because Germany properly understood the strategic challenges in the environment and then turned those strategic challenges into operational virtues against the "background of shortages in economic resources."[139] A similar improvisation has occurred today by US adversaries attempting to transform their strategic shortages into operational virtues. Echoing Boyd's *Destruction and Creation* premise that no actions exist in a vacuum, David Kilst writes, "The model of battlefield dominance that the United States pioneered in 1991 transformed the environment for everyone else, allies and adversaries alike; that model peaked between 1998 and 2003, and it has been eroding ever since, as others have figured out how to fight us."[140]

This section analyzes the threat to the current LRPF paradigm posed by China and North Korea, two adversaries who will serve as a sampling from the two levels of the National Defense

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[138] Karl-Heinz Frieser, *The Blitzkrieg Legend: The 1940 Campaign in the West* (Annapolis: Naval Institute Press, 2005), 11.

[139] Ibid., 350.

[140] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (Cambridge: The MIT Press, 1996), 228.

Strategy's (NDS) 2+3 framework.[141] Specifically, it focuses on how China and North Korea have oriented their doctrine to deliberately target the five assumptions foundational to the LRPF paradigm.

The Rise of the Dragon

Two of the key lessons China learned from operations in Iraq were the importance of asymmetric warfare and the necessity of effective missile defense systems.[142] These lessons were emphasized by the 1995-1996 Taiwan crisis and the 1999 US bombing of the Chinese embassy, where for the first time China's leadership realized "that there was little they could do to stop the United States from coming to Taiwan's assistance."[143] Chinese strategists understood they were "dealing with a new way of war" marked by "battlefield dominance through precision strike," and that Anti-Access Area Denial (A2/AD) capabilities were required to "deter, delay, or deny an advanced enemy from entering the theatre of operations in Asia."[144] These A2AD capabilities were directly aimed at neutralizing the LRPF paradigm that had been the hallmark of US dominance.[145]

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[141] Gregory D. Foster, "The National Defense Strategy is No Strategy: It's closer to a call for a new cold war," Defense One, accessed 01 December 2020, https://www.defenseone.com/ideas/2019/04/national-defense-strategy-no-strategy/156068/. The 2 + 3 mnemonic associated with the NDS prescribes the priority of challenges requiring US attention (China and Russia being the "2", and North Korea, Iran, and violent extremism being the "3").

[142] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics, and Military Lessons* (Washington: Center for Strategic and International Studies, 2003), 482, 485. Cordesman writes: "Rather than being trained properly for asymmetric warfare, troops were often given pointless ideological nonsense." Additionally, "Iraq was never credited with having more than 12 to 25 surviving Scuds, and its Al-Samoud II and Ababil missiles and rockets lacked the range, accuracy, and lethality to be much of a threat."

[143] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (Cambridge: The MIT Press, 1996), 194.

[144] Michael J. Cole, "The Third Taiwan Strait Crisis: The Forgotten Showdown Between China and America," *National Interest*, accessed 01 December 2020, https://nationalinterest.org/feature/the-third-taiwan-strait-crisis-the-forgotten-showdown-19742.

[145] Andrew Scobell, Edmund J. Burke, Cortez A. Cooper III, Sale Lilly, Chad R. Ohlandt, Eric Warner, J.D. Williams *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition* (Santa Monica: RAND Publications, 2020), 77. RAND claims that the 1990s loom large as a "marker for updated

Challenging the Players:

China's new People's Liberation Army (PLA) framework is designed to rebuff the two key players in the LRPF paradigm. Following the 27 August 2020 Chinese missile volley, Mark Moore, citing a correspondent close to the PLA, writes that this missile launch served as a "warning to two key U.S. targets: aircraft carriers and regional bases … central to China's strategy of deterring any military action off its eastern coast by threatening to destroy the major sources of U.S. power projection in the region."[146] An increase in Chinese Gross Domestic Product (GDP) toward spending, which has nearly doubled in the last decade, gives China the world's largest navy, with 350 ships and 130 major surface combatants juxtaposed to the US total of 293 ships.[147] Yet, more disconcerting than sheer numbers is the increase in cruise missiles and "carrier-killer missiles" these ships are designed to project.[148]

In concert with maritime power projection is the PLA's expansion in GLCMs and GLBMs, which have increased to 1,250 systems able to range between 500 to 5,500 kms (310 to 3,417 miles).[149] China is also rapidly expanding its air capabilities, boasting the H-6N, its first

party threat analysis" when China came to the realization that the US "could conduct precision strikes that would rapidly paralyze an adversary's critical operational and strategic nodes."

[146] Mark Moore, "China Fires Missiles into South China Sea in Warning to US," New York Post, accessed 01 December 2020, https://nypost.com/2020/08/27/china-fires-missiles-into-south-china-sea-in-warning-to-us/.

[147] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/.

[148] Mark Moore, "China Fires Missiles into South China Sea in Warning to US," New York Post, accessed 01 December 2020, https://nypost.com/2020/08/27/china-fires-missiles-into-south-china-sea-in-warning-to-us/.

[149] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/. The only GLBM the US fields is the ATACMS with a range under 300 kms.

ever "nuclear-capable, air-refuellable bomber," able to launch conventional and nuclear air-launched cruise missiles.[150]

Challenging the Offense:

By directly threatening these key players, the PLA framework also challenges the LRPF paradigm assumptions regarding offensive operations. John Warden writes that "historically, being on the pure defense in air matters clearly is fraught with danger."[151] Unfortunately, the PLA orientation thrusts the LRPF paradigm into this prospect, an eventuality that proves an anathema to US assumptions. Christian Brose puts it best when he writes, "The problem for the United States is that we have been building our military to project power and fight offensively for decades, while China has invested considerably in precision kill chains to counter the ability of the United States to project military power."[152]

As evidenced in the past three decades, the LRPF paradigm operates from an offensive assumption that presumes on its ability to rapidly seize the initiative, a key assumption that has been the focus of multiple PLA Professional Military Education (PME) discussions: "The PLA recognized that U.S. forces aim to seize and maintain superiority … therefore, [PLA] worked to develop a suite of capabilities and operating concepts to stymie, degrade, and otherwise inhibit the ability of U.S. forces to do so."[153]

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[150] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/.

[151] John A. Warden III, *The Air Campaign* (New York, toExcel Press, 2000), 57, xviii. Warden writes that "an air force on the defensive faces greater risk to itself and the total war effort than an air force on the offensive."

[152] Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York, Hachette Books, 2020), 95.

[153] Andrew Scobell, Edmund J. Burke, Cortez A. Cooper III, Sale Lilly, Chad R. Ohlandt, Eric Warner, J.D. Williams, *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition* (Santa Monica: RAND Publications, 2020), 86.

Challenging the Basing:

Even if the LRPF paradigm is able to reorient to defensive assumptions, it still relies on secure basing, another area that has been challenged by the PLA framework. RAND asserts that "an ascending China also means a more difficult operating environment" in which the US should "anticipate increased risk to already threatened forward-based forces in Japan, South Korea, and the Philippines and a loss of the ability to operate routinely in the air and sea space above and in the Western Pacific".[154] Loss of secure air bases in the theater forces the LRPF paradigm to leverage its maritime capabilities, for which China also seems to have an answer, as Carl Schuster, former operations director of USINDOPACOM's Joint Intelligence Center, writes: "China is signaling to the U.S., its allies, and partners that China has an answer to America's aircraft carrier strike groups, an answer that is always available and not dependent on deployment schedules … In effect, China is saying, 'If the U.S. puts two carriers in the South China Sea, we send aircraft carrier-killer missiles there.'".[155]

Challenging the Tempo:

Challenging the LRPF paradigm's offensive and secure basing assumptions significantly reduces its ability to dictate the tempo of operations. Even if the US is able to seize the initiative at the outset of hostilities, China's potential to threaten USN ships while disrupting airbases in the theater forces the USAF to rely heavily on Continental US (CONUS) based bombers to project power, a move that greatly inhibits US capacity to maintain the tempo of operations. As Ronald O'Rourke writes, while China primarily sees A2/AD as an ability to deter US intervention, should

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[154] Andrew Scobell, Edmund J. Burke, Cortez A. Cooper III, Sale Lilly, Chad R. Ohlandt, Eric Warner, J.D. Williams, *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition* (Santa Monica: RAND Publications, 2020), 117.

[155] Mark Moore, "China Fires Missiles into South China Sea in Warning to US," New York Post, accessed 01 December 2020, https://nypost.com/2020/08/27/china-fires-missiles-into-south-china-sea-in-warning-to-us/.

deterrence fail, it will also be able to significantly "delay" or "reduce the effectiveness" of subsequent operations.[156]

David Kilcullen proposes that this new framework, termed "counter-intervention operations," leverages anti-ships and ballistic missiles, long-range air defenses, and new classes of hypersonic missiles to immoderately increase the friction of the LRPF paradigm in China's sphere of influence.[157] However, this friction may even extend outside the theater, as a recent Pentagon report alludes to in its analysis of the PLA Rocket Force: "The number of warheads on the PRC's land-based ICBMs capable of threatening the United States is expected to grow to roughly 200 in the next five years … the PRC is also moving to a 'launch on warning' posture."[158]

Challenging the Effects:

Finally, China's A2/AD framework creates range, survivability, and weapon effects problems which markedly impede the LRPF paradigm's ability to achieve the desired effects. The fixed IADS on the man-made islands of the South China Sea, complimented with mobile maritime systems, create myriad range problems for even TLAM and JASSM platforms. In regards to survivability, the Pentagon report went on to say that China's "robust and redundant" air defense systems are some of the best in the world, leveraging Russian-built S-300 and S-400s

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[156] Ronald O'Rourke, *China Naval Modernization: Implications for U.S. Navy Capabilities – Background and Issues for Congress* (Washington, DC: Congressional Research Service, 1 August 2018), 2, https://fas.org/sgp/crs/row/RL33153.pdf.

[157] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (Cambridge: The MIT Press, 1996), 196-197. "China also mounted a major industrial and technological effort to acquire long-range anti-ship systems such as the DF-21 and DF-26, so-called carrier killer ballistic missiles capable of carrying conventional or nuclear warheads more than 2,000 miles and equipped with maneuvering reentry vehicles employing radar and other sensors to allow them to strike a moving target at sea."

[158] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/. The PLA Rocket Force is the Chinese equivalent of US Strategic Command (USSTRATCOM).

augmented by indigenous systems with emergent capabilities to intercept ballistic missiles.[159] Lastly, in terms of weapon effects, the mobility and redundancy of the PLA IADS and LRPF systems present further Find, Fix, Target, Track, Engage, Assess (F2T2EA) problems.

The Hermit Kingdom's New Look

In the mid-1990s North Korea (nK) also began to reorient and reform their military framework. In the context of severe economic decline, food shortages, and the overwhelming success of the US LRPF paradigm against Iraq, the nK regime recognized the infeasibility of reunifying the Korean Peninsula through conquest.[160] As RAND asserts, nK no longer dreamed of "tank divisions streaming southwards," rather new "functions" had to be created to achieve political objectives.[161] This required a shift in nK strategy toward asymmetric advantage where, similar to the 2006 conflict between Israel and Hezbollah, limited military objectives could be leveraged to achieve disproportionate political effects.[162] The capability to achieve this strategy came in the form of an asymmetric triad consisting of Long-Range Artillery (LRA), Ballistic Missiles (BM), and Special Operations Forces (SOF).[163] Each part of this triad is directly aimed at neutralizing the LRPF paradigm, rapidly enabling the achievement of political objectives.[164]

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[159] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/. The PLA Rocket Force is the Chinese equivalent of US Strategic Command (USSTRATCOM).

[160] Homer Hodge, "DPRK Briefing Book: North Korea's Military Strategy," Nautilus Institute, accessed 01 December 2020, https://nautilus.org/publications/books/dprkbb/military/dprk-briefing-book-north-koreas-military-strategy/.

[161] Michael J. Mazarr, Gian Gentile, Dan Madden, Stacie L., Pettyjohn, & Yvonne K., Crane *The Korean Peninsula: Three Dangerous Scenarios* (Santa Monica, CA: RAND Corporation, 2018), 20.

[162] Ibid., 20.

[163] Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Taylor & Francis Group, 2005), 134. Dolman writes that this form of asymmetric warfare is not only the "bane of high-technology military forces" but is paradoxically "our own creation."

[164] Barnett, D. Sean, Yvonne K. Crane, Gian Gentile, Timothy M. Bonds, Dan Madden, & Katherine Pfrommer, *North Korean Conventional Artillery: A Means to Retaliate, Coerce, Deter, or*

Challenging the Players and Basing:

Aside from achieving devastating effects against the civilian populace, the nK asymmetric triad challenges the LRPF paradigm players by directly targeting their air generation capability or basing. The LRA threat is most recently evidenced in the KN-09 Multiple Launch Rocket System (MLRS), a Close-Range Ballistic Missile (CRBM) able to range and significantly disrupt multiple air bases, including the key ROK-US Combined Forces Air Component Command (CFACC) at Osan AB.[165] This threat is also realized through Short, Medium, and Intermediate Range BMs (SR/MR/IRBMs) which challenge not only in theater air bases, but also air generation capability from Japan and Guam.[166] Finally, it is actualized through the use of approximately 150,000 nK air and maritime SOF, whose function includes infiltrating and disrupting air base operations.[167]

While nK currently does not possess strategic weapon systems which directly threaten USN LRPF assets, its ability to hold air bases in theater at risk in a moment's notice presents indirect operational challenges for USN response time and future freedom of maneuver. Since the 7th Fleet covers the entire USINDOPACOM AOR, there are multiple windows of opportunity for

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Terrorize Populations (Santa Monica, CA: RAND Corporation, 2020), 6, 20. "North Korea currently has an estimated 4,800 medium-range artillery pieces arrayed across the DMZ that can fire artillery shells and rockets as far as 25 kilometers. Its long-range artillery (LRA)—close to 950 pieces—can reach the South Korean capital of Seoul and its surrounding population centers." RAND assesses that in a dangerous "Sea of Fire" scenario, nK LRA could inflict over 130,000 civilian casualties in a one-hour barrage.

[165] Peter D. Zimmerman, "Assessing the DPRK's KN-09 300mm Multiple Rocket Launcher System: Decisive or Incremental," Nautilus Institute, accessed 01 December 2020, https://nautilus.org/napsnet/napsnet-special-reports/assessing-the-dprks-kn-09-300-mm-multiple-rocket-launcher-system-decisive-or-incremental/#_edn11. "The KN-09 shows considerable upgrades from North Korea's older generations of MLRS (M1985/1991 – range 40-60 km). The 190 km range is significantly more than its predecessors and even more that Russian and Chinese comparative systems. It brings more South Korean and United States targets, including all of the Seoul, within range of artillery bombardment from the North."

[166] Anna Fifield, *The Great Successor: The Divinely Perfect Destiny of Brilliant Comrade Kim Jong Un* (New York: St. Public Affairs, 2019), 226. In 2016, Kim Jong-Un, following an IRBM launch to celebrate his birthday, touted, "We have the sure capability to attack in an overall and practical way the Americans in the Pacific operation theater."

[167] Kyle Mizokami, "With 200,000 Special Forces, North Korea is a Dangerous Foe," The National Interest, accessed 01 December 2020, https://nationalinterest.org/blog/buzz/200000-special-forces-north-korea-dangerous-foe-106746.

nK to seize the initiative prior to a USN LRPF reaction. Additionally, the early challenges to air base sortie generation decreases the ability of the CFACC to neutralize time-sensitive Coastal Defense Cruise Missile (CDCM) and minelaying targets, which pose a considerable threat to future 7th Fleet operational freedom of maneuver.[168] RAND proposes this potential situation in *The Korean Peninsula: Three Dangerous Scenarios* where they surmise that the existing use of air and maritime capabilities in operations plans may not "align with the changing nature of the North Korean threat."[169]

Challenging the Offense:

In *The Hermit King: The Dangerous Game of Kim Jong-Un*, Chung Min Lee asserts the "one area where the ROK has an advantage" is in its offensive force projection capability through the US 7th Air Force in Korea, the US 5th Air Force in Japan, and US bombers in Guam.[170] Unfortunately, this assertion is becoming disjointed from the operational environment in the Peninsula since nK asymmetric capabilities are inherently offensive in design, aiming to "achieve reunification by force, employing surprise, overwhelming firepower, and speed."[171]

This premise directly challenges the offensive assumptions of the LRPF paradigm, which assume USAF and USN offensive capability at the outset of hostilities. In fact, the LRPF strategy in the Korean Peninsula assumes enough Indications and Warnings (I&W) will arrive to "fight tonight" and generate overwhelming offensive airpower through an intricately mapped out

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[168] Ankit Panda, "North Korea Introduces a New Coastal Defense Cruise Missile Launcher: First Takeaways," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/north-korea-introduces-new-coastal-defense-cruise-missile-first-takeaways/.

[169] Michael J. Mazarr, Gian Gentile, Dan Madden, Stacie L., Pettyjohn, & Yvonne K., Crane *The Korean Peninsula: Three Dangerous Scenarios* (Santa Monica, CA: RAND Corporation, 2018), 20. RAND concludes that the "existing ways of doing business" are unsustainable and there must be a push toward "new ways of achieving U.S. and South Korean objectives."

[170] Chung Min Lee, *The Hermit King: The Dangerous Game of Kim Jong Un* (New York: St. Martin's Press, 2019), 179.

[171] Homer Hodge, "DPRK Briefing Book: North Korea's Military Strategy," Nautilus Institute, accessed 01 December 2020, https://nautilus.org/publications/books/dprkbb/military/dprk-briefing-book-north-koreas-military-strategy/.

prepositioned-ATO.[172] This LRPF planning assumption does not address nK's offensive strategy built on surprise through asymmetry.[173] As Homer Hodge writes in the *DPRK Briefing Book*, North Korea has aimed at an offensive strategy designed to isolate the peninsula from US operational and strategic effects in order to rapidly achieve political aims.[174]

Challenging the Tempo:

The goal of the nK asymmetric redesign is to achieve "escalation dominance," or the ability to control the tempo at the outset of hostilities to create favorable conditions for success.[175] This goal is very similar to that of former Egyptian President Anwar Sadat during the 1973 Yom Kippur War against Israel. George Gawrych in *The 1973 Arab-Israeli War: The Albatross of Decisive Victory* writes that Sadat realized he could leverage rapid military success to establish the "conditions for postwar negotiations."[176] Sadat knew that through surprise he could negate "the very foundations of Israel's war plans," enabling him to control the tempo of initial operations.[177] Dolman writes that controlling the tempo of operations in this manner

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[172] Richard Sisk, "US Troops Are Still Ready to 'Fight Tonight' Against North Korea Despite Canceled Exercises, General Says," Military.com, accessed 01 December 2020, https://taskandpurpose.com/news/us-troops-are-still-ready-to-fight-tonight-against-north-korea-despite-canceled-exercises-general-says.

[173] Amy McCullough, "Keeping Peace in Korea: US Keeps Its Forces in Korea at Maximum Readiness to Deter a Belligerent and Aggressive North," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/PDF/MagazineArchive/Documents/2016/November%202016/1116korea.pdf . "The pre-positioned air tasking order maps out the first few days of conflict. It's exercised regularly just in case. Everyone stationed on the peninsula knows exactly what their piece of the puzzle would be if the plan is executed."

[174] Homer Hodge, "DPRK Briefing Book: North Korea's Military Strategy," Nautilus Institute, accessed 01 December 2020, https://nautilus.org/publications/books/dprkbb/military/dprk-briefing-book-north-koreas-military-strategy/.

[175] Michael J. Mazarr, Gian Gentile, Dan Madden, Stacie L., Pettyjohn, & Yvonne K., Crane *The Korean Peninsula: Three Dangerous Scenarios* (Santa Monica, CA: RAND Corporation, 2018), 20.

[176] George W. Gawrych, *The 1973 Arab-Israeli War: The Albatross of Decisive Victory* (Fort Leavenworth, KS: Combat Studies Institute, 1996), 79.

[177] Similar to US-ROK OPLANs, Israeli plans going into 1973 were based on an assumption that there would be sufficient I&W to prevent operational surprise.

compresses the decision time frame of the opponent, making the capacity to "assess (measure) and react using standard methods and means" increasingly difficult.[178]

Similarly, nK's ability to achieve surprise and disrupt the LRPF paradigm at the outset of hostilities assists in their ability to control the tempo of operations and create political conditions favorable for success. For example, with the LRPF paradigm unable to achieve effects at the outset of hostilities, nK is free to disperse its critical BM and Nuclear assets from their garrisons, creating insurmountable future F2T2EA problems for ROK-US forces.[179] Securing the survivability of these systems, many of which may be able to threaten the surrounding region or even continental US with a nuclear strike, along with persistent LRA and SOF strikes against the civilian populace, enables nK to negotiate from a position of advantage.[180] It also presents ROK-US planners with the unamiable possibility that nK can, at least temporarily, control the tempo.

Challenging the Effects:

Finally, nK has challenged the weapon effectiveness of the LRPF paradigm through their extensive use of UGFs. According to a South Korean military journal, there are between

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[178] Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Taylor & Francis Group, 2005), 97.

[179] Joseph Bermudez, "Undeclared North Korea: Missile Operating Bases Revealed," Beyond Parallel, accessed 01 December 2020, https://beyondparallel.csis.org/north-koreas-undeclared-missile-operating-bases/. "Once they launch, the TELs [Transporter Erector Launchers] or MELs [Missile Erector Launchers] will quickly displace to another pre-surveyed launch position or UGF (other than those at the missile operating base) where they will meet up with the technical support element and its equipment (i.e., reload missiles, warheads, fuel, crane vehicles, etc.). Once serviced and rearmed, the technical support element will move to another prearranged location while the TEL or MEL will either wait for a launch order or move to another pre-surveyed launch position and wait there for a launch order. As the conflict develops, rather than returning to an operating base—which will undoubtedly be the target of repeated attacks—both the technical support element and launchers will remain in the field using pre-positioned reloads and supplies while moving frequently to different pre-surveyed locations."

[180] Gian Gentile, Yvonne K. Crane, Dan Madden, Timothy M. Bonds, Bruce W. Bennett, Michael J. Mazarr, & Andrew Scobell *Four Problems on the Korean Peninsula: North Korea's Expanding Nuclear Capabilities Drive a Complex Set of Problems* (Santa Monica, CA: RAND Corporation, 2019), 8. "North Korea has more than 650 short- and medium-range ballistic missiles capable of hitting cities throughout South Korea, Japan, and eastern China … these missiles will allow the DPRK to hold military bases and population centers in northeast Asia at risk."

six to eight thousand UGFs scattered across the country.[181] In addition to their strategic northern location, BM and Nuclear UGFs present multiple targeting dilemmas for LRPFs, particularly USN TLAMs which are inferior to hardened targets. While the JASSM has some penetrating capability, these assets would be launched from the peninsula at Kunsan AB, which is at high risk of being disrupted by nK asymmetric capabilities. Furthermore, with the CBP mission removed from Guam, the nearest JASSMs have to come from CONUS, only further exasperating US response time while favoring nK capabilities.[182]

[181] John A. Tirpak, "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/. While possessing a land mass of only ~120,000 sq kms, or 0.06% of earth's ~196 million sq kms of land mass, North Korea contains over fifty percent of the worldwide UGF inventory.

[182] Peter Layton, "Discontinued: America's Continuous Bomber Presence," War on the Rocks, accessed 01 December 2020, https://warontherocks.com/2020/05/discontinued-americas-continuous-bomber-presence/.

Section 5: Toward a New LRPF Paradigm

> In rounding this Cape Horn the new horizons before us will only recover the grand line of tradition by a complete revision of the methods in vogue and by the fixing of a new basis of construction established in logic. In architecture the old bases of construction are dead. We shall not rediscover the truths of architecture until new bases have established a logical ground for every architectural manifestation.
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> —Le Corbusier, *Towards a New Architecture*

Having "mapped the mess" of the LRPF paradigm through *searching*, *mapping*, and *telling the story*, this section looks to the future potentialities involved in building a new LRPF paradigm. Using Robert Leonhard's *Fighting by Minutes* as a framework, this section asserts that *balance, time*, and *phasing* must inform the future LRPF paradigm to adapt to emergent threats.

Balance:

Robert Leonhard writes that since warfare involves the "interaction of opposites, the enemy will invariably react to any particular style of warfare in order to diminish its success."[183] This is evident in how US adversaries have reoriented their functions and corresponding forms to address the LRPF paradigm. Leonhard asserts that the answer to dealing with this phenomenon resides in one word: *balance*.[184] This balance comes from a harmonization of what Leonhard describes as the three styles of war: Maneuver Theory (Protection Implicit), Positional Theory (Striking Implicit), and Interchangeability Theory (Movement Implicit).[185] The LRPF paradigm largely favors maneuver and interchangeability at the expense of positional theory, ignoring the

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[183] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* 2nd ed. (Scotts Valley, CA: CreateSpace Publishing, 2017), 34.

[184] Ibid., 34.

[185] Ibid., 30-33. Leonhard writes that the three principal activities in war are *moving*, *striking*, and *protecting*. Due to "the tradeoff nature of the three activities … commanders and military thinkers in the past have (sometimes unknowingly) developed three theories of style (and countless variations of each), designed in each case to emphasize two of the activities at the expense of the third." Maneuver Theory: "Through momentum [and strike], an attacking army can both defeat the enemy and implicitly protect itself." Positional Theory: "Emphasizes the two functions of movement and protection, while avoiding a direct strike on the enemy." Interchangeability Theory: "Simple notion that firepower [and protection] can be substituted for maneuver in war."

Clausewitzian dictum that defense is the stronger form of combat.[186] It also neglects the preeminence of firepower over maneuver in the land domain, relegating primary long-range indirect fires to USAF and USN functions. Leonhard questions this imbalance when he notes that future warfare may see indirect fires moving from a "supporting role to the decisive element of land combat power."[187]

For the LRPF paradigm to adapt to the changing operational environment, it must achieve balance by elevating Army LRPF capabilities. This emphasis not only adds redundancy of fires in line with the interchangeability theory, but it also adds much needed trilateral balance to the LRPF paradigm through the positional theory.[188] The ability to move and protect LRPFs in the land domain mitigates many of the challenges to the existing paradigm.[189] Walter Boyne recognizes this potentiality when following OIF he writes: "The U.S. military needs a wide spectrum of capability in all services. No one service or capability is the answer for every conflict."[190] He prophetically says that the future of US military operations should combine so many types of effects across domains that it "presents an overwhelming challenge to potential aggressors," and thereby "creates the future of warfare, rather than a force that reacts to it."[191] Unfortunately, the US is reacting to the future of warfare due to decades of self-oriented

[186] Carl von Clausewitz, *On War*. Edited and translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 358. In Book 6, Clausewitz writes that despite possessing a negative objective, the "defensive form of warfare is intrinsically stronger than the offensive" and that the "natural course in war is to begin defensively and end by attacking."

[187] Ibid., 33.

[188] Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York, Hachette Books, 2020), 174. Brose writes that "in a broader sense, the real effect of future fires will be their ability to overwhelm targets with sheer mass."

[189] Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington: The Brookings Institution, 1981), 182. Regarding Ground-Launched Cruised Missiles (GLCMs), Betts asserts that "their proposed mobility, ability to operate from dispersed unpresurveyed sites, and quick activation enhances prelaunch survivability."

[190] Walter J. Boyne, *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why* (New York: Tom Doherty Associates, 2003), 122, 180.

[191] Ibid., 180.

processes that emphasize function which leads to form following preference over context.[192] One of the key potentialities in resolving this dilemma is found in regaining balance across domains.[193]

Time:

Leonhard writes that there is "no understanding of warfare apart from time," since from "Thermopylae to Kuwait, the 'Hours' have decided military victory, often in defiance of spatial conditions."[194] While the LRPF paradigm shows that given adequate time, it can deliver overwhelming combat power against any threat, the problem is "not one of mass, but of minutes."[195] Leonhard labels this potential fourth-dimension gap as a "time flank," or the "period of time *before* the army is ready to fight."[196] This time flank prior to conflict is where the LRPF paradigm is challenged as adversaries compress their own time flanks to operate inside air and maritime decision cycles.[197]

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[192] Theresa Hitchens, "Long-Range All-Domain Prompts Roles & Missions Debate," Breaking Defense News, accessed 01 December 2020, https://breakingdefense.com/2020/07/long-range-all-domain-prompts-roles-missions-debate/. This emphasis on form over function is evidenced in retired USAF Lieutenant General Dave Deptula's comments regarding the Army's recent LRPF modernization efforts: "It's ridiculous, to be quite candid. It is encroachment on roles and missions … the fact of the matter is the services need to adhere to their core competencies. And the United States Army reaching out to develop weapon systems that operate at thousand-mile range truly is encroachment."

[193] Andrew Scobell, Edmund J. Burke, Cortez A. Cooper III, Sale Lilly, Chad R. Ohlandt, Eric Warner, J.D. Williams, *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition* (Santa Monica: RAND Publications, 2020), 117. RAND concludes that "because the Pacific theater likely will remain for the foreseeable future primarily focused on contested maritime and air domains … the U.S. Army must prioritize capabilities development in keeping with larger joint force objectives."

[194] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* 2nd ed. (Scotts Valley, CA: CreateSpace Publishing, 2017), 2, 7, 9. "Military conflict – whether in wars, campaigns, or battles – seeks to summon that failure (or delay it) and is therefore, when reduced to its fundamentals, a contest of time."

[195] Ibid., 9, 13. Leonhard concludes that "regardless of the nature of future challenges, the common denominator in all American strategic formulation is time."

[196] Ibid., 8.

[197] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015). The assertion that adversaries are challenging the fourth dimension runs anathema to USAF doctrine which states that "airpower dominates the fourth dimension—time— and compresses the tempo of events to produce physical and psychological shock."

RAND projects that because China will most likely be able to contest all domains of conflict by the mid-2030s, "the U.S. Army as part of the joint force will need to be able to respond immediately to crises or contingencies at various points of contention," while operating "inside the wire at the outset of a crisis."[198] They also assert that because of PLA modernization efforts aimed at neutralizing US air and maritime strike capabilities, the US Army must increase cross-domain LRPF capabilities that can readily respond at the outset of hostilities.[199] The future LRPF paradigm must consider a time-based theory of conflict that looks to all domains as potential sources of power projection.[200] As Leonhard succinctly concludes, "Hence, the issue in any future conflict overseas boils down to getting there with enough power *in time* to attain strategic goals."[201]

Phasing:

Leonhard contends that all forms of conflict have traditionally unfolded into two distinct phases: the *protective phase*, in which actions are taken to neutralize the enemy's strength to prevent interference with the friendly operations, and the *dislocation* phase, in which actions are taken against enemy systems to gain a clear advantage.[202] Leonhard notes that once service

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[198] Andrew Scobell, Edmund J. Burke, Cortez A. Cooper III, Sale Lilly, Chad R. Ohlandt, Eric Warner, J.D. Williams, *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition* (Santa Monica: RAND Publications, 2020), 118-119.

[199] Ibid., 118-119.

[200] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 36. Regarding time, Boyd writes, "The injunctions of air-to-air combat are simple. Don't be predictable, and end the engagement as quickly as possible."

[201] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* 2nd ed. (Scotts Valley, CA: CreateSpace Publishing, 2017), 9.

[202] Ibid., 46, 49-50. "As with tactical phasing, joint operations typically feature an initial phase, during which each component of the joint force (navy, air force, and ground force) conducts a protective fight against its enemy counterpart. In a typical American joint campaign … the air force (along with navy and army aircraft, usually under the command of an air force officer acting as the joint force air component commander) will strive first to fight an air superiority campaign against the enemy air force" … "once each service component has defeated its counterpart, operations within that component switch from protective fighting to dislocation fighting against unlike enemy components."

components defeat similar enemy counterparts in the protective phase, operations transition to the dislocation phase, fighting against "unlike enemy components."[203] This phased approach mirrors the classic adage verbalized by Billy Mitchell before Congress when he stated that "the principal mission…of aviation…is the destruction of the hostile aviation, in the same way that the principal mission of the navy is the destruction of the hostile navy, or the principal mission of an army is destruction of the hostile army."[204]

However, this phased approach is not entirely compendious for future 21st century warfare where domain codependency transcends partitional phasing.[205] As evidenced in the multidimensional challenges facing the LRPF paradigm, services can no longer afford to "align themselves with either protective ideas or dislocating ideas to the exclusion of the other."[206] As Boyd writes in *Destruction and Creation*, "The combination of variety, rapidity, harmony, and initiative, - particularly their interaction – seems to be the key that permits one to shape and adapt to an ever-changing environment."[207] Just as commanders must learn to "perceive and employ"

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[203] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* 2nd ed. (Scotts Valley, CA: CreateSpace Publishing, 2017), 50, 53. "Professional military officers of every service tend to focus on protective fighting – fighting against their enemy counterparts … battles tend to focus on attritional struggles among like systems. Tank forces wear down enemy tank forces; combat ships destroy combat ships; aircraft shoot down aircraft. This type of thinking pervades military training in most modern armies today."

[204] United States Congress, *Army Reorganization: Hearings before the Committee on Military Affairs*, 66th Cong., 1st sess., 1919, 44, 46. This division is clearly seen in history and is evidenced in the operations in Iraq. According to doctrine, traditionally it is the Air Component that is supported in Phase 2 of conflict prior to transitioning to Phase 3 where the Land Component becomes the supported. This phased tiering is another influence that fortuitously limits US Army involvement in the LRPF paradigm.

[205] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* 2nd ed. (Scotts Valley, CA: CreateSpace Publishing, 2017), 62. "The dynamic interaction of war will tend to diminish the effectiveness of objective warfare and threaten it with a decisive subjective fight."

[206] Ibid., 52.

[207] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington: Smithsonian Books, 2001), 124. "The goal of human beings is not merely to survive but also to survive on our own terms … It is advantageous to possess a variety of responses that can be applied rapidly to gain sustenance, avoid danger, and diminish an adversary's capacity for independent action. Organisms must cooperate, or better yet, harmonize their activities in their endeavors to survive in an organic synthesis. To shape and adapt to change, one cannot be passive; indeed, one must take the initiative. These qualities aid in getting inside an adversary's OODA loop."

two phases of a conflict as an integrated campaign, service components must look beyond their traditional disdain for dislocation fighting and embrace the necessity of "using mediums, not owning mediums."[208]

Just as Le Corbusier writes that architecture is confronted with new laws that demand "bold innovations," the LRPF paradigm must undergo a "genuine liberation from the constraints" of parochial phased-based and protection-focused specialization by boldly reorienting with the emergent environment.[209] It is this kind of boldness that leads RAND to conclude that the Army should focus on areas like sea denial and joint operational fires and why Curt Taylor and Larry Kay describe the key to future LRPF success as "an artful combination of multiple dilemmas, rather than a clear overmatch in terms of any particular capability."[210] This kind of LRPF liberation can only occur if one destroys the conventional archetypes like phasing constructs and builds a new LRPM paradigm informed by balance and time.

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[208] United States Air Force, *Volume 1, Basic Doctrine* (Maxwell AFB: Curtis E. Lemay Center, 2015). "Doctrine is about using mediums, not owning mediums. This illustrates the importance of properly using a medium to obtain the best warfighting effects, not of carving up the battlespace based on service or functional parochialism. Focusing on VOLUME 1 BASIC DOCTRINE using a medium is a vital first step to integration of efforts. 'Ownership' arguments eventually lead to suboptimal (and usually at best tactical) application of efforts at the expense of the larger, total effort."

[209] Le Corbusier, *Towards a New Architecture*, translated from the thirteenth French edition and with an introduction by Frederick Etchells (New York: Dover Publications, 2014), 3, 286. Le Corbusier writes that architecture is "stifled by custom … there is so much novelty in the forms and rhythms furnished by these constructional methods, such novelty in arrangement and in the new industrial programmes, that we can no longer close our minds to the true and profound laws of architecture."

[210] Curt Taylor & Larry Kay, "Putting the Enemy between a Rock and a Hard Place: Multi-Domain Operations in Practice," Modern War Institute, accessed 01 December 2020, https://mwi.usma.edu/.

Conclusion

> Contrary to popular belief, twentieth-century American operational practice saw few genuine Kuhnian paradigm shifts to revolutionary ways of thinking. Rather, what took place was more akin to paradigm "tiering." Like layers of sediment, earlier paradigms were partially covered by newer ones but were never physically displaced.
>
> —Antulio J. Echevarria II, *Reconsidering the American Way of War*

> We've got 21st century technology and speed colliding with 20th and 19th century institutions, rules, and cultures.
>
> —Amory Lovins

Twenty years ago, the 2001 Quadrennial Defense Review outlined the bleak projection that "future adversaries could have the means to render ineffective much of our current ability to project power overseas. Saturation attacks with ballistic and cruise missiles could deny or delay US military access to overseas bases, airfields, and ports."[211] Unfortunately that "future" is now.[212] Gharajedaghi accurately describes why this is in his three casualties of strategic thinking: a retroactive pride in the past, a shift of focus from new discoveries and frontiers to safeguarding what has already been achieved, and operating in a reactive mode responding to problems only as they emerge.[213] These slayers of strategic thought are precisely why Le Corbusier writes that sending architectural students to Rome is "to cripple them for life."[214]

Yet, as Le Corbusier concludes, "If we challenge the past, we shall learn that 'styles' no longer exist for us, that a style belonging to our own period has come about; and there has been a

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[211] Douglas A. Birkey & Lt. Gen (Ret) David A. Deptula, "A Change in Vector," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/article/a-change-in-vector/.

[212] Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York: Hachette Books, 2020), xxvi. Brose writes that the "entire model of American military power now finds itself in much the same position that Barnes & Noble or Blockbuster Video did amid the rise of Amazon, Apple, and Netflix, and this circumstance is forcing a similar choice: Change or become obsolete."

[213] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 169.

[214] Le Corbusier, *Towards a New Architecture*, translated from the thirteenth French edition and with an introduction by Frederick Etchells (New York: Dover Publications, 2014), 7.

Revolution."[215] Challenging the past is precisely what this monograph seeks to accomplish by exploring problems in the existing LRPF paradigm through analyzing its history, assumptions, and threats while also looking ahead to future potentialities.[216] It asserts that through prioritization of balance, time, and phasing, the LRPF paradigm can shift to meet the emergent needs of the operational environment.[217]

David Kilcullen writes that "actions we take now in response to erosion can either accelerate or delay the decline and can steer it toward a hard crash or alternatively achieve a soft landing."[218] While the US appears cognizant of the rapidly changing environment and has even made significant technological gains in the realm of LRPF technology, Robert Futrell warns against doctrines "tied solely to the equipment and processes of the moment" that have the potential to "delude the nation into a false sense of security."[219] The key, as Boyd illuminates, is to continually look outside the constraining inward self-oriented processes that convert novelties

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[215] Le Corbusier, *Towards a New Architecture*, translated from the thirteenth French edition and with an introduction by Frederick Etchells (New York: Dover Publications, 2014), 7.

[216] Michael J. Arena, *Adaptive Space: How GM and Other Companies are Positively Disrupting Themselves and Transforming into Agile Organizations* (New York: McGraw Hill Education, 2018), 239. Arena writes that successful organizations "need to be willing to positively disrupt themselves in the never-ending quest toward new possibilities, just as Netflix disrupted the DVD-by-mail business to move toward online streaming, and then migrated to original content. Like Lewis and Clark, they must map out new territories that spur curiosity from others and compel them to travel forward."

[217] Tyler Rogoway, "The Army is Working to Field a Ground-Launched Strike Version of the Navy's SM-6 Missile," The Drive, accessed 01 December 2020, https://www.thedrive.com/the-war-zone/36213/the-army-is-working-to-field-a-ground-launched-strike-version-of-the-navys-sm-6-missile. Army Futures Command (AFC) lists Long-Range Precision Fires as their number one modernization priority. Regarding this priority, General Joseph M. Martin describes the Army's efforts to operationalize a land-based cruise missile similar to a TLAM: "What the precision strike missile will do for us is it allows us to exceed the capability of our ATACM. It'll go several hundred kilometers beyond that, but we're also in the process of coordinating with other services to bring some other mid-range capabilities into play. Think about Tomahawks and think about shorter-range hypersonic weapons. We're looking at land-based, land launched Tomahawk Missiles and SM-6s, which are in the Navy's inventory. We're looking at launching those from the land. That capability is coming third quarter of '23."

[218] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (Cambridge: The MIT Press, 1996), 228. Kilcullen goes on to write: "It may even be possible to pioneer a new military model, thereby reshaping a dynamic fitness landscape for our adversaries once again."

[219] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 180.

to "mismatches that confuse or disorient us."[220] Instead, one's eyes must be kept oriented on the "changing world" in order to "run with endurance, the race that is set before us."[221]

[220] Frans P.B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York: Routledge Taylor & Francis Group, 2007), 105.

[221] Hebrews 12:1 (NKJV).

Bibliography

Arena, Michael J. *Adaptive Space: How GM and Other Companies are Positively Disrupting Themselves and Transforming into Agile Organizations*. New York: McGraw Hill Education, 2018.

Arnett, Eric H. *Sea-Launched Cruise Missiles and U.S. Security.* New York: Praeger Publishers, 1991.

Baldwin, Stanley. "Fear is a Very Dangerous Thing: Baldwin in the Commons 1932," Emerson Kent, accessed 01 December 2020, https://www.emersonkent.com/speeches/the_bomber_will_always_get_through.htm.

Berger, Peter L., and Thomas Luckmann. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. New York: Doubleday, 1966.

Bermudez, Joseph. "Undeclared North Korea: Missile Operating Bases Revealed," Beyond Parallel, accessed 01 December 2020, https://beyondparallel.csis.org/north-koreas-undeclared-missile-operating-bases/.

Betts, Richard K. *Cruise Missiles: Technology, Strategy, Politics.* Washington: The Brookings Institution, 1981.

Birkey, Douglas A. & Deptula, David A. Lt. Gen (Ret), "A Change in Vector," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/article/a-change-in-vector/.

Birkler, John. *A Framework for Precision Conventional Strike in Post-Cold War Military Strategy.* Santa Monica: RAND Publications, 1996.

Boyd, John. *Discourse on Winning and Losing*. Marine Corps University, Quantico, VA, May 1989.

Boyne, Walter J. *Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why*. New York: Tom Doherty Associates, 2003.

Brose, Christian. *The Kill Chain: Defending America in the Future of High-Tech Warfare*. New York: Hachette Book Group, 2020.

Browne, M. Neil & Keeley, Stuart M. *Asking the Right Questions: A Guide to Critical Thinking.* New Jersey: Pearson Prentice Hall, 2007.

Bugos, Shannon. "US Completes INF Treaty Withdrawal," Arms Control Association, accessed 01 December 2020, https://www.armscontrol.org/act/2019-09/news/us-completes-inf-treaty-withdrawal.

Chun, Clayton K.S. *Aerospace Power in the Twenty-First Century: A Basic Primer*. United States Air Force Academy: Air University Press, 2001.

Clausewitz, Carl von. *On War*. Edited and translated by Michael Howard and Peter Paret.

Princeton, NJ: Princeton University Press, 1984.

Cole, Michael J. "The Third Taiwan Strait Crisis: The Forgotten Showdown Between China and America," *National Interest*, accessed 01 December 2020, https://nationalinterest.org/feature/the-third-taiwan-strait-crisis-the-forgotten-showdown-19742.

Coram, Robert. *Boyd: The Fight Pilot Who Changed the Art of War*. New York: Little, Brown and Company, 2002.

Cordesman, Anthony H. *The Iraq War: Strategy, Tactics, and Military Lessons.* Washington: Center for Strategic and International Studies, 2003.

Correll, Diana. "The Air Force has stopped its Continuous Bomber Presence mission in Guam," Air Force Times, accessed 01 December 2020, https://www.airforcetimes.com/news/your-air-force/2020/04/21/the-air-force-has-stopped-its-continuous-bomber-presence-mission-in-guam/.

Creveld, Martin Van. *The Age of Airpower* (New York: Public Affairs Books, 2011.

Dolman, Everett C. *Pure Strategy: Power and Principle in the Space and Information Age.* New York: Taylor & Francis Group, 2005.

Douhet, Giulio. *The Command of the Air.* New York: Coward-McCann, 1942.

Echevarria, Antulio J. "Toward an American Way of War." *US Army War College, Strategic Studies Institute*, 2004.

Eckstein, Megan. "'Multi-Domain Battle' Concept to Increase Integration Across Services, Domains," USNI News, accessed 01 December 2020, https://news.usni.org/2016/10/04/multi-domain-battle-concept-increase-integration-across-services-domains.

Epstein, David *Range: Why Generalists Triumph in a Specialized World.* New York: Riverhead Books, 2019.

Fadok, David S. *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*. Maxwell Air Force Base: Air University Press, 1995.

Fifield, Anna. *The Great Successor: The Divinely Perfect Destiny of Brilliant Comrade Kim Jong Un.* New York: St. Public Affairs, 2019.

Foster, Gregory D. "The National Defense Strategy is No Strategy: It's closer to a call for a new cold war," Defense One, accessed 01 December 2020, https://www.defenseone.com/ideas/2019/04/national-defense-strategy-no-strategy/156068/.

Freedman, Lawrence. *Deterrence.* Cambridge: Polity Press, 2004.

———. *Strategy: A History.* New York: Oxford University Press, 2013.

Frieser, Karl-Heinz. *The Blitzkrieg Legend: The 1940 Campaign in the West.* Annapolis: Naval

Institute Press, 2005.

Futrell, Robert F. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960.* Maxwell Air Force Base: Air University Press, 1989.

Gady, Franz-Stefan. "US Deploys 10 Long-Range Air-To-Ground Missiles to South Korea," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/us-deploys-10-long-range-air-to-ground-missiles-to-south-korea/.

Gallagher, Sean. "We all love the Tomahawk: a brief history of US's favorite robotic killer," Ars Technica, accessed 01 December 2020, https://arstechnica.com/information-technology/2017/04/we-all-love-the-tomahawk-a-brief-history-of-uss-favorite-robotic-killer/.

Gawrych, George W. *The 1973 Arab-Israeli War: The Albatross of Decisive Victory.* Fort Leavenworth, KS: Combat Studies Institute, 1996.

Gentile, Gian, Crane, Yvonne K., Madden, Dan, Bonds, Timothy M., Bennett, Bruce W., Mazarr, Michael J., & Scobell, Andrew. *Four Problems on the Korean Peninsula: North Korea's Expanding Nuclear Capabilities Drive a Complex Set of Problems.* Santa Monica, CA: RAND Corporation, 2019.

Gharajedaghi, Jamshid. *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. 3rd ed. Amsterdam: Morgan Kaufmann, 2011.

Graben, Eric K. *What Don't We Need Anymore? U.S. Land-Based Strategic Weapons Modernization and the End of the Cold War.* London: University Press of America, 1992.

Gray, Colin S. *Airpower for Strategic Effect.* Maxwell AFB, Alabama: Air University Press, 2012.

———. *Irregular Enemies and the Essence of Strategy: Can the American Way of War Adapt?* US Army War College: Strategic Studies Institute, 2006.

Hallion, Richard P. *Storm over Iraq: Air Power and the Gulf War.* Washington: Smithsonian Institution Press, 1992.

Hammond, Grant T. *The Mind of War: John Boyd and American Security.* Washington: Smithsonian Books, 2001.

Hezlet, Arthur. *Aircraft and Sea Power.* New York: Stein and Day Publishers, 1970.

Hitchens, Theresa. "Long-Range All-Domain Prompts Roles & Missions Debate," Breaking Defense News, accessed 01 December 2020, https://breakingdefense.com/2020/07/long-range-all-domain-prompts-roles-missions-debate/.

Hodge, Homer. "DPRK Briefing Book: North Korea's Military Strategy," Nautilus Institute, accessed 01 December 2020, https://nautilus.org/publications/books/dprkbb/military/dprk-briefing-book-north-koreas-military-strategy/.

Holley I.B. Jr, *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States During World War 1; A study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons.* Hamden: Archon Books, 1971.

Hudson, James J. *Hostile Skies: A Combat History of the American Air Service in World War 1.* New York: Syracuse University Press, 1968.

Jarecki, Eugene *The American Way of War: Guided Missiles, Misguided Men, and a Republic in Peril.* New York: Free Press, 2008.

Kilcullen, David. *The Dragons and the Snakes: How the Rest Learned to Fight the West*. New York: Oxford University Press, 2020.

Knights, Michael A. *Cradle of Conflict: Iraq and the Birth of Modern U.S. Military Power.* Annapolis: Naval Institute Press, 2005.

Krippendorff, Klaus. *The Semantic Turn: A New Foundation for Design.* New York: Taylor & Friends, 2006.

Kuhn, Thomas S. *The Structure of Scientific Revolutions.* Chicago: The University of Chicago Press, 1962.

Layton, Peter. "Discontinued: America's Continuous Bomber Presence," War on the Rocks, accessed 01 December 2020, https://warontherocks.com/2020/05/discontinued-americas-continuous-bomber-presence/.

Le Corbusier. *Towards a New Architecture*. New York: Dover Publications, 2014.

Lee, Chung Min. *The Hermit King: The Dangerous Game of Kim Jong Un.* New York: St. Martin's Press, 2019.

Leonhard, Robert R. *Fighting by Minutes: Time and the Art of War* 2nd ed. Scotts Valley, CA: CreateSpace Publishing, 2017.

Liang, Qiao and Xiangsui, Wang. *Unrestricted Warfare.* Vermont: Echo Point Books & Media, 1999.

Lockie, Alex. "US and Japanese Fighters Are Getting Missiles Ideal for Striking North Korea," Business Insider, accessed 01 December 2020, https://www.businessinsider.com/us-air-force-jassm-f-16-south-north-korea-pyongyang-2017-6/.

Mann III, Col. Edward C. *Thunder and Lightning: Desert Storm and the Airpower Debates.* Maxwell AFB, Alabama: Air University Press, 1995.

Martel, William C. *Victory in War: Foundations of Modern Military Policy*. New York: Cambridge University Press, 2007.

Matheny, Michael R. *Carrying the War to the Enemy: American Operational Art to 1945*. Norman: University of Oklahoma Press, 2011.

Mattis, James. "Summary of the 2018 National Defense Strategy of the United States of America." Washington, DC: Department of Defense, 2018. Accessed 02 November 2020.

https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

Mazarr, Michael J., Gentile, Gian, Madden, Dan, Pettyjohn, Stacie L., & Crane, Yvonne K. *The Korean Peninsula: Three Dangerous Scenarios.* Santa Monica, CA: RAND Corporation, 2018.

McCullough, Amy. "Keeping Peace in Korea: US Keeps Its Forces in Korea at Maximum Readiness to Deter a Belligerent and Aggressive North," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/PDF/MagazineArchive/Documents/2016/November%2020 16/1116korea.pdf.

McLeary, Paul. "CJCS Milley Predicts DoD Budget 'Bloodletting' To Fund Navy," Breaking Defense, accessed 02 January 2021, https://breakingdefense.com/2020/12/cjcs-milley-predicts-dod-bloodletting-to-fund-navy-priorities/.

Mets, David R. *The Air Campaign: John Warden and the Classical Airpower Theorists* (Maxwell Air Force Base: Air University Press, 1999.

Mitchell, William. *Winged Defense.* New York: The Knickerbocker Press, 1924.

Mizokami, Kyle. "The Pentagon's New Strike Missile Just Saw Its First Combat," Popular Mechanics, accessed 01 December 2020, https://www.popularmechanics.com/military/weapons/a19843076/syria-attack-jassm-er-new-long-range-strike-missile/.

Mizokami, Kyle. "With 200,000 Special Forces, North Korea is a Dangerous Foe," The National Interest, accessed 01 December 2020, https://nationalinterest.org/blog/buzz/200000-special-forces-north-korea-dangerous-foe-106746.

Moore, Mark. "China Fires Missiles into South China Sea in Warning to US," New York Post, accessed 01 December 2020, https://nypost.com/2020/08/27/china-fires-missiles-into-south-china-sea-in-warning-to-us/.

Morgan, Forrest E. *Crisis Stability and Long-Range Strike: A Comparative Analysis of Fighters, Bombers, and Missiles.* Santa Monica: RAND Publications, 2013.

Murray, Williamson & Scales, Robert H. Jr., *The Iraq War: A Military History.* Cambridge: The Belknap Press of Harvard University Press, 2003.

Nkwake, Apollo M. *Working with Assumptions in International Development Program Evaluation* (New York: Springer-Verlag, 2013.

Olsen, John A and Creveld, Martin. *The Evolution of Operational Art: From Napoleon to the Present*. Oxford: Oxford University Press, 2011.

O'Rourke, Ronald. *China Naval Modernization: Implications for U.S. Navy Capabilities – Background and Issues for Congress.* Washington, DC: Congressional Research Service, 1 August 2018.

Osinga, Frans P.B. *Science, Strategy and War: The Strategic Theory of John Boyd.* New York: Routledge Taylor & Francis Group, 2007.

Owen, Robert C. *Deliberate Force: A Case Study in Effective Air Campaigning.* Maxwell AFB, Alabama: Air University Press, 2000.

Panda, Ankit. "North Korea Introduces a New Coastal Defense Cruise Missile Launcher: First Takeaways," The Diplomat, accessed 01 December 2020, https://thediplomat.com/2017/06/north-korea-introduces-new-coastal-defense-cruise-missile-first-takeaways/.

Pape, Robert A. *Bombing to Win: Air Power and Coercion in War* (New York: Cornell University Press, 1996.

Parsons, Dan. "Air Force Shows Off Stealthy Long-Range JASSM-ER for First Time in Syria Strikes," Defense Daily, accessed 01 December 2020, https://www.defensedaily.com/air-force-shows-off-stealthy-long-range-jassm-er-first-time-syria-strikes/air-force/.

Reynolds, Col. Richard T. *Heart of the Storm: The Genesis of the Air Campaign Against Iraq.* Maxwell AFB, Alabama: Air University Press, 1995.

Rogoway, Tyler. "The Army is Working to Field a Ground-Launched Strike Version of the Navy's SM-6 Missile," The Drive, accessed 01 December 2020, https://www.thedrive.com/the-war-zone/36213/the-army-is-working-to-field-a-ground-launched-strike-version-of-the-navys-sm-6-missile.

School of Advanced Airpower Studies, *The Paths of Heaven: The Evolution of Airpower Theory.* Maxwell Air Force Base: Air University Press, 1997.

Schwartz, Peter. *The Art of the Long View: Planning for the Future in an Uncertain World*. New York: Crown Business, 1996.

Scobell, Andrew, Burke, Edmund J., Cooper III, Cortez A., Lilly, Sale, Ohlandt, Chad R., Warner, Eric, Williams, J.D. *China's Grand Strategy: Trends, Trajectory, and Long-Term Competition.* Santa Monica: RAND Publications, 2020.

Sean, Barnett, D., Crane, Yvonne K., Gentile, Gian, Bonds, Timothy M., Madden, Dan, & Pfrommer, Katherine, *North Korean Conventional Artillery: A Means to Retaliate, Coerce, Deter, or Terrorize Populations.* Santa Monica, CA: RAND Corporation, 2020.

Sisk, Richard. "US Troops Are Still Ready to 'Fight Tonight' Against North Korea Despite Canceled Exercises, General Says," Military.com, accessed 01 December 2020, https://taskandpurpose.com/news/us-troops-are-still-ready-to-fight-tonight-against-north-korea-despite-canceled-exercises-general-says.

Taylor, Curt & Kay, Larry. "Putting the Enemy between a Rock and a Hard Place: Multi-Domain Operations in Practice," Modern War Institute, accessed 01 December 2020, https://mwi.usma.edu/.

Tirpak, John A. "China Now Tops US in Shipbuilding, Missiles, and Air Defense, DOD Says," Air Force Magazine, accessed 01 December 2020, https://www.airforcemag.com/china-

now-tops-us-in-shipbuilding-missiles-and-air-defense-dod-says/.

Trimble, William F. *Admiral John S. McCain and the Triumph of Naval Air Power*. Annapolis, Naval Institute Press, 2019.

Tschumi, Bernard. *Architecture and Disjunction*. Cambridge: The MIT Press, 1996.

———. *Architecture Concepts: Red is Not a Color*. The University of California: Random House Incorporated, 2012.

United States Air Force, *Air Force Future Operating Concept: A View of the Air Force in 2035* September 2015.

United States Air Force, *Volume 1, Basic Doctrine.* Maxwell AFB: Curtis E. Lemay Center, 2015.

United States Congress, *Army Reorganization: Hearings before the Committee on Military Affairs*, 66th Cong., 1st sess., 1919.

United States Navy, *Naval Doctrinal Publication 1: Naval Warfare.* Dept. of the Navy, Office of the Chief of Naval Operations and Headquarters, 2010.

US Department of Defense, Joint Staff, Joint Publication (JP) 3-03, *Joint Interdiction.* Washington, DC: Government Publishing Office, 2016.

———, Joint Publication (JP) 3-09, *Joint Fire Support.* Washington, DC: Government Publishing Office, 2019.

———, Joint Publication (JP) 3-30, *Joint Air Operations.* Washington, DC: Government Publishing Office, 2019.

———, Joint Publication (JP) 5-0, *Joint Planning.* Washington, DC: Government Publishing Office, 2017.

US Department of the Air Force. Air Force Doctrine Note 1-20, *USAF Role in Joint All-Domain Operations*. Washington, DC: Government Publishing Office, 2020.

U.S. Department of the Army, *Field Service Regulations, Operations, FM 100-5*. Washington, D.C.: Government Printing Office, 1986

———. TRADOC Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations 2028*. Washington, DC: Government Publishing Office, 2018.

Warden III, Col. John A. *The Air Campaign*. New York, toExcel Press, 2000.

———. *The Air Campaign: Planning for Combat*. Washington, DC: Pergamon-Brassey's, 1989.

White, Dana W. "Department of Defense Press Briefing by Pentagon Chief Spokesperson Dana W. White and Joint Staff Director Lt. Gen. Kenneth F. McKenzie Jr. in the Pentagon Briefing Room," US Department of Defense, accessed 01 December 2020,

https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1493749/department-of-defense-press-briefing-by-pentagon-chief-spokesperson-dana-w-whit/.

Zimmerman, Peter D. “Assessing the DPRK’s KN-09 300mm Multiple Rocket Launcher System: Decisive or Incremental,” Nautilus Institute, accessed 01 December 2020, https://nautilus.org/napsnet/napsnet-special-reports/assessing-the-dprks-kn-09-300-mm-multiple-rocket-launcher-system-decisive-or-incremental/#_edn11.