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To effectively face a peer competitor in the Great Power era, the U.S. Navy will require a modern risk assessment model to effectively accomplish maritime objectives in support of the joint force effort towards operational and strategic objectives during a high-end fight. Modernizing the current risk assessment process of identifying hazards, determining frequency, and impacts into a broader acceptable level of risk (ALR) construct, like that of the U.S. Air Force, will enable commanders to better communicate risk acceptance levels and intent in the distributed maritime operations (DMO) model of fleet employment. Additionally, tactical-level commanders will better understand the boundaries or limits of risk acceptance at the tactical level when executing mission command within the DMO concept.

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NAVAL WAR COLLEGE
Newport, RI

A Modern Acceptable Level of Risk Model for the Operational Maritime Commander in the Great Power Competition Era

By

Brian Seymour
Major / U.S. Air Force

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of Maritime Advanced Warfighting School.

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Introduction

To effectively face a peer competitor in the Great Power era, the U.S. Navy will require a modern risk assessment model to effectively accomplish maritime objectives in support of the joint force effort towards operational and strategic objectives during a high-end fight. Modernizing the current risk assessment process of identifying hazards, determining frequency, and impacts into a broader acceptable level of risk (ALR) construct, like that of the U.S. Air Force, will enable commanders to better communicate risk acceptance levels and intent in the distributed maritime operations (DMO) model of fleet employment. Additionally, tactical-level commanders will better understand the boundaries or limits of risk acceptance at the tactical level when executing mission command within the DMO concept.

The Problem with Current Risk Assessments

In the Naval Warfare Publication (NWP) 5-01, the Navy Planning Process (NPP) contains extensive guidance in assisting planners and staff with identifying hazards, measuring frequency, and the potential impacts of those risks via detailed risk matrices. However, it does not effectively illustrate what commanders should do with that risk, nor does it guide planners or the commander on how much risk should be accepted to achieve the current objective without impacting follow-on operations. The NPP also struggles to define how commanders are to communicate risk acceptance levels to subordinate commands once the plan goes into execution.[1]

According to the NWP 5-01, risk falls into two distinct categories, risk to mission and risk to force. In most cases, risk to mission is focused primarily on the operational level of war

[1] Captain Bill Shafley, "Risk and Reward," *The U.S. Naval Institute Blog,* 14 June 2018, Accessed 7 January 2021, https://blog.usni.org/posts/2018/06/14/risk-and-reward.

and risk to force at the tactical level. In the Navy's risk assessment model, it is prudent for the operational staff and lower-echelon units to identify both risks to mission and force for the commander so the commander might enable risk mitigation measures based on intuition, past experiences, and personal judgment.[2] Additionally, the current risk assessment model expects all risks (at least those known to the staff) to be identified and mitigated or managed at both the operational and tactical levels with continuous updates throughout the operation. However, this process can be time-consuming and does not provide adequate flexibility as risk can continuously change based on the enemy's reaction to friendly forces. The very flexibility required to enable tactical level commanders to take advantage of risk opportunities in the accomplishment of objectives. It may also bog down the staff and operational level commander, such as the Joint Force Maritime Component Commander (JFMCC), with an overwhelming number of tactical details, further complicating or stalling the decision-making cycle.[3]

Having not faced a peer competitor since World War II (WWII), combined with the inflexible nature of the Navy's current risk assessment model, assessments may lead to discontinuities across commanders between what is and is not a significant risk. Compounding this issue is the transition to the DMO concept of fleet employment. Compared to the tactical employment methods before DMO, the fleet's distribution across large areas connected via sophisticated networks will require a shift in risk understanding and its impact on the force. A constant enemy order of battle (EOB) will pose different risk factors to the force and mission based on the fleet's composition and distribution. For example, it is much easier to assess and manage risk to a carrier when it is well protected and in close proximity to its destroyers and

[2] U.S. Navy, Office of the Chief of Naval Operations, *Navy Planning,* Navy Warfare Publication 5-01, Washington, DC: Department of the Navy, CNO, December 2013, Accessed 5 January 2021, APPENDIX F.
[3] Captain Bill Shafley, "Risk and Reward," *The U.S. Naval Institute Blog.*

cruisers as historically employed. However, within DMO, this may not always be the case as there may be a need or a time when high-value assets such as a carrier will need to operate independently or vastly separated from escorts from time to time.[4]

The intent is not to diminish a commander's judgment or experiences or to dismiss the need to identify hazards at the tactical level, rather to highlight the need to better quantify and communicate risk across the force and reduce the staff and commander workload on risk estimates and assessments at the operational level of war. While also empowering the tactical level commander to make intelligent risk decisions as opportunities present themselves across the distributed maritime domain. The Air Force model of ALR may do just that if adequately adapted to the maritime environment.

Air Force ALR

The Air Force ALR model provides the operational level commander a means of expressing risk to force and risk to mission as an inverse relationship to one another. Generally, as the risk to mission goes down, the acceptable level of risk to forces increases even if no significant threats to air forces exist. For example, a high-priority mission or objective might incur a "low" risk to the mission, meaning the risk of failing or not achieving the objective in a timely manner must remain low. With direct reference to the importance of the objective and to ensure the mission succeeds, the operational commander may direct an ALR (unmitigated risk to forces) as "high" to provide the highest probability of mission success. The operational commander, the Joint Force Air Component Commander (JFACC), expresses his or her ALR as

[4] Kevin Eyer and Steve McJesse, *Operationalizing Distributed Maritime Operations,* Center for International Maritime Security, Washington, DC: 2019, Accessed 26 March 2021. https://cimsec.org/operationalizing-distributed-maritime-operations/.

the willingness to accept risk to forces at the operational level based on objective importance via the ALR spectrum of low, moderate, significant, high, and extreme.[5,6] Tactical level commanders then employ forces, maneuver, and make risk decisions based on the commander's intent and within the JFACC's ALR. Significantly different from the NWP 5-01 process, which requires the detailed analysis of both the risk to force and risk to the mission at both the operational and tactical levels as frequency and severity matrices before the operational commander makes risk decisions and directs methods of force employment.[7]

Each level of ALR considers five sub-areas. First, the definition and use of a given ALR, the confidence in EOB, factor threat management techniques, historical examples of force loss rates for a given ALR, and the context for when different ALR levels should be employed. For example, the typical use of moderate ALR is for protracted campaigns with an improbable chance of aircraft losses or damage; however, management of force loss rates is vital to ensure force sustainability and tempo over several months. Confidence in the location of significant adversary forces and weapons is high, yet it is acceptable to have some uncertainty regarding lower threat systems' location and disposition. Air forces are to avoid, suppress, neutralize, or destroy factor threats based on organic capability while maintaining a high level of protection to ensure follow-on capability exists. Historical examples would include a majority of DESERT STORM or the average losses across all LINEBACKER operations and are most likely to be used in Phase I (deter) or Phase III (dominate) in a campaign.[8]

[5] Secretary of the Air Force, *Air Force Tactics Techniques and Procedures 3-3.IPE,* Tactical Doctrine, Washington, DC, 3 April 2020, 1-25.
[6] *Air Force Tactics Techniques and Procedures 3-3.IPE*, A11-10.
[7] Chief of Naval Operations, *Navy Planning,* Navy Warfare Publication 5-01, APPENDIX F.
[8] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-24.

For comparison, the use of a significant ALR is when the JFACC is willing to accept substantial losses in the effort towards the objective; however, additional forces must be available via the Time Phased Force Deployment Data (TPFDD) before the current unit becomes combat ineffective. Only reasonable confidence compared to high confidence in the EOB locations and staging, but confidence is high in the types and numbers of factor threats. Air forces can only enter significant factor threat rings if an organic capability against a factor threat exists, such as onboard offensive and defensive suite, or be adequately force packaged and protected by assets that do. Significant ALR or higher is usually reserved for Phase II (seize the initiative) in a campaign or hasty operations with minimal planning when the objective is of great importance to the joint force.[9] For a more detailed explanation of each ALR level, reference *Figure 1* and the Air Force Tactics, Techniques, and Procedures 3-3 Integrated Planning and Employment (AFTTP 3-3.IPE).

An ALR of "high" communicated by the JFACC expresses a willingness or tolerance to accept major force losses in accomplishing an objective. In contrast, an ALR of "low" can imply one of two messages. Either the value of the objective (mission) is not worth the loss of people and equipment due to the unmitigated risks, or the protection of forces over the objective accomplishment is more critical for follow-on operations, which is more likely to be the case. It is important to note that even though the JFACC may determine an overall ALR for a given campaign or operation, the ALR may vary between phases, formations, areas, or functional areas based on force protection and the ability to mitigate hazards organically.[10]

[9] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-26.
[10] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-23.

ALR	Tactics, Techniques, Procedures	Implications and Example	Expected Daily Loss Rate
Low	Operate outside known threat weapon engagement zones; mitigate environmental hazards. Factor threats destroyed or neutralized with BDA prior to entering. High confidence of threat OB.	Sustained operations, indefinite duration. Preservation of forces/capabilities is higher priority than mission success. *(OEF, NATO Air Policing)*	Normal attrition
Moderate	Accept only advantageous engagements; (1) destroy, neutralize or suppress factor threats prior to entering with bomb hit assessment ***or*** (2) use highly effective onboard defensive system/low risk tactic. High confidence of threat OB.	Unit is combat-ineffective in 60 ±30 days; facilitates sustained air campaign of defined duration. *(OPERATION DESERT STORM, Allied Force)*	< 1/100
Significant	Prudently accept increased risk; enter factor threat environments with (1) valid counter-TTP or defensive suite, ***and*** (2) if threats are disrupted. Reasonable confidence in threat OB.	Unit is combat-ineffective in 72 hrs; allows for TPFDD back-fill or operational pause to halt losses. *(Linebacker 2, Package Q)*	< 1/5
High	Accept disadvantageous engagements; enter factor threat environments with (1) valid counter-TTP or defensive suite ***or*** (2) if threats are disrupted.	Unit is combat-ineffective in one ATO day; allows for back-fill on next ATO cycle from in-theater assets or for COD/msn commander to direct "abort." *(WW2 Schweinfurt Raid, Op Tidal Wave)*	< 1/2
Extreme	Accept any engagement that results in some probability of success. Enter any threat environment.	Unit is combat-ineffective in one sortie, no abort option; force annihilation is acceptable. *(WW2 Doolittle Raid)*	> 1/2
NOTE: These terms were chosen to align with CJCSM 3105.01.			

Figure 1: Air Force ALR Template[11]

In addition to the descriptions in *Figure 1*, which communicate ALR levels as it relates to the threat environment and overarching commander's risk acceptance for an operation or campaign, the AFTTP 3-3.IPE provides standard operating levels of ALR for functional areas such as mobility platforms, combat search and rescue (CSAR), suppression of enemy air

[11] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-25.

defenses (SEAD), and high-value airborne assets (HVAA), as seen in *Figure 2*. In the absence of a specified functional ALR from the JFACC, these standards enable planners and aircrew to force package adequately and sequence air forces in and out of the objective area based on advantageous and disadvantageous environments while remaining within the overall ALR designated by the commander.

ALR by Functional Team	
CSAR	Moderate
HVAA	Low
Strikers	Moderate
SEAD	Significant
DCA	Moderate, High in defense of DAL
OCA	Significant
Mobility	Moderate
Space	Low
Cyber	Low

Figure 2: Air Force ALR by Functional Team[12]

As stated, the JFACC can establish a higher or lower ALR for a given functional area based on the importance of the objective.[13] Implementing a functional ALR outside of what is usually considered "standard" is common when time, space, and force (friendly or enemy) considerations do not allow for sufficient protection or standoff. Such as elevating a tanker aircraft (HVAA) with a standard ALR of "low" to "moderate" when it is necessary to position the aircraft in the vicinity of a threat when no-organic defensive capability exists, and friendly force protection is inadequate.

The means by which the Air Force ALR construct identifies hazards, frequency of occurrence, and the impact of those hazards are not entirely different than the Navy's approach to risk at the tactical level. The identification of factor threats and risk will always be necessary.

[12] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-26.
[13] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-26.

However, what is significantly different between the models is the effective communication of the risk acceptance level within the ALR construct. Including what planners and operators should do with that risk and the freedom of maneuver it grants commanders to capitalize on risk opportunities through a clear understanding of the JFACC's ALR.

Overview of the DMO Concept

The underlying principle of DMO is operational tempo and maneuver of the fleet as a unified fighting force in the effort to gain sea control and project maritime power. Differentiating itself from the previous fleet tactics or concepts of fleet employment, DMO uses dispersion across vast areas to complicate the enemy's scouting, targeting, and decision-making process via a complex friendly force presentation.[14] Additionally, DMO will increase the risk to adversary forces as the dispersion of friendly ships will place the enemy at risk for attacks across multiple axes.[15] This dispersion may also limit the enemy's ability to mass fires and force specific sectors of approach, which the friendly fleet may more easily defend.[16] To do so will require a highly sophisticated network architecture across multiple domains to enable each ship to see what every other ship sees, with instantaneous information sharing, allowing for improved over-the-horizon targeting information and the ability for improved target handoff.[17]

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[14] Bryan Clark, Timothy A. Walton, and Seth Cropsey, "American Sea Power at a Crossroads: A Plan to restore the U.S. Navy's Maritime Advantage," *Real Clear Defense,* 30 September 2020, Accessed 10 January 2021,https://www.realcleardefense.com/articles/2020/09/30/american_sea_power_at_a_crossroads_a_plan_to_restore_the_us_navys_maritime_advantage_579137.html, 41.

[15] Eyer and McJesse, *Operationalizing Distributed Maritime Operations.*

[16] Uppal, Rajesh, " U.S. Navy Operationalizing "Distributed Maritime Operations (DMO)," Strategy Integrating Diverse Autonomous Unmanned Vehicles UUV, USVS, UAVs," *International Defense, Security, & Technology,* 1 February 2021, Accessed 30 March 2021, https://idstch.com/military/navy/unmanned-naval-warfare-advances-from-unmanned-vehicles-to-swarms-us-navy-tests-swarm-of-autonomous-intelligent-drones/.

[17] Bryan Clark and Timothy A. Walton, *Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare,* Center for Strategic and Budgetary Assessments, Washington, DC: 2019, Accessed 11 January 2021, https://csbaonline.org/uploads/documents/CSBA8192_(Taking_Back_the_Seas)_WEB.pdf, 40-45.

By seeing what every ship sees via the integrated network of sensors combined with the ability to target with one ship while engaging from another, DMO is more easily commanded and controlled at the operational level yet providing flexibility for mission command and more decentralized execution of operations.[18] As factor threats present themselves in the theater, the JFMCC will be able to quickly identify the closest and best suited friendly ship formation to the threat, maneuver as required, and terminate the threat. Of course, this is assuming a fully operational network in an environment free from communication and sensor denial. However, due to the fleet's distributed nature and the requirement for assets such as cruisers and destroyers to protect high-value units (HVU) while maintaining sea control, it is expected HVU such as aircraft carriers and amphibious ships will be unescorted from time to time. Mainly as a result of the commander further dispersing forces to neutralize targets.[19] In this dispersion, subordinate units need to clearly understand how much risk the commander is willing to accept as the environment can drastically change over time and through movement and maneuver.

Still, the fleet's dispersed nature in the DMO construct may prove challenging for the operational level staff to adequately identify and manage all risk over large areas and across multiple force packages, even with a highly sophisticated common operating picture. Each geographic location will have varying threats, and even similar threats will pose different risks depending on the compilation of the friendly force package. With a mindset of decision-centric warfare inherent in DMO,[20] implementing a standard ALR for varying ships based on capability and fleet value will better prepare the JFMCC and subordinate commanders with risk decisions,

[18] Clark and Walton, *Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare,* Center for Strategic and Budgetary Assessments, 22.
[19] Eyer and McJesse, *Operationalizing Distributed Maritime Operations.*
[20] Clark, Walton, and Cropsey, "American Sea Power at a Crossroads: A Plan to restore the U.S. Navy's Maritime Advantage," *Real Clear Defense*. 23-32.

especially as force packages disintegrate to combat factor threats, potentially rendering HVUs less protected than historically accepted. If DMO and its associated networks are to facilitate exponentially faster decision cycles, the current means of risk assessment will be cumbersome and counter-productive to the intent of effective distributed maritime operations.[21]

ALR Applied to DMO

The functional area ALR construct implemented by the Air Force will be used to demonstrate a conceptual means of a standard operating surface and subsurface fleet ALR with carrier-based air remaining on par with the Air Force for simplicity. The standard operating ALR's purpose is to create a baseline for the typical unmitigated risk environment a given functional area can operate without additional force packaging, deception, shaping fires, etc., and remain within the JFMCC overarching ALR for an operation or campaign.[22] As seen in *Figure 3*, HVUs will consist of aircraft carriers and amphibious assault ships. Guided-missile cruisers (CG) and guided-missile destroyers (DDG) will be separate based on Aegis and SPY radar capability. The subsurface category will include both SSNs and SSGNs for the sake of simplicity, and the last two categories will consist of mine countermeasure ships (MCM) and supply.

Maritime ALR by Functional Team	
HVU	Low, Mod with CG/DDG Escort
CG without Aegis or SPY	Moderate
CG with Aegis and SPY	Significant
DDG without Aegis or SPY	Moderate
DDG with Aegis and SPY	Significant
Subsurface	High
MCM	Moderate
Strike Fighter	Moderate
SEAD	Significant
OCA	Significant
DCA	Moderate, High in active DCA
Supply	Low

Figure 3: Maritime ALR by Functional Team (Proposed)

[21] Shafley, "Risk and Reward," *The U.S. Naval Institute Blog.*
[22] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-25, 26.

In addition to the standard functional area ALR, the JFMCC requires the means to communicate the overarching ALR for the operation predicated on the same five subareas as the Air Force ALR but with modifications for the maritime domain. Those areas being the definition and use of a given ALR, the confidence in the EOB, factor threat mitigation techniques, historical examples (where available), and the context of when different ALR levels should be employed.[23]

As an example, moderate maritime ALR is for protracted campaigns with the chance of minimal damage to ships, and combat effectiveness is maintained. There is an improbable chance of naval losses; however, management of force loss rates is vital to ensure force sustainability and tempo over several months. Confidence in the location of significant adversary forces and weapons is high, yet it is acceptable to have some uncertainty regarding lower threat systems' location and disposition. Naval forces will accept only advantageous engagements with relative combat power analysis (RCPA) overmatch and consistent air support. Naval forces are to avoid, suppress, neutralize, or destroy factor threats based on organic capability while maintaining a high level of protection to ensure follow-on capability exists. Sea control is easily gained and only lightly contested and is most likely to be used in Phase I (deter) or Phase III (dominate) in a campaign. Reference *Figure* 4 for additional descriptions of the different proposed ALR levels.

For demonstration purposes, consider a conceptual and straightforward amphibious assault scenario upon an adversary's coast. For this operation, the JFMCC has communicated an overall ALR of "significant." Meaning planners and commanders may prudently accept risk, enter factor threat environments with or without RCPA overmatch, a valid counter TTP and air

[23] *Air Force Tactics Techniques and Procedures 3-3.IPE*, 1-24.

support exists to disrupt the threat, and at least reasonable confidence in EOB. Initial forces available are the amphibious assault ship with an ALR of moderate when under escort and two three-ship surface action groups (SAG) with mixed Aegis and SPY radar capabilities allowing for only a moderate ALR.

ALR	Tactics, Techniques, Procedures	Implications and Example	Expected Daily Loss Rate (Based on Fleet Size of 50-70 Ships
Low	Operate outside known threat weapon engagment zones; mitigate environmental hazards. Factor threats destroyed or neutralized with BDA prior to entering. High Confidence of threat OB.	Sustained maritime operations of indefinite duration. Preservation of forces/capabilities is higher priority than mission success. (OEF/OIR)	Normal attrition
Moderate	Accept only advantageous engagements with RPCA overmatch and air support; (1) destroy, neutralize, or suppress factor threats prior to entering with BDA *or* (2) use highly effective onboard dfensive system/low risk tactic such as maneuver. High confidence of threat OB.	Unit is combat-ineffective in 90 +/- 30 days; facilitates lightly contested sea control and projection of forces ashore in only lightly contested environment for a defined duration.	<10%
Significant	Prudently accept increase risk; enter factor threat environments with or without RCPA overmatch and with (1) valid counter TTP/air support, *and* (2) capability exists to disrupt threat. Reasonable confidence in threat OB.	Unit is combat-ineffective in 30 +/- 15 days; contested sea control and allows for TPFDD back-fill or operational pause to halt losses (Battle of Tsushima and Coral Sea)	<20%
High	Accept disadvantgeous engagements without RCPA overmatch; enter factor threat environments with or without air support and non-organic capability to disrupt threat. Low confidence in threat OB.	Unit is combat in-effective in 14 days. Back-fill would require movement of forces from other in-theater objective areas with unknown TPFDD back-fill capability. Contested sea control for only short duration. An option to "abort" mission exists prior to total loss of asset(s). (Battle of Leyte Gulf/Midway - Japanese Side)	<50%
Extreme	Accept any engagement that results in some probability of success. Enter any threat environment regardless of RCPA and air support.	Unit is combat-ineffective following mission; sea-control is minimal if not unattainable. No abort option and total force annihilation is acceptable.	>75%
NOTE: EXAMPLE ONLY. Naval SMEs will need to further refine/define above criteria based on historical data and exercise scenarios in order to provide better fidelity.			

Figure 4: Maritime ALR Template (Proposed)

However, when presented with the EOB in *Figure 5,* the environment is disadvantageous and resembles an extreme ALR requiring additional force packaging to bring the ALR within the JFMCC's tolerance.

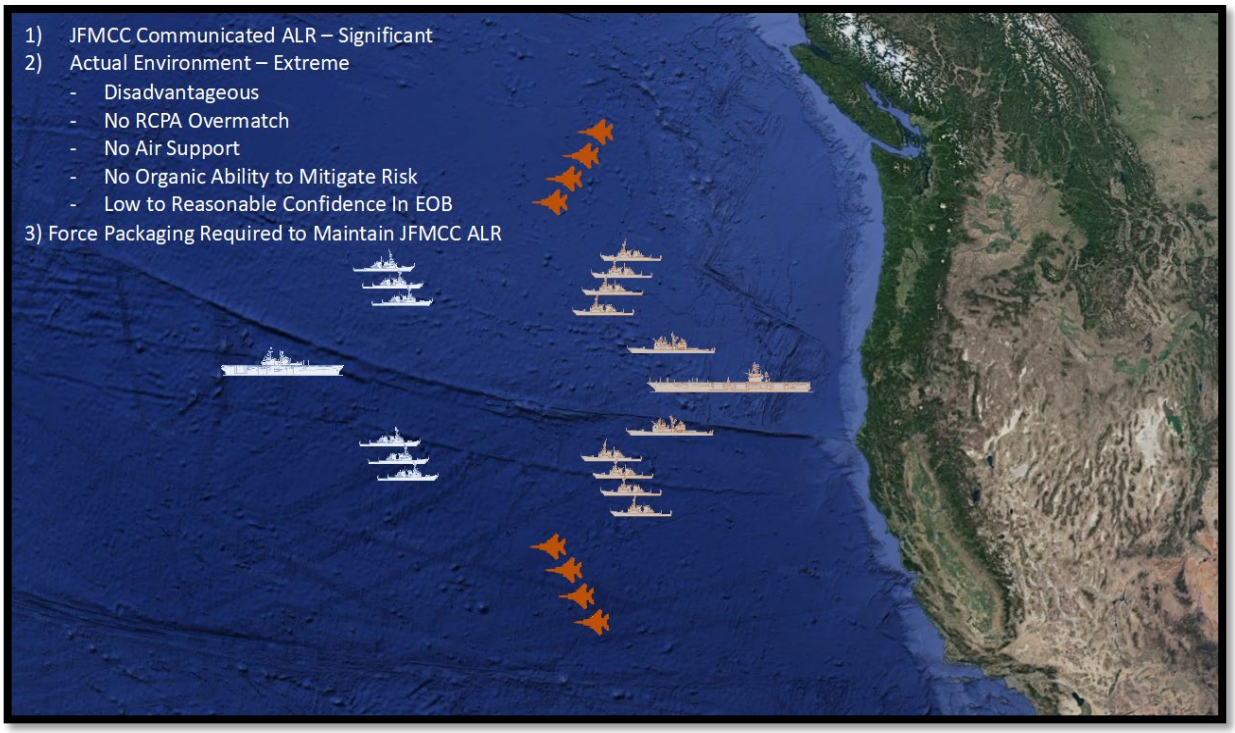

Figure 5: EOB and Environment Exceeds JFMCC ALR

As seen in *Figure 6,* blue forces now meet the requirement to operate within the JFMCC's ALR by adding air support to the fight. However, there is little room for error as blue forces still do not have RCPA overmatch, and ALR could easily exceed the JFMCC's communicated risk as attrition on the battlespace occurs. To ensure the JFMCC's ALR is adhered to, additional force packaging is necessary in both planning and execution.

Simply because the JFMCC communicates a willingness to accept increased risk and disadvantageous threat environments does not mean additional risk mitigation should not occur when mitigation measures are available. The goal is not to exceed ALR and strive to remain well within the commander's risk tolerance, perhaps well below it if forces are available.

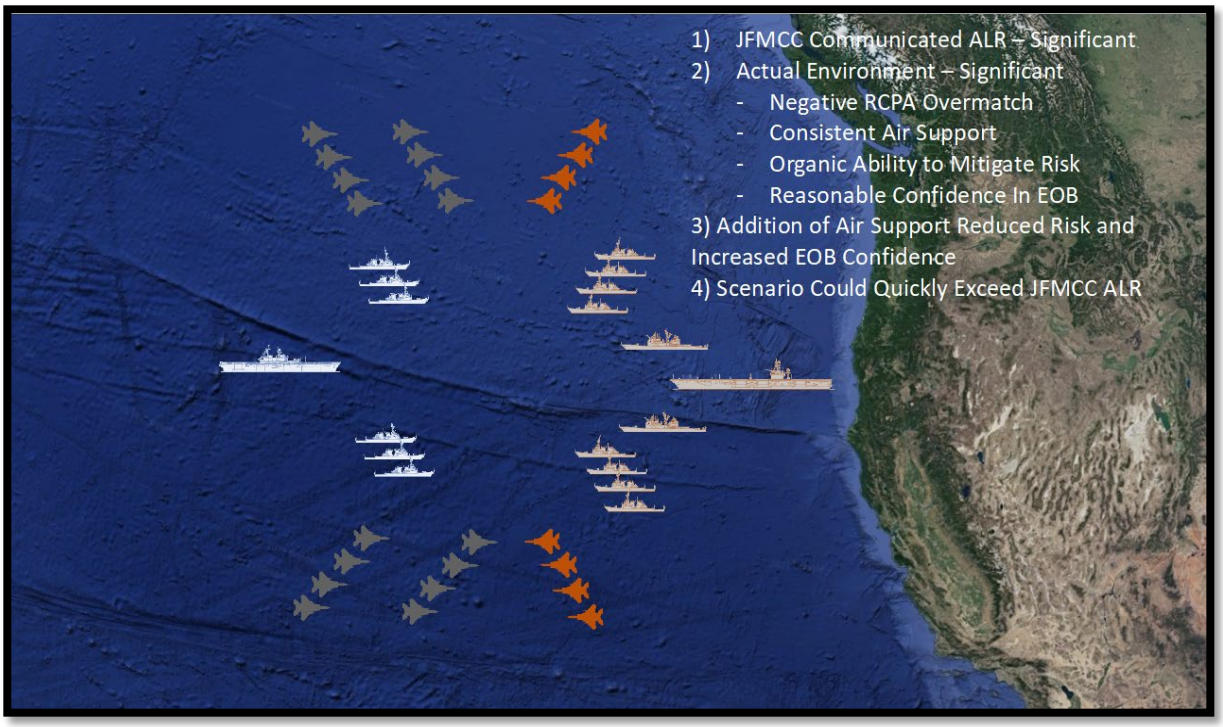

Figure 6: Addition of Air Support to Remain Within JFMCC's ALR

Even while distributed in a DMO construct, the incorporation of additional SAGs, CGs, and aircraft carriers providing mutual support and protection of the amphibious assault ship reduces the ALR environment to moderate (*Figure 7*). Blue forces are now in an advantageous threat environment, have RCPA overmatch and consistent air support. Furthermore, the expansion of blue forces and the increase in sensors enable higher confidence in the EOB and allow all players to track and target threats with greater fidelity. Lastly, lower echelon commanders now have the freedom to assume additional periodic risk within the bounds of ALR while taking advantage of opportunities as they present themselves during an operation.

It will be prudent that subject matter experts across naval functional areas further define and refine this standard based on individual ship capabilities and employment realities should the U.S. Navy adopts this ALR concept. Alternatively, the principle of calculated risk has naval

roots beginning in the Second World War and might offer a more simplistic transition for risk assessment in the maritime domain.

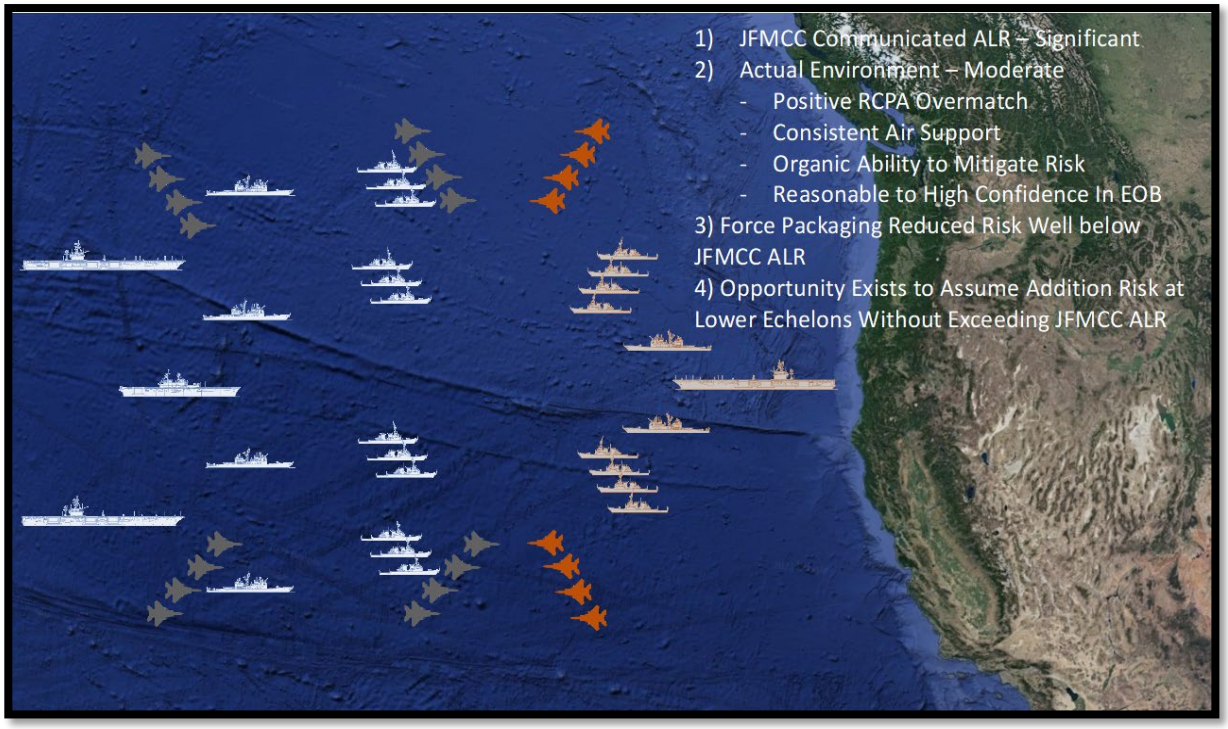

Figure 7: ALR Below the JFMCC Tolerance

Principle of Calculated Risk

Leading up to the Battle of Midway during WWII, Admiral Nimitz provided guidance to Admiral Fletcher and Spruance detailing his intent for the mission. In this letter, Admiral Nimitz stated the principle of calculated risk would govern the fleet's actions and that the fleet should not be exposed to a superior adversary unless that exposure would result in a greater cost to the enemy. In essence, a significant loss of aircraft carriers in the Battle of Midway, without the battle being decisive in the course of the war, would prove useless as maintaining sea control would no longer be possible. Nimitz was willing to risk the fleet; however, the loss of multiple aircraft carriers at the wrong time and place, especially after losing two carriers earlier in the war, would leave Nimitz with minimal options to further protect the U.S. and accomplish follow-

on objectives.[24] Nimitz's commanders had to be confident in the intelligence, of their surprise, and ensure the U.S. fleet would strike effectively first to ensure the reward far exceeded the potential costs. More simply, the risk versus reward.

Underpinning the principle of calculated risk is a fleet-sized engagement, logic, critical thinking, and a thorough study of the problem at hand. Instead of attempting to understand and mitigate risk via risk matrices viewed through a lens of operational risk management (ORM), calculated risk decisions embrace risk and seeks to place all available odds in your favor to maximize reward and minimize cost for that reward.[25] Calculated risk decision-making differs from the doctrinal approach to decision-making as it heavily considers odds, payoff, and costs and places less emphasis on the risk itself. Risk is inherent in war and has less influence over the commander's decision within the principle of calculated risk.[26] To do this requires a significant balance of time, space, and force to ensure all aspects of the problem are in the commander's favor before executing an operation.

Additionally, the aircraft carrier is the fleet's capital ship and serves as the measure of currency (cost) in calculated risk decisions. The carrier also determines when and where a fleet can operate based on the ability to project combat power a great distance from its current location. However, the carrier is a high-value asset, and risk must remain low in most cases due to the limited number of carriers in the fleet, the monetary cost of replacement, and the time it requires to produce additional carriers once destroyed.[27]

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[24] Robert C. Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review,* Vol. 68: No. 1, Article 4, 2015, Accessed 24 March 2021, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1180&context=nwc-review, 1-2.
[25] Shafley, "Risk and Reward," *The U.S. Naval Institute Blog.*
[26] Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review,* 1-2.
[27] Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review,* 3.

With the carrier at the center of the calculated risk principle, the risk versus reward decisions become relatively straightforward. To risk the carrier is to risk the fleet, and if the reward for that loss is not greater than the cost, additional time is necessary to obtain better odds or wait for a better reward. Nimitz weighed the cost of committing all his carriers at Midway and decided the reward, a decisive victory that would change the war's course, was worth the costs associated with carrier losses. If the battle were not decisive by delivering a devastating blow to the Japanese fleet, Nimitz would have waited another year until additional carriers were available and relied on attrition tactics instead.[28] There were still many unknowns and risks of varying severity and frequency in the Battle of Midway, but the principle of calculated risk made the decision simple. By applying logic and thinking critically about the problem at hand, Nimitz ensured the odds were in his favor, and the reward was worth the potential cost. The future fight with a peer adversary will impose even higher costs than Nimitz faced in World War II, and calculated risk decisions will be necessary when commanders face uncertain scenarios with varying risks.[29]

Conclusion

Although aspects of the calculated risk decisions are relevant in today's fight, the command structure of today's military does not afford the JFMCC the necessary authority to make a decision of that severity, as the command structure in WWII afforded Nimitz.[30] The consequences of failure will have severe impacts on the joint force, and the loss of an aircraft carrier may take upwards of five years to replace with devastating second and third-order effects on objective accomplishment and sea control.[31] While the principle of calculated risk may be an

[28] Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review,* 5-10.
[29] Shafley, "Risk and Reward," *The U.S. Naval Institute Blog.*
[30] Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review*, 11.
[31] Rubel, "Deconstructing Nimitz's Principle of Calculated Risk," *Naval war College Review*, 9.

effective tool in communicating a commander's intent, as it did for Admiral Fletcher and Spruance,[32] it still does not effectively explain how to communicate the JFMCC's risk tolerance to planners and lower echelon commands.

The near-peer fight will be dynamic with a high operations tempo. It is highly probable blue forces will experience communications and sensor degradation, if not a complete denial, in a fight against a near-peer adversary. With the heavy reliance on integrated communications and sensors, it is vital commanders clearly articulate intent through mission-type orders and the willingness to *accept risk* to subordinate commanders.[33] This articulation of intent and risk acceptance is especially crucial when executing mission command within the DMO concept. The Air Force ALR construct will do precisely that for those executing mission command.

The ALR construct presented here provides commanders with a clearly communicated, easily understood, quantifiable, and measurable means of risk acceptance that commanders can effectively employ while executing operations in a sensor and communications denied DMO environment. Additionally, decision cycles are improved in non-denied environments as the ALR construct enables commanders to take advantage of risk opportunities that present themselves without the need to "reach back." U.S. Navy leaders should consider adopting the U.S. Air Force ALR construct for future naval operations to support DMO in the future maritime and joint fight.

[32] Captain Bill Shafley, "Put the Commander Back in Commander's Intent," *Center for International Maritime Security,* 13 May 2020, Accessed 3 April 2021, https://cimsec.org/put-the-commander-back-in-commanders-intent/.
[33] Eyer and McJesse, *Operationalizing Distribute Maritime Operations.*

Bibliography

Clark, Bryan, and Timothy A. Walton. *Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare.* Center for Strategic and Budgetary Assessments. Washington, DC: 2019. Accessed 11 January 2021. https://csbaonline.org/uploads/documents/CSBA8192_(Taking_Back_the_Seas)_WEB.pdf.

Clark, Bryan, Timothy A. Walton, and Seth Cropsey. "American Sea Power at a Crossroads: A Plan to restore the U.S. Navy's Maritime Advantage." *Real Clear Defense.* 30 September 2020. Accessed 10 January 2021. https://www.realcleardefense.com/articles/2020/09/30/american_sea_power_at_a_crossroads_a_plan_to_restore_the_us_navys_maritime_advantage_579137.html.

Eyer, Kevin, and Steve McJesse. *Operationalizing Distributed Maritime Operations.* Center for International Maritime Security. Washington, DC: 2019. Accessed 26 March 2021. https://cimsec.org/operationalizing-distributed-maritime-operations/

Rubel, Robert C. "Deconstructing Nimitz's Principle of Calculated Risk," *Naval War College Review.* Vol. 68: No. 1, Article 4. 2015. Accessed 24 March 2021. https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1180&context=nwc-review.

Secretary of the Air Force. *Air Force Tactics Techniques and Procedures 3-3.IPE.* Tactical Doctrine. Washington, DC: 3 April 2020. Accessed 4 January 2021.

Shafley, Captain Bill. "Put the Commander Back in Commander's Intent." *Center for International Maritime Security.* 13 May 2020. Accessed 3 April 2021. https://cimsec.org/put-the-commander-back-in-commanders-intent/.

Shafley, Captain Bill. "Risk and Reward." *The U.S. Naval Institute Blog.* 14 June 2018. Accessed 7 January 2021. https://blog.usni.org/posts/2018/06/14/risk-and-reward.

Uppal, Rajesh. " U.S. Navy Operationalizing "Distributed Maritime Operations (DMO)," Strategy Integrating Diverse Autonomous Unmanned Vehicles UUV, USVS, UAVs." *International Defense, Security, & Technology.* 1 February 2021. Accessed 30 March 2021. https://idstch.com/military/navy/unmanned-naval-warfare-advances-from-unmanned-vehicles-to-swarms-us-navy-tests-swarm-of-autonomous-intelligent-drones/.

U.S. Navy. Office of the Chief of Naval Operations. *Navy Planning.* Navy Warfare Publication 5-01. Washington, DC: Department of the Navy, CNO. December 2013. Accessed 5 January 2021.