



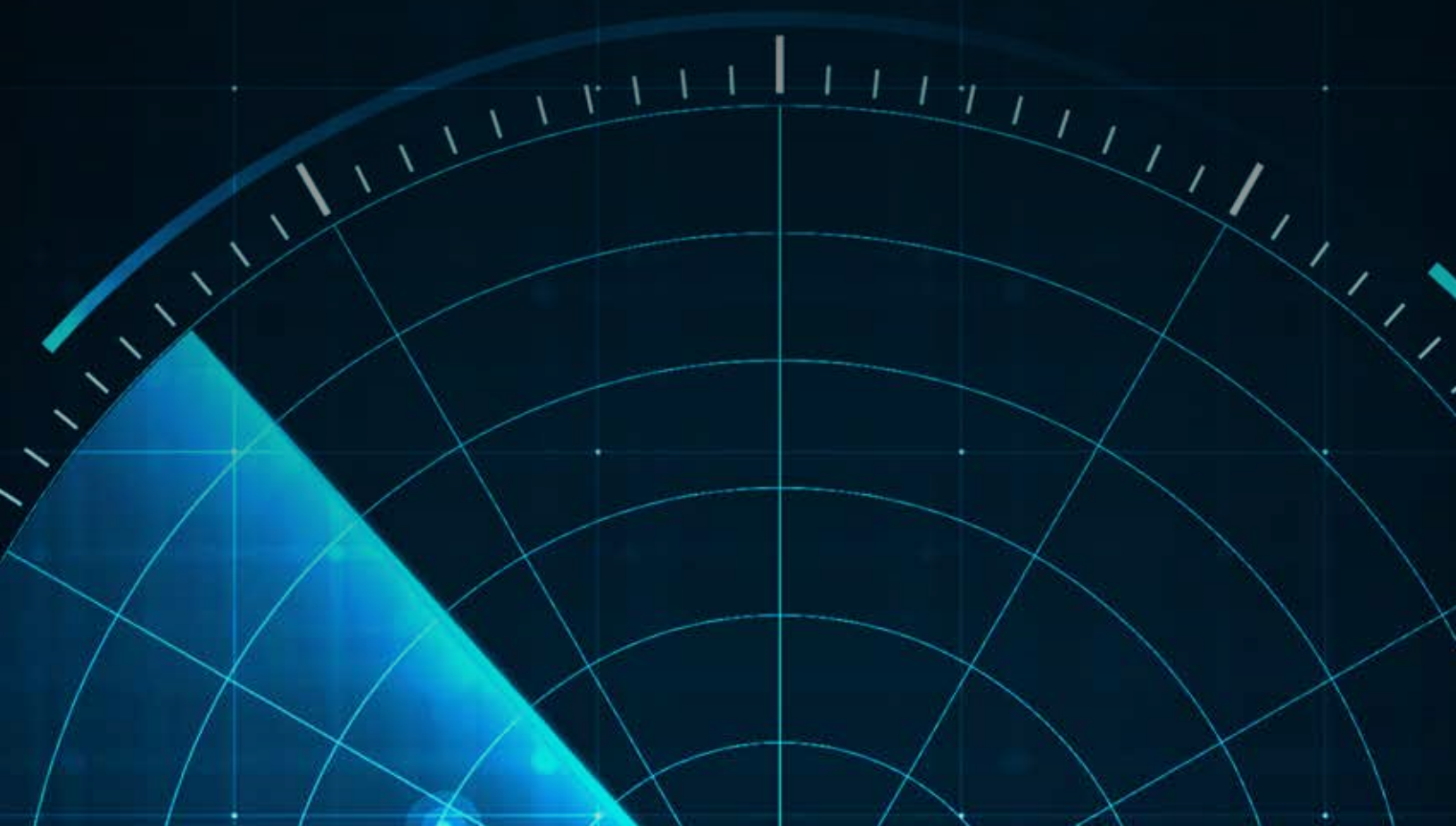
The Andrew W. Marshall
FOUNDATION

Submarines and Future War:

A View from Outside the Force

Based on Remarks by Andrew W. Marshall

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Andrew W. Marshall

(1921 - 2019)

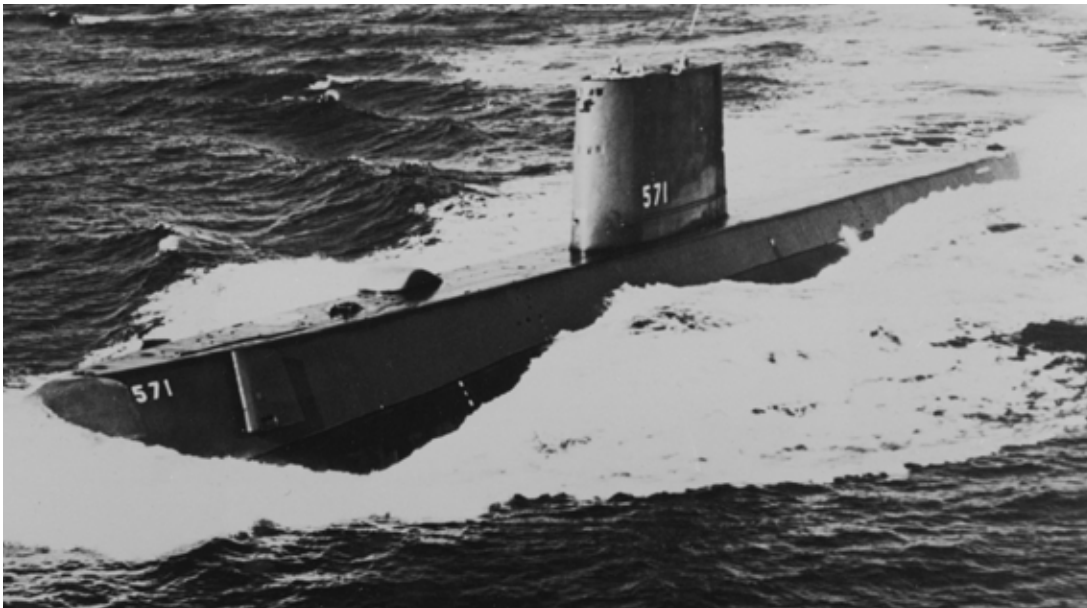
Andrew Marshall dedicated his life to the support of new voices, rigorous analysis, and the defense of the United States. His career spanned seven decades, including 25 years at the RAND Corporation before becoming Director of Net Assessment in the Office of the Secretary of Defense. Throughout his long career, Andy played a pivotal role in creating new ways to think about U.S. national security through collaboration with and mentorship of other strategists.

Andy worked at the RAND Corporation in the 1950s and 1960s. As an organization composed of some of the most influential advisors to senior U.S. administration officials, RAND developed and matured methods of analyzing the nature of the long-term competition between the United States and the Soviet Union. In the late 1960s, Henry Kissinger recruited Andy to apply these approaches in the National Security Council, where Andy worked for several years before becoming the first Director of Net Assessment, a post he held for the next 43 years.

During his time in government, Andy matured the practice of net assessment as it is often employed today. These assessments were rich and robust pictures of the state of the military competition between the United States and a competitor, including but not limited to trends and asymmetries, challenges the countries faced, and opportunities to improve the position of the United States in the competition. These assessments drew on diverse fields of study and areas of expertise.

Following the defeat of the Soviet Union in the Cold War, Andy directed his efforts toward the changing character of warfare, identifying the emerging revolution in military affairs at its inception, and recognizing the rise of China and the emergence of the Asia-Pacific region as the locus of future geostrategic competition. Throughout his tenure at Net Assessment, Andy sponsored databases, war games, and translations; funded the development of new analytic techniques; brought in views from orthogonal fields; and supported new voices in all areas of national security. The network of experts he had begun to develop at RAND blossomed into a vast community of analysts, military officers, and scholars at institutions across the country and in Europe and Asia.

Andy retired from government service in 2015 at the age of 94 and dedicated the remaining four years of his life to supporting all those who sought his counsel and writing his own short essays on the history and practice of defense analysis.



Submarines and Future War: A View from Outside the Force


(Based on the remarks of Andrew Marshall, Director of OSD Net Assessment, delivered at the National Security Industrial Association's 13 September 1995 Seminar on "Submarines in the Littoral".)

Thank you for inviting me to this discussion of future warfare and the role that submarines may come to play. What I would like to do is give you my view of the future security environment, the revolution in military affairs it suggests, the impact this will have on US forces and military operations and, finally, what all this may mean for the future roles of the submarine.

The Future Security Environment

The future security environment of the United States, looking two to three decades ahead, I believe will be shaped by three major trends. The first is the ongoing transition from the geopolitical structure that existed during most of the Cold War to a new structure of multiple powers of which the US will very likely be the strongest. This transition is driven by the Chapter 11 of the Soviet Union and by the sustained, rapid economic growth in Asia, which will lead to the rise of new major powers there. If we take a 25 - 30 year-perspective, it is quite possible that China may emerge with the largest GNP of any country (though its per capita income won't approach that of the United States or other major Western powers). There may well be six or eight significant powers in Asia, but the most important will be China. In any case, we will be dealing with a world where we cannot easily forecast the likely coalitions or the rivalries. When thinking about this future world, we need to use three or four alternative scenarios to suggest the wide range of possibilities.

The second major trend is the increasingly widespread proliferation and diffusion of advanced technology and weaponry, as well as technical skills, which could provide potential regional powers with much improved military capabilities. Potential adversaries may well be able to exploit available technologies in unforeseen ways that could change the nature of the power projection problem for the US and, in fact, for all of the larger powers.



The third major development, and the one I will concentrate on today, is the prospect of a “revolution in military affairs” or RMA that may occur over the next 20 - 30 years. This revolution is superimposed on the changed geostrategic environment and increased proliferation of a wide range of weaponry. The potential RMA remains a hypothesis or conjecture, but one that seems plausible given the rapid pace of technological change in a number of key areas.

The Potentially Emerging Revolution in Military Affairs

What is a Revolution in Military Affairs? There is often semantic confusion about what one means by a military “revolution”. Earlier terminology which referred to it as a “Military-Technical Revolution” or MTR put too much emphasis on technology. Technology makes a revolution possible, but the revolution itself takes place only when new concepts of operation develop and new military organizations emerge in order to take full advantage of the opportunities generated by the relevant technologies.

There is also a tendency today to talk about *the* military revolution. This might imply that it is already here — already completed. I do not believe this is the case. Rather, it seems to me that we are just entering a potentially revolutionary period. Thus, we cannot yet know the full nature of the changes in the character of future warfare.

So what are we really talking about? It might be better to think in terms of our moving into a special period, one during which a major transition or transitions between regimes of warfare will take place. If one looks at the whole sweep of military history, one can pick out such special periods in which new technologies led to major changes in the *character* of combat operations in various areas of warfare. By contrast, in other periods, technology as it changed was used essentially to do what one was already doing — carrying out the kind of operations already extant, only somewhat better.

By way of historical analogy, the years between the world wars may be one of the most interesting periods for us to reflect on today. The character of warfare in World War II was very different from that of World War I.

Technological developments brought changes in almost all existing areas of warfare and created others. Between 1918 and 1939, aircraft, tanks, and the exploitation of various other technologies such as radio and radar led to big changes in operational concepts. Well-known examples include development of armored warfare, carrier centered maritime warfare, amphibious operations and long-range aerial bombardment. New operational concepts were accompanied by the creation of new

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military organizations such as armored divisions, carrier task forces, and aviation units of various kinds, created to fully exploit the new technological opportunities. These examples may illustrate the scale of the changes that “revolutionary” implies.


What can we say about this potential RMA? Despite all the uncertainties, there are some changes in warfare that seem plausible. The first one is that long-range Precision Strike (PS), appropriately supported by Information Operations (IO), may become the dominant operational approach. This is not a new or original idea. The Soviets noted that the emergence of advanced non-nuclear technologies was engendering a new revolution in military affairs (their term) as far back as the early 1980s. Their writings emphasized the reconnaissance-strike-complex, the dominant role of long-range strike in many warfare areas, and information warfare as newly important or dominant areas of warfare. The Gulf War convinced them of the validity of their hypothesis.

To date, Soviet ideas have been elaborated mostly in connection with large continental air-land theaters, but it seems plausible that PS/IO operations play a very prominent role in future power projection, war at sea, and perhaps space operations. By reducing sensor-shooter strike timelines by orders of magnitude and increasing the range, target discrimination and lethality of weapons, such systems could conceivably provide conventional forces the ability to rapidly destroy an opponent’s critical military targets with little collateral damage. Some long-range precision strike proponents even believe these systems may enable the rapid destruction of an enemy’s operational and strategic centers of gravity and greatly shorten war timelines.

Such PS/IO capabilities might afford the US new approaches to power projection through the ability to destroy selected target sets, independently or in support of other missions, if we have such capabilities and a regional opponent does not. However, these will likely be *two-sided capabilities* due to the inevitable widespread proliferation of the enabling technologies. Indigenous production capacities may offer potential foes much larger missile inventories than we have hitherto encountered. So, even as PS/IO capabilities appear to offer US forces *new opportunities*, in the hands of adversaries, these systems could present significant new risks to US forces and our current modes of operation.

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The second broad change is the emergence of what might be called Information Warfare (IW). The information dimension or aspects of warfare may become increasingly central at all levels to the outcome of battles, campaigns, perhaps even the war itself. Therefore, the strategy and tactics of establishing information superiority over one’s adversary will become a major focus of the operational art. Clearly one wishes to be more effective, more skillful in information acquisition and processing, and in using that information to hit targets/functions and/or influence the intentions and actions of an opponent. An initial



advantage could result from investment in sensors and other information technologies and in superior training. However, in the early stages of a conflict, one would take measures to widen this advantage through the protection of one's own information systems while destroying, disrupting, manipulating, or corrupting the opponent's information gathering and processing. As in the last 60 - 70 years one wished to obtain air superiority in order to better conduct all other military operations, so in the future obtaining early superiority in the information area may become central to our forces' success in battle.

This full range of activities, which may become an integrated area of military strategy and operations, could be called information warfare. If this is what lies ahead, it will present us with very serious intellectual and analytical problems. We may find ourselves in the situation where the area that we are least able to analyze or to measure is becoming, perhaps, the most important, perhaps decisive area of conflict. That is not a situation we can allow to develop.

Now, if these ideas about the future security environment are in some sense correct, they raise some very important questions. What are the implications for DoD strategic planning? What impacts might there be on future US military forces and operations? Let me briefly suggest some possible answers.

Strategic Planning Issues

Whether you believe that a military revolution is underway or not, we are unquestionably in a dynamic period of geopolitical and technological change that has major implications for strategic planning. We clearly need to adapt our planning processes to an increased level of uncertainty. One of the most important things we should be doing is identifying the major strategic management issues facing the Department of Defense and developing longer term strategies for this situation. Setting longer term goals is very important.

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We may want to think in terms of two phases, the first of which is a period that is a continuation of the world we are living in. The main military problems involve power projection to deal with regional contingencies and peacemaking. Then there will be a second phase beginning with the emergence of a major competitor or perhaps a coalition that may seriously challenge us militarily as well as in other realms. In any case, there will come a period when our focus of attention shifts to relations with a set of major powers, some of which are newly powerful, many of which may rise in Asia. Delaying the onset of this phase and positioning ourselves to do well when the challenge does arise should be the focus of attention now and throughout the first phase.

As I noted before, we are certainly not alone in our speculations and discussions on the charac-

ter of future warfare. But there is notable uncertainty about who the major competitors will be and how the character of war will change. Paul Wolfowitz has observed that periods with a potential for major innovation in warfare provide ambitious powers an opportunity to greatly increase their relative military capability, if they get on the leading edge of the relevant technical and operational developments. The Germans would not have been able to reach the position they had in the early 1940's had they not


seized the opportunity for innovation presented in the 1920's and 30's. Japan's GNP in 1938 was approximately 10 percent of US GNP, but it entered World War II at the forefront of naval aviation and aircraft carrier development, and with a world-class navy.

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We need to closely monitor our potential competitors' military writing, organizational innovations, exercises, etc., and maintain an adequate margin of capability over regional powers (who will also have access to this technology and may also have some nuclear or biological weapons) and, in the long term, against potential major competitors. Initially our forces, in exploiting what technology will offer over the course of the next two or three decades, will (should) be directed to counter regional power, particularly as and if proliferation of NBC weapons takes place.

Another major issue concerns our allies. Our broad strategy will very likely emphasize coalition building in order to share the responsibility and cost of defending against aggressive activities of some of the major powers, or against more formidable regional powers. But European allies who are natural partners, like the French and the Germans, are only beginning to think about RMA implications. Moreover, they are encountering considerable economic difficulties and are now cutting their military budgets much more rapidly than we are. Japan, our most likely and important ally in the Far East, will also have its difficulties. Thus, allies may have fewer resources available for military budgets and less interest in military issues than was the case during the Cold War. On the technological and operational levels, if future military operations will be significantly different in character than today, this has major implications for how we will fight with allies as well.

Why do these things matter and why now? Principally for two reasons. First, being second best may lead to catastrophic loss in future wars. Since the only conclusive benchmark for determining the relative effectiveness of forces (success in combat) is unavailable during long periods of peace, there is great potential for asymmetries in combat effectiveness to develop between militaries, observable only when an appropriate real test occurs, i.e., a major engagement where at least one force has been sufficiently redesigned.



Secondly, as equipment life cycles, especially for platforms, steadily grow to encompass decades, many of the principal weapons systems of 2025 already exist or will likely be designed and built in the next few years. Since militaries can only slowly change their force structures, it is more crucial than ever to think now, in peacetime, about the impact of possibly revolutionary changes in the nature of war, and about what will matter in winning wars 20 - 30 years from now. Transitions between regimes of warfare take time, but the whole force does not have to change for the effect to be large. The history of the 1920's and '30's shows this. Panzer divisions were only about 15% of German forces in May 1940.

In any event, as I said, I believe we are only at the *beginning* of a potentially revolutionary period, whose character and outcome we cannot now fully foresee. Given both the geopolitical and technological trends I have described, the DoD planning context is necessarily very uncertain both with respect to future foes and the nature of future warfare. But since we face no large-scale immediate threat and are thus in a rather favorable strategic position, we have time to think things through. We can afford to focus more on the longer-term problems and objectives and pay more attention to the potential emergence of major competitors 20 - 30 years from now.

Impact on US Forces and Operations

Now let me discuss some possible impacts on US forces and military operations. The operational context in which we need to think about both PS/IO and IW continues to concern power projection over very long distances, but also — and to a greater degree than we have been used to thinking about — protection of the US homeland. How might these impact US forces and operations? I won't get any further into IW today, but here are a few propositions concerning future PS/IO operations which might be worth considering.

An effective and survivable *enemy* PS/IO capability may force major changes in the way the US conducts power projection and other traditional operations. A robust enemy capability threatens to make traditional forces and operations more vulnerable. Fixed sites like airbases, ports, depots, and amphibious operations areas like those used in Desert Storm could be accurately located and targeted. Relatively fixed or high signature targets like conventionally designed surface ships may be readily targetable if they approach too close to the theater (a range which technology may allow a future enemy to extend from hundreds to thousands of miles from his coastline).

If you grant these propositions, various consequences would probably follow. Credible, physical forward presence, crisis response and support of early entry forces would continue to be critical missions. At the same time, traditional forward presence forces would likely be more vulnerable in the early stages of hostilities, especially if the enemy attacks preemptively. But if the US is to continue to effectively pursue a strategy of forward engagement, it would still need to be able to keep forces forward even while the enemy PS/IO capability remains effective.

The enemy's ability to push US precision strike platforms farther from his territory or the theater has serious implications. Operationally, the vulnerability of fixed or high signature targets would seem to preclude supporting heavy ground forces or large numbers of in-theater aircraft, at least

while the enemy's PS/IO capability remains effective and able to impose a higher level of risk than the theater commander is willing to accept. Technologically, the demands on US precision strike systems in terms of required range (and thus missile size), smartness (and thus cost), etc., might be significantly higher than might otherwise be the case.

So how can we deal with the risks stemming from a potential opponent's PS/IO capabilities? We have several initiatives underway to try to counter an adversary's ability to effectively use such capabilities. These include active cruise and ballistic missile defenses, counterforce efforts aimed at finding and destroying mobile missile launchers, and command and control warfare initiatives which focus on denying him both critical sensor information and the ability to link that targeting information to his weapons. However, the ultimate success of these defensive and counterforce capabilities is uncertain. A continuing offense-defense, measure countermeasure competition is likely.


Our best hedge against this uncertainty may lie in our ability to effectively deny our enemy the capability to detect and target our forward forces. Thus, in addition to active defense measures, we may have to rely increasingly on platforms and operational concepts that emphasize stealth and mobility. Here the submarine offers advantages which may be increasingly important in future conflicts.

Future Role of the Submarine

One of the submarine's prime virtues is its innate stealthiness. It inherently possesses a quality which combatants of all kinds have sought since conflict began — the ability to approach and operate in the vicinity of an adversary undetected. Although advances in technology might rapidly change the face of modern warfare in many areas, one thing that probably will not be affected by any currently foreseeable technological breakthrough is this relatively low submarine vulnerability. Incremental improvements in detection and processing will likely be matched by quieting and operating advances that maintain the advantage such that nothing short of making the oceans transparent will significantly reduce the submarine's effectiveness across a broad spectrum of missions. Submarines are difficult and expensive to find and kill, even in littoral areas. In short, submarines offer a significant advantage in the "hider-finder" competition.

The submarine has proven compatible with a wide range of surveillance and strike systems. It is able to take these systems close to the enemy at much less risk than other platforms. Consequently, it can conduct forward surveillance and power projection missions at relatively low risk *while the enemy's PS/IO is substantially intact*. A crucial future mission may well be degrading the enemy PS/IO capability in order to enable the operations of follow-on forces. Submarines can approach within range of enemy systems. Submarine-launched precision weapons may offer relatively short time of flight for many strike missions. Given sufficient magazine capacity, they could conceivably be equipped to provide "call for fire" response and accuracy

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with tactical ballistic missiles and other weapons in support of early entry forces. (Concerns over the submarine's ability to carry sufficient missiles to make it a robust strike platform might be addressed by TRIDENT Ballistic Missile submarine conversion options that could place over one hundred missiles on one of the stealthiest platforms at sea.) In short, submarines appear to be significantly less at risk from enemy PS/IO capabilities while concomitantly serving as prime PS/IO (and anti-enemy PS/IO) platforms.

Other plausible forward missions in this regime might include theater missile defense (TMD), counter-C3I operations, offensive mining and mine countermeasures operations, launch and control of Unmanned Aerial Vehicles (UAV) or Unmanned Underwater Vehicles (UUV) to serve as "horizon extenders" for SIGINT collection, as well as the core missions of anti-submarine warfare and forward area surveillance and warning.

The submarine is a core competency of the United States. We have mastered the technology, operational concepts, expertise and organization. We are a world leader in this area and can remain so, leveraging this experience, if we so choose, to maintain our traditional competencies, but also perhaps creating new and potentially critical ones.

Key Issues

I have sketched out a picture of a regime towards which future warfare *may* evolve. But even if the broad direction is right, there are many important issues both for PS/IO and for the submarine force which need to be critically examined. I can only touch briefly on a few of them here, but these may be particularly important.

First, we need to better understand the risk side of this postulated PS/IO regime. We need to examine the full range of potential adversaries. We must analyze the extent to which they will be able to exploit PS/IO technologies. Can we influence their choices so as to lead to paths and outcomes favorable to ourselves? How viable are active missile defenses and counterforce capabilities against the emerging threat?

With regard to the submarine force, we must also address potential mission tradeoffs given the limited and declining numbers currently envisioned. The inherent flexibility and multi-mission capabilities afforded by submarines may quickly lead to competition for and/or overtasking of them by various commanders. Opponents may try to exacerbate the scarcity problem. For example, investments by an adversary in modern diesel submarines may force diversion of many submarines from other critical missions. Consequently, submarine force levels may become a major constraint in this postulated regime.

We must recognize that US PS/IO capabilities are crucially dependent on robust information connectivity and becoming more so. This means that maintaining information and space dominance will be critical especially for submarines which have limited organic sensors. Our communications architecture must have sufficient C3I capacity, flexibility and redundancy to support our PS/IO capabilities, including forward operating submarines.

But perhaps the most challenging and urgent PS/IO issue, particularly on the opportunity side, is intellectual. What is our concept of operations for our PS/IO capability? How do we best exploit the relevant technologies to maintain an advantage? Our concept of operations must be related to missions and tasks. What is the overall campaign context? This will determine the quantities of PS/IO weapons which are “meaningful”, which in turn will determine submarine and other platform weapons capacity requirements as well as overall force level and inventory needs.

If these notions about future warfare continue to look plausible or promising, there are the issues associated with how to operationalize them. Given that we face no immediate challenges, I believe that one of the most important near-term tasks is to undertake a more active search for insights about appropriate longer term changes in doctrine, concepts of operation, and organization needed to respond to the risks and exploit the opportunities I noted earlier. How might we do this? A variety of methods suggest themselves, including wargaming, operational analysis, exercises, and above all, testing and experimenting with novel and innovative ideas and concepts. The development of naval aviation in the 1920’s and ‘30’s provides a useful historical source of lessons and insights as to how to do this.

Conclusion

The most compelling lesson that comes from looking at the 1920’s and ‘30’s and the early years of World War II is that some military establishments do much better in developing the appropriate concepts of operation, making the organizational changes, and creating the doctrine and practices that fully exploit the available technologies. If no major wars occur along the way, each country has its own view of how best to make use of the available technology. Then war comes and it becomes clear that some countries’ militaries have done a much better job than others of thinking through the appropriate concepts of operation and have made the necessary organizational changes. They have a dramatic advantage until the other military establishments can emulate them or make adjustments. This may take several years because of the difficulty in changing existing standard operating practices and the competencies of large organizations.

The big implication I would draw from this is that the most important competition is not the technological one (although one would clearly want to have superior technology if it is available). Rather, the most important thing is to be the first, the best in the intellectual task of finding the most appropriate innovations in concepts of operation and making organizational changes to fully exploit the technologies already available and those that will be available in the course of the next decade or so.

By virtue of its mobility, flexibility and stealth, the submarine force will most certainly play a critical role in future warfare. It brings ever-increasing capabilities to a variety of missions, but even more importantly, it offers a major hedge against the present uncertainties about the future character of warfare. Should an adversary’s PS/IO capabilities render other forces unacceptably vulnerable, especially during the early phases of a conflict, its surveillance and strike capabilities may be critical in ensuring a favorable conflict outcome. Therefore, it is especially important that the members of the submarine force involve themselves deeply in thinking about the issues and implications of this potential RMA.

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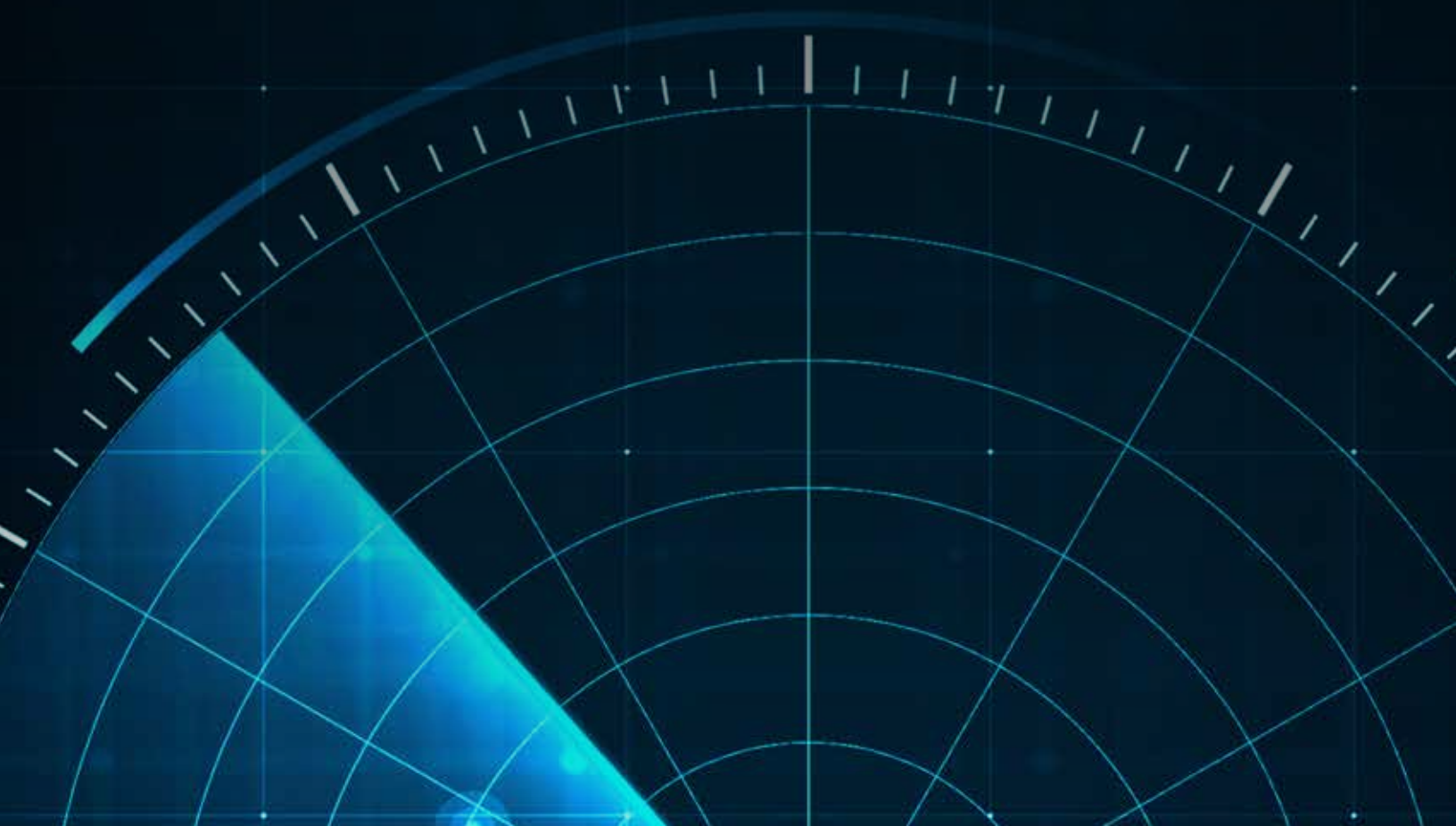
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