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NAVAL WAR COLLEGE  
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**DANCE WITH THE ONE THAT BROUGHT YOU: REVITALIZING ANTI-  
SUBMARINE WARFARE TO COUNTER CHINESE DIESEL SUBMARINES**

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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## Abstract

### DANCE WITH THE ONE THAT BROUGHT YOU: REVITALIZING ANTI-SUBMARINE WARFARE TO COUNTER CHINESE DIESEL SUBMARINES

Anti-Submarine Warfare (ASW) is a key tenet of U.S. force protection and cannot be neglected, especially in East Asia. The U.S. Navy needs to revitalize ASW, or risk losing the ability to gain sea control in strategic areas of the East Asian Littoral and South China Sea due to a rising Chinese diesel-electric submarine threat. The Peoples Liberation Army Navy (PLA Navy) is planning for a future showdown with the U.S. Navy and is heavily invested in countering aircraft carrier battle groups and derailing American power projection inside the first island chain.

The global economy has put harsher requirements on merchant ships than ever before. Any disruption in sea traffic would have dire consequences and access must be assured to global markets during regional conflicts. Many of the world's busiest sea-lanes pass through areas that the Chinese want to influence. An unchecked ASW threat in any of these areas would threaten the global economy as well as the synchronization of joint planning and the time phased force deployment plans in an East Asia contingency.

Finally, anti-submarine warfare is not just a Navy problem but also a joint problem. The current threat of Chinese submarines can be neutralized if operational commanders once again start conducting ASW on the operational level using appropriate joint assets in their theater of operations.

## Thesis

The end of the Cold War significantly reduced any challenge to the U.S. Navy on the world's oceans, especially by Soviet submarines. Accordingly, the U.S. Navy downsized in platforms and capabilities during the last ten years, focusing on missions other than anti-submarine warfare (ASW) while assuming unfettered access to the world's oceans and littorals. The lack of any credible blue water naval threat seemed to justify the reduction in U.S. Navy forces and concentration on missions other than ASW.

The naval "threat holiday" started in the early 1990's and continues to the present. The U.S. Navy has shrunk to 302 ships, 108 surface combatants, twelve aircraft carrier and amphibious ready groups, twelve patrol squadrons and fifty-five attack submarines.<sup>1</sup> Recent conflicts in Iraq, Afghanistan, Kosovo, Bosnia and Somalia have nudged the U.S. Navy away from the core competency of ASW and toward missions that project power over land.

However, if ASW is not revitalized soon, the U.S. will lose the ability to project power in strategic areas of the East Asian Littoral and South China Sea due to a rising Chinese diesel-electric submarine threat. To make matters worse, few in the U.S. National Security Establishment view Chinese military modernization as a potential menace.<sup>2</sup> If the U.S. Navy continues on its current trend, resources and training dedicated to ASW will be insufficient to counter a growing Chinese People's Liberation Army Navy (PLA Navy) threat. Projected U.S. losses due to hostile Chinese submarines could grow to a point of significance for operational commanders since ninety percent of the joint force material for sustained global operations will come by the sea.<sup>3</sup>

## **The Nature of the Problem**

The Secretary of Defense in January 2000 stated concerns about the importance of ASW; however, his proposed force cuts and naval missions for 2001 were counter to his ASW concerns.<sup>4</sup> By 2001, traditional ASW aircraft such as P-3s had decreased to fifty percent of their Cold War numbers and were focused on ISR and shooting SLAM-ER missiles overland in Kosovo and Afghanistan rather than practicing ASW.<sup>5</sup> Other aircraft like the S-3 are no longer funded or trained for acoustic ASW missions and are used mostly for aerial refueling. The SH-60 helicopter fleet has significantly shifted from its primary ASW mission to combat search and rescue and other non-ASW missions.

Surface platforms that are not as multi mission capable but excellent ASW platforms are being phased out. Five Spruance class destroyers are being accelerated for decommissioning, as are four T-AGOS ships.<sup>6</sup> Mission creep is challenging newer cruisers and destroyers. Surface combatants in the 21<sup>st</sup> century must perform several missions that compete for space on the ship, training time and money. Ships are forced to disperse from each other in order to carry out these diverse missions. The focus on other missions has been at the expense of effective ASW. Successful tracking and prosecution of a submarine generally requires a concentration of platforms, unity of effort and being close to the target submarine for success.<sup>7</sup>

U.S. submarines were not immune to the siren call of other missions. While an American nuclear powered attack submarine (SSN) is more than a match for any other submarine in the world, they are being culled into multiple missions that compete with ASW for training, space and funding. A recent Joint Chiefs of Staff study on submarine missions stated that due to emerging mission requirements for SSNs, 55-68 attack

submarines were needed by 2015 and 65-78 are needed by 2025; however, only one Virginia class submarine is being built per year, leaving a shortfall of thirty attack submarines within eighteen years.<sup>8</sup> RADM Konetzni, Commander, Submarine Forces, Pacific Fleet, voiced his frustration with the over scheduling of submarines in April 2000 by saying, "I have zero flexibility in scheduling because the SSNs are overtaxed."<sup>9</sup>

Focusing on non-ASW missions was the norm for the past ten years. Strike warfare has become an easy way to justify and acquire funds for upgrades and training. Compared to ASW, Strike warfare was media friendly and relevant to current conflicts. However, letting ASW atrophy could have dire results. The PLA Navy with only a small force of conventional submarines could impose severe casualties on U.S. forces, inflicting a price that may not be worth the stakes in an East Asian regional conflict. Finally, VADM H. C. Mustin and VADM D. J. Katz summed up the poor state of U.S. ASW competence as "the Navy's capabilities in littoral ASW have failed to keep pace with emerging threats."<sup>10</sup>

### **Why does this matter?**

Competently operated submarines and mines have been the most challenging threats to surface ships since World War I. In a world increasingly dependent upon sea borne goods to feed the global economy, the U.S. cannot afford to lose access to any of the mega-ports on the Pacific Rim. The People's Republic of China (PRC) has recognized the value of a submarine force and made no secret of their interest in East Asian hegemony.<sup>11</sup> With sovereign interests in Taiwan, the South China Sea and the East China Sea, the PLA Navy seeks to counter the influence of the United States with modern diesel-electric submarines and to force American leaders to gain PRC approval for access to East Asia.<sup>12</sup>

The People's Republic of China is uncompromising when it perceives an infringement upon claimed national territory. The Taiwan Straits could be the trigger that sets off a conflict with the PLA Navy. The show of force by two aircraft carrier battle groups during the Taiwan Straits Crisis in 1996 made an indelible imprint on senior Chinese leadership.<sup>13</sup> Predicting an inevitable conflict with the United States in the Taiwan Straits, the Chinese Navy is shaping their forces to asymmetrically counter U.S. forces.<sup>14</sup>

The Spratly Islands are another possible conflict area. They are simultaneously claimed by several Asian nations and are close to some of the busiest sea-lanes in the world. U.S. involvement in the Spratly Islands is plausible given the amount of money invested by large oil corporations and the enormous amount of merchant traffic steaming through these seas. Exxon, Mobil and Conoco have signed contracts with Vietnam, the Philippines and Indonesia as large as thirty five billion dollars to search for oil and natural gas near territories claimed by China.<sup>15</sup> The PLA Navy has increased area tensions for several years by exchanging fire and sinking ships encroaching upon their claimed territories in the South China Sea.<sup>16</sup> U.S. involvement with China over the Taiwan issue or the Spratly Islands could turn into a regional conflict that would require maritime dominance for an outcome that would be palatable to American interests.

### **Anti-Submarine Warfare Lessons From the Past**

As the Alliance of Great Britain and the United States learned in World War I, inadequate ASW can be very costly in blood and treasure. Initially, Allied ASW was poorly executed and disjointed. However, innovation and the fear of losing the war forced the Allies into conducting ASW on the operational level using multiple platforms to defeat the U-boats. Nonetheless, German U-boats were responsible for eighty five percent

of British ships sunk between November 1917 and October 1918, even though the Allies were able to counter most of the U-boats with new convoy tactics and mines.<sup>17</sup>

Nearly three decades later, the U.S. Navy used submarines to sink Imperial Japanese Navy ships and destroy their merchant fleet. A devastating anti-ship campaign versus Imperial Japan was conducted in World War II. Two percent of the U.S. Navy's force structure torpedoed sixty percent of Imperial Japanese shipping and sunk 670 Japanese ships by submarine laid mines.<sup>18</sup> A lesson learned by the Japanese in World War II is that an inadequate ASW capability leads to disastrous results.

Another important ASW lesson from World War II was the Battle of the Atlantic. It illustrated the value of directing efforts from the operational level and utilizing joint forces rather than strictly naval forces. Despite a slow start and resistance from the U.S. Navy, Royal Air Force and U.S. Army Air Forces were extensively used and proved effective in countering German U-boats. By May 1943, the ASW efforts directed by American and British operational commanders had turned the tide for the allies. I Bomber Command in Florida, in close cooperation with the Coast Guard, forced the U-boats out of American waters while Royal Air Force B-24s in Great Britain, Newfoundland and Iceland worked closely with American and Royal Navy destroyers in successfully protecting convoys and coordinated pursuit of Nazi U-boats.<sup>19</sup>

Although Great Britain prevailed against Argentina during the Falklands/Malvinas Islands conflict in 1982, they did not heed the ASW lessons from World War II. Two obsolete German Type 209 diesel submarines created tremendous anxiety for the Royal Navy. ASW dictated, as much as the air threat, the conduct of Royal Navy operations and caused the expenditure of almost all their ASW weapons on false contacts.<sup>20</sup>

It is readily apparent that a single submarine can wreak more damage in a political or military sense than can any other ship. Additionally, several nations have proven that a tiny portion of the population and national economy can support a small but potent submarine force.<sup>21</sup> As the Royal Navy relearned in 1982, even the mere threat of submarines requires a large reaction force to counter it, typically with little real time feedback on the effectiveness of ASW efforts.

### **Modern Diesel-Electric Submarines**

The proliferation of modern and ultra quiet diesel-electric submarines is a reality in the 21<sup>st</sup> century. Shipyards in Russia, Germany, France and Sweden sell very capable platforms with accurate weapons systems to nations all over the world. In fact, conventional diesel-electric submarine sales are predicted to double by the year 2010.<sup>22</sup> The Russians appear to be the most desperate to sell submarines to any nation with money, as there is an "export or die" imperative on Russian shipyards.<sup>23</sup> The Chinese have taken advantage of an upswing in their economy to buy Russian Kilo submarines, particularly the Kilo 636 class that the Russians have not exported in the past.

The most challenging aspect of modern diesel submarines is that they are quiet, especially when powered only by batteries. They also tend to operate in shallow water areas that have relatively noisy environmental conditions. Although most nations can afford only a few diesel submarines, it takes a disproportionate amount of ASW ships, aircraft and submarines to counter them. This will continue to be a problem for a smaller and lighter U.S. Navy that is increasingly shaped to perform missions other than ASW. The PLA Navy has taken note of this trend and intends to counter U.S. Navy carrier battle groups and amphibious ready groups with diesel-electric submarines.<sup>24</sup>

## **The PLA Navy, a Legitimate Threat?**

China's booming economy supports the purchase of the best available Russian submarines and weapons systems. Their seven percent annual growth in gross domestic product, record foreign investments of fifty three billion dollars and new membership in the World Trade Organization are speeding up economic reforms and investments.<sup>25</sup> Their economy is currently able to support their political goal of total control of the approaches and seas around Taiwan, the Spratly Islands and the South China Sea.

The twelve Russian Kilo submarines purchased by the PLA Navy are the cause for grave concern. Acquisitions of Russian submarines and weapons systems have allowed the Chinese military access to cutting edge submarine technologies. Although the first two Kilos that were delivered were the export version, the last two and the eight most recently purchased Kilos are of the previously unexported 636 class.<sup>26</sup> The PLA Navy has had difficulties operating the Kilo 877EKM submarine. Faulty maintenance of electronics, generators and engines has lead to problems. Battery malfunctions have sidelined two of the Kilos because the batteries had to be shipped back to Russia for repairs.<sup>27</sup> While these difficulties appear to diminish the threat of the PLA Navy submarine fleet, only the Kilo type 877EKM was having problems and not the Kilo type 636. To alleviate these problems, the Chinese have purchased only Kilo type 636 submarines since 1997.<sup>28</sup>

The Kilo 636 is significantly more advanced and quiet than other diesel submarines. It gives the PLA Navy the Klub anti-ship cruise missile, wake homing torpedoes and an excellent fire control system. The most disturbing aspect of the Kilo 636 is its stealth. According to the Office of Naval Intelligence, the Kilo 636 is as quiet as a U.S. Los

Angeles class submarine at low speeds.<sup>29</sup> Even a small number of these submarines dramatically improve the quality of the PLA Navy.

Not only is the quality of Chinese submarines is increasing, but so is the quality of manpower in the PLA Navy. Personnel training is being modeled on the West. Their officer accession is being restructured to resemble U.S. NROTC, cross training between submarine and surface communities is being instituted and they are creating a cadre of senior enlisted personnel rather than just relying upon conscripts that serve for two years.<sup>30</sup> Morale is a recognized problem and some ranks were given one to two hundred percent pay increases to help increase moral and build a senior enlisted cadre.<sup>31</sup>

Training and exercises are also more rigorous. Complexity and scope of fleet wide exercises are increasing, as well as realistic training for wartime logistics. Particularly interesting is PLA Navy efforts to resupply submarines from civilian ports assuming air strikes damaged PLA Navy port facilities.<sup>32</sup> The PLA Navy is also seeking an over the horizon capability by marrying Skymaster "search and rescue" radars to PLA Navy IL-76 aircraft, assessed to be operational by 2005.<sup>33</sup> While their training and exercises do not come close to that in the Western navies, it is important to note that a marginally competent Argentine submarine created havoc with the Royal Navy in 1982.

The Chinese and particularly the PLA Navy have reoriented strategically. The newest submarines are being shifted from the Koreas and Northeast Asia to Taiwan and the South China Sea.<sup>34</sup> The PLA Navy has stated that the U.S. Navy is their next probable adversary and the PRC will use submarines to force carrier battle groups out of the East Asian Littoral, with an emphasis on preemptive strikes.<sup>35</sup> They have dramatically increased their capabilities in hardware, training and personnel. The PLA Navy has

evolved into a significant threat to the U.S. due to their capable submarine force and their stated intentions widely reported in their media and military journals.

The U.S. Navy's recent exercises versus allied diesel submarines justify concerns about PLA Navy submarines because of declining American ASW capabilities. A report by the Congressional Research Service revealed how diesel submarines have penetrated Navy defenses and conducted simulated attacks on aircraft carriers and logistics ships for the past few years. U.S. Navy units could not find Chilean diesel submarines in a 1996 bilateral exercise, an undetected Russian Oscar SSGN trailed the USS CORONADO in 1997 for several days and several Australian submarines penetrated U.S. Navy ASW defenses during RIMPAC 2000. Additionally, the report outlined poor performance in undersea warfare exercises conducted off the coasts of Hawaii and Florida and the level to which ASW has atrophied in the U.S. Navy.<sup>36</sup>

### **Recommendations to Solve the ASW Problem**

One challenge for revitalizing ASW is changing the perception that the Navy is spending much more on ASW than the mission deserves; this view is coupled with an urgency to find a "silver bullet" for ASW that will perform the mission at a fraction of the cost.<sup>37</sup> To regain ASW competence, the Navy would be required to train against the new threat: competent diesel submarines in environments like the South China Sea and Taiwan Straits. The U.S. Navy conducts exercises with Chilean, Australian, Japanese and South Korean diesel boats; however, these exercises were very basic and focused on improving competence and capabilities in allied navies instead of the U.S. Navy.

Although multinational exercises like RIMPAC are huge morale and public affairs boosts for some allied navies, the Navy needs to mandate training that is more than

communications drills and maneuvers. This concern was echoed by an unfunded initiative forwarded by the fleet commanders to the Chief of Naval Operations to spend 2.6 million dollars to provide diesel submarine opposition forces for battle group exercises. However, no action has been taken to fund the initiative.<sup>38</sup>

There are promising technologies that need to be exploited to improve ASW capabilities. Low frequency active SONAR, new acoustic processors, networked distributed sensors and unmanned underwater vehicles will help offset ASW challenges.<sup>39</sup> Space based systems that can detect electromagnetic effects from space are also areas of technology that are promising. Current satellites are usually limited to capturing non-moving objects. They are ideal for finding submarines in port, but once submarines have sailed they are difficult to track from space. Phenomena such as surface waves, internal waves, bioluminescence, temperature or chemical wakes are areas that could make the oceans more transparent and reveal submarines.<sup>40</sup>

In the littoral, detailed understanding of the ocean environment is critical to finding submarines. The three of the four T-AGOS ships that are not being decommissioned are currently being used for counter drug operations, rather than detailing the ocean environments in the littorals.<sup>41</sup> Correct utilization of T-AGOS assets is critical to mastering the environmental conditions in the East Asian Littorals and effectively countering Chinese diesel submarines.

ADM Doran's recently expressed ASW concerns and subsequent requirement for all carrier battle groups to conduct an ASW exercise prior to deployment are a step in the right direction.<sup>42</sup> However, ASW should be rigorously trained, graded and accurately debriefed during all phases of the interdeployment training cycle and at all levels in the

operational command. Scheduling and exercising against challenging diesel opponents in waters that are similar to potential combat littorals will give American platforms the confidence and ability to conduct an effective ASW offensive.

Submarines are not the only platforms that can perform ASW. Since the Navy has drawn down to fifty-five attack submarines, other traditional ASW platforms like P-3s, SH-60s, destroyers and frigates must reallocate time and money to reestablish ASW excellence instead of focusing on Strike and other missions. Service parochialism must be set aside and utilization of all forward deployed assets in the Pacific must be considered to defeat the Chinese submarine threat. Of particular interest is the U.S. Air Force's doctrine to support countersea operations, including ASW.<sup>43</sup> While ASW is not listed as a primary mission, it is listed as a collateral mission to be accomplished under the direction of a maritime commander.

Air Force and Marine Corps squadrons do not specifically train or organize to operate as part of an ASW group; therefore it is incumbent upon the Navy to create and schedule training for countersea operations. Air Force squadrons in Kadena and Marine Corps squadrons deploying to Iwakuni could be trained in their ready rooms and in the air by naval officers with ASW experience. Getting all aircrews up to speed would not be difficult. Almost all diesel-electric submarines are uniquely vulnerable to visual and radar detection while on the surface. The visual signature of a submarine with masts above the surface is called a "feather" because of the wake left behind the mast. Feather recognition and training is not difficult and easily attainable for all aircrews in all services.

Additionally, the first major hurdles to achieving joint ASW efforts are to train non-ASW crews on what to look for and how to pass the location of the submarine to the ASW

commanders. This training could be initially given at the various weapons schools and also periodically reinforced in theater to all levels in the operational command.

A standing Destroyer Squadron Commander and Staff should be immediately established in the SEVENTH FLEET, on the same lines as DESTROYER SQUADRON 50 in the Arabian Gulf. A permanent staff that does not deploy out of East Asia focused on the Chinese submarine threat could fill the gap until the operational commander takes over the ASW mission. They could expeditiously set into motion unit level exercises against Japanese diesel submarines as well as schedule joint service ASW exercises for SEVENTH FLEET, quickly enabling Pacific Command forces the skill set to find and report diesel submarines to the appropriate commanders.

Finally, the time has come to create an ASW doctrine that bridges all communities and conducts ASW on a joint level. The U.S. Joint Forces Command as the military transformation catalyst, force provider and joint trainer is the logical choice to jump-start this challenge. Twenty-first century ASW must rise to the Combatant Commander level to become effective. As a result of Joint Forces Command training, the various combatant commanders could mandate theater specific ASW training for all units transiting through their areas of responsibility and not limit ASW training solely to traditional ASW units. Operational commanders could designate a joint force ASW commander to be on the same level as the JFACC and the JFMCC, instead of subordinating ASW to other tactical commanders and destroyer squadron commanders.

### **Counter Arguments**

*Chinese ASW is a long-range issue, not an immediate problem. Funding and training more extensively for ASW could derail naval modernization and transformation.*

*Additionally, U.S. advances in technology have helped level the playing field as new ASW sensors onboard platforms have ranges two to four times longer than Cold War systems.*<sup>44</sup>

The most significant threat to U.S. forces in the Pacific Command is not aircraft or cruise missiles, but Chinese Kilo submarines that will be assisted by fifty other submarines as well as naval air forces. While advances in technology have made the oceans a little more transparent, the U.S. Navy still needs more platforms to carry the new technologies and crews that are rigorously trained with the equipment and doctrine to defeat a diesel submarine threat. RADM Paul Sullivan has observed, "Sensors and networks may advance technology, but you still need ships and aircraft to carry them."<sup>45</sup>

ASW systems and technology do not necessarily translate into ASW capability. If platforms and crews do not practice with the systems currently onboard, new systems will not make much difference. If the U.S. Navy had to face a fully mobilized PLA Navy in the East Asian Littoral today, some American ships would likely be sunk due to the sheer number of Chinese submarines and diminished ASW abilities in the American Navy.<sup>46</sup>

*The U.S. Navy has also studied Kilo submarines for decades, with an improved understanding of their tactics, designs and limitations. Because of past problems, Kilos are currently limiting their depths to 164 feet. They are uniquely vulnerable to detection by air and surface platforms in the clear waters off Taiwan and the South China Seas.*<sup>47</sup>

The Chinese are aggressively seeking new diesel submarine technologies such as Air Independent Propulsion and improving their acoustic weapons solutions for torpedoes.<sup>48</sup> Being able to fire a torpedo at a target without relying on a periscope solution or having any part of the submarine above the surface would make Chinese submarines

much more difficult to detect and attack. Currently, the number of American ASW capable platforms continues to shrink, diminishing capabilities to find submarines. Meanwhile, the PLA Navy continues to find innovative solutions for its vulnerabilities and improve its capability to counter aircraft carrier battle groups.<sup>49</sup>

*Anti-Submarine Warfare is a Navy problem, not a joint problem.* ASW has become such an important warfare skill in the Pacific Command that the U.S. no longer has the luxury of just utilizing naval forces to combat Chinese submarines. ASW is a key component of force protection, not only for the U.S. Navy, but also for all the services since the bulk of their forces and logistics will come by ship for sustained global operations. Lack of access to key littoral regions would wreck the highly coordinated timelines for major regional conflicts. Unlocated submarines would dictate a huge increase in the scale and intensity of ASW operations, putting other considerations and plans on hold. It would also reduce the ability to conduct other missions. A delay of several days or weeks could dilute the effectiveness of a major regional conflict and completely wreck the time phased force deployment plan. During contingency and limited operations, the loss of even one ship due to a failure in ASW could endanger the political success of the operation.

## **Conclusion**

ASW is a key tenet of United States force protection and cannot be neglected, especially in the East Asian Littoral. The United States humbled the PLA Navy in 1996 by sending carrier battle groups to the Taiwan Straits; China has vowed not to be humbled again by American carrier battle groups.<sup>50</sup> The PLA Navy is planning for a

future showdown with the U.S. Navy and is heavily invested in derailing American power projection inside the first island chain.

The global economy has put harsher requirements on merchant ships than ever before. Any disruption in sea traffic would have dire consequences and access must be assured to global markets during regional conflicts. Many of the world's busiest sea-lanes pass through areas that the Chinese want to influence. The potential wealth in the South China Seas and billions of American dollars invested in energy exploration will almost guarantee American involvement.

An unchecked ASW threat in any of these areas would threaten the synchronization of joint planning and wreck the time phased force deployment plan in an East Asia contingency. A delay of days or weeks could reverse potential gains, reduce the joint force's ability to do other missions and does not support the current push toward rapid resolution of conflicts. The loss of preposition force shipping as well as U.S. Navy ships is a tremendous concern to the operational commander and a robust ASW capability is needed to ensure the operational commander will have all the assets for Asian conflicts.

Arguments have been made that the U.S. Navy currently can handle the Chinese submarine threat, but what about a few years from now? While U.S. ASW capabilities continue to shrink, the PLA Navy is making sweeping changes to improve their anti-access strategy in the East Asian sphere. Finally, anti-submarine warfare is not just a Navy problem but also a joint problem. The threat of PLA Navy submarines can only be solved if the operational commanders seize control of this challenge and utilize all services and platforms just like the United States and Great Britain did in World War II.

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