



EXECUTIVE POLICY BRIEF

**A Look Into China's Race to the Seabed: Understanding China's Future
in the Deep Sea and its Potential Threat to the Philippines**

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INTRODUCTION

In 2023, the Center for Strategic International Studies (CSIS) released its report on their wargame about China's invasion on Taiwan.¹ In the report, China faced naval losses from American submarines that are strategically placed in the Taiwan Strait. In order to overcome their strategic disadvantages, Beijing must overcome its constraints in undersea warfare to increase its chances for achieving its long-term plans for Taiwan. China has also explored different dimensions of warfare to gain a strategic advantage against its adversaries, whether it be Artificial Intelligence (AI), quantum technology, and robotics. Related to this is a featured article written by Guo Lasheng from the Chinese People's Liberation Army (PLA) Academy of Military Sciences in an official newspaper of the Chinese Military Network - PLA Daily highlighting the deep sea as the "new dimension for future military competition."² The article heavily discussed the operational and strategic uses of undersea capabilities, which utilizes many of the aforementioned emerging technologies, indicating China's fixed strategic outlook for the undersea. It would seem that China understands that it needs to form an advantage in multiple dimensions – in this case, the deep sea – to achieve its goals.

To achieve China's plans for the deep sea, China would require resources to fuel its research and commercial industries. While China's industries develop and diversify, there is only a matter of time before their appetite for materials necessary for high technology grows as well. Land-based mining industries may not be able to keep up with the demand. One of the opportunities for this is the rare earth elements (REE) found on the seabed. With China treating their illegal maritime claims

as sovereign territory, their interest in the seabed is an opportunity for them to grow their economic and industrial needs. Fortunately, some of the REEs, such as Yttrium (Y) and Neodymium (Nd), are used for radar and sonar technology necessary for deep sea exploration.³ This may help meet the growing needs of materials by key global industries. In contrast, China's growing interest in the seabed may also pose as a potential threat. Considering China's interest in the seabed, there might be a possibility to accelerate their capabilities for Anti-Submarine Warfare (ASW), and seabed warfare through civilian technology with apparent military applications. This is in line with China's strategy in utilizing civilian industries to contribute to their military's development through dual-use technologies. This strategy has many terms, such as "military and civilian dual use," "military-civilian integration (MCI)," "nestling the military within the civilian," or the better known "Military-Civilian Fusion (MCF)."⁴ First introduced by the late President of the People's Republic of China (PRC) Hu Jintao, the MCF strategy served as a way to utilize civilian capabilities for military potential.⁵ The said strategy in detail also enables China's military to propel its development by eliminating the barriers between "civilian research and commercial sectors, and the military and defense industrial sectors," as stated by the US Department of State's MCF Briefer.⁶ Knowing the long-term plans of China in replacing the current international order, there is a risk that China will direct its industries to drive technological advancement for their national interests and goals. Hence, possessing technological capabilities relevant to the deep sea may enable China to have a greater chance to accomplish their geopolitical ambitions if they eliminate the

current technological barriers to master the deep sea.

By further studying what China has been doing to achieve its goals for the deep sea, the Philippines then can take opportunities to increase its chances in mitigating issues that may threaten its national security. With this in mind, this paper aims to contribute to the discourses surrounding the underexplored deep sea and its potential technological impact to seabed warfare capabilities. China's current race to exploit the underexplored seabed can potentially grow its own civilian industries, but the same technology developed may be utilized for military applications. In order to stay ahead of this potential threat, it is worth examining China's prospects for the deep sea and seabed mining. As such, this Executive Policy Brief aims to answer the following questions:

1. What is the deep sea, and why is China invested in it?
2. What are the known indicators of China's growing intent to capacitate itself for the deep sea?
3. How can China's deep sea capabilities forward their geopolitical goals in the region? Furthermore, how will China's deep sea capabilities impact the Philippines?

MAJOR CASE ISSUES

THE DEEP SEA AND ITS OPPORTUNITIES

Found at depths of more than 200 meters (or as high as two Statue of Liberties),⁷ the deep sea presents opportunities for growing nations seeking to expand their resources. Diving deep towards the seabed, there are resources that are critical for countries seeking to produce and develop demanding technologies.

REEs are often found at the seabed, but mostly concentrated at the seabed of the Pacific Ocean between Mexico and Hawaii in an area called, the Clarion-Clipperton Zone (CCZ), where the 3,000 to 5,000 meter seabed⁸ is littered with polymetallic nodules that contain a wide range of REEs essential for defense industries, key technological industries, and even the emerging electric vehicle industry.⁹

While seabed mining is not a mature commercial industry, there are corporations already seeking to exploit the deep sea's resources to reach demands for the aforementioned technologies. The seabed and its resources outside national jurisdiction is regulated and controlled by the International Seabed Authority (ISA), an international organization established in 1994 by implementing the United Nations Convention on the Laws of the Sea (UNCLOS).¹⁰ States that are party to UNCLOS are considered as members of the organization. The ISA has already granted 30 exploration contracts to multiple companies and governments with China's State-owned Enterprises (SOE) possessing 5 of 30 contracts to date.¹¹ From the amount of contracts that China has, it is worth deducing that they are capitalizing on the new gold rush and have been trying to develop technological capabilities required for it. It is evident from China's actions that they want to control this opportunity away from their competitors. Most of the world is dependent on China for refined REEs, and that in itself is a strategic issue for the United States. This strategic issue has been made evident when China limited exports by requiring permits to reportedly "protect national security."¹² Another similar issue happened in 2010 when a maritime incident happened between Japan and China in the contested East China Sea. A captain of the Chinese fishing

boat was arrested by Japanese authorities after it rammed a vessel from the Japanese Coast Guard resulting in China's restriction of REEs to Japan for two months citing "environmental issues."¹³ The incidents made it clear that China has the potential to disrupt REE supply chains through political and economic tools.

Fortunately for China's industries, REEs contain certain elements required to produce batteries that can also be utilized by China's military. As a result, China's enterprises, private sector, and military recognizes that there is a window of opportunity that will benefit China's development through their intent to exploit the deep sea's resources, specifically by utilizing their Military-Civilian Fusion (MCF) strategy.

MILITARY-CIVILIAN FUSION STRATEGY

The MCF Strategy is central to China's development. It was first introduced by the late Hu Jintao under his term from 2002 to 2012.¹⁴ It was then elevated into a national strategy by President Xi Jinping in 2015 to deeply integrate military and civilian development.¹⁵ In essence, this move places China's economic issues alongside the need for defense modernization in both priorities, because China endeavors to fast-tracking its development in realizing their goals of "building a strong military in the new era," as a way of "catching up" with the West's already-established industries.¹⁶

On the surface, China's MCF may look like the USA's civil-military integration (CMI) with the public and private sectors cooperating in research and development. America's CMI started off by publishing their military research after the second World War.¹⁷ US military technology trickled down to civilian industries, which in turn helped develop their defense

industries.¹⁸ Unlike America's CMI, the strategy of China is directed by the state itself to maximize technological growth, which complements China's strategic goals, having the military prioritized first, then civilian as second.¹⁹ The most notable feature of China's MCF would be how private sector companies receive direct funding coming straight from the state to develop technologies with potential military applications.²⁰ Thus, assessing the MCF strategy better will further clarify how China's strategic goals manifests in their industries.

It is well understood that China aims to challenge the current international rules-based order. To be more specific, one part of China's goals is to be at the forefront of emerging technologies to gain international advantage with hopes of surpassing Western technologies.²¹ At a glance, China's pursuit of technological advancement can be interpreted as a developing country trying to catch up with the world, but China has indicated with its MCF strategy that it aims to have a deeper free flow of information between its military and civilian industries. In reality, however, the deep integration that President Xi Jinping aims for is still lacking. In 2019, MCF Chinese researchers²² have illustrated the working relationship between the military and civilian institutions (see **Figure 1**). While it is not yet deeply integrated, there are still major interactions between Civilian Institutes of Higher Educations (IHE) and Research Institutions, State-owned Defense Conglomerates with their research institutions, and Military Research Institutions.

To fulfill the vision of President Xi Jinping for a deeper MCF, Chinese analysts²³ have illustrated a system that reflects President Xi's vision while effectively operationalizing

each sector in China (see **Figure 2**). The ideal system allows the free flow of information, technology, capital, and talent in between the military and civilian sectors to effectively modernize China's military. Thus, the whole concept of the MCF strategy in itself has been widely viewed as a national security issue, most especially from the USA. Former Secretary of State Michael Pompeo²⁴ regarded China's MCF strategy as a threat to global security due to its specific aims. A briefer made by the US Department of State even described how MCF develops and acquires key technologies by directing academic and research collaboration for military gain, forcing technology transfer, and intellectual property theft.²⁵ Indeed, the US' mistrust with China is sound and reasonable, as official Chinese policies and plans reflect with their strategic intentions more specifically, China's 13th Five-Year Plan, 14th Five-Year Plan, and China's Science and Technology Innovation 2030 Megaproject.

CHINA'S INTENT FOR THE DEEP SEA

"Five-Year Plans" are key policy documents released by the Chinese Communist Party (CCP) that serve as a guide for China to prioritize in the next five years.²⁶ Then, the approved Five-Year Plan will be utilized for other, more specific plans to be implemented by other government bodies. The next administrative step for this is to draft the specific plans that include several project proposals with detailed targets in order to meet the initial guidance from the CCP. By inferring from the Five-Year Plans in the last two cycles, China's intent for the deep sea can be explored and defined.

From the 13th (2016-2020) and 14th (2021-2025) Five-Year Plans, the two documents have both mentioned the deep

sea. For the 13th Five-Year Plan of China, the deep sea was mentioned as part of their thrusts in science and technology.²⁷ The document indicated that China aims to lead the development of "major key technologies" that will enable them to protect their own "maritime sovereignty rights and interests." With China's current foreign policy on the South China Sea, it is clear that China will make use of its MCF strategy to fast-track the development of key emerging technologies to advance its maritime interests. The document further detailed the specifics of deep sea technology that China aims to develop: their deep sea cargo operations, deep sea oil and gas exploration, and seabed mining and exploration. China's intent for the deep sea indicates what possible capabilities that they are putting focus on. One that we are already familiar with is China's seabed mining and exploration while we have yet to see China's other projects. Fortunately, the more detailed and specific Five-Year Plan, called the "13th Five-Year for Science & Technology Innovation Plan," provides us with China's major project proposals to achieve their technological goals. This plan proposed sixteen projects dubbed as the "Science & Technology Innovation Plan 2030" (S&T Innovation Plan 2030).²⁸

The S&T Innovation Plan 2030 has specified a project proposal to implement the needed thrust for deep sea operations. This project was called the Deep Sea Space Station project, which was conceptualized as a station that can enable China to conduct deep sea exploration and operations, and research on deep sea technologies. Further, the S&T Innovation Plan 2030 mentions how they propose to explore mobile and fixed deep sea space stations, which may serve as a litmus test for China's deep sea capabilities. China's civilian research is already heavily linked to

augmenting its military research. Despite the lack of a military application to their Deep Sea Space Station project, there are still opportunities that China may have already considered, such as surveillance systems, undersea robotics, or even long-term deep sea missions that can transform their advantage in future warfare. The most important detail in this document lies in their proposed research on deep sea technology, as they have specifically mentioned that they aim to research on both general and “special-purpose” technologies. As we refer to the MCF Strategy, this proposed deep sea space station suggests that the research will have military applications for the deep sea.

From the 14th Five-Year Plan, there was only a brief mention of the deep sea where the document described how they will carry out strategic national projects. This means that any intent towards the deep sea in the 14th Five-Year Plan will only continue the currently existing S&T Innovation Plan 2030. However, the 14th Five-Year Plan provided more policy guidance on what China aims to do with its military, and science and technology within the five-year period. Its science and technology goals, however, were detailed more in its “Vision 2035” plan found in the same document. Implementing China’s research and development (R&D) programs and projects was heavily emphasized in its Vision 2035 Plan.²⁹ China asserted that they will aim for increasing funding for R&D, provide tax advantages for enterprises to conduct research, and tap the private sector to direct funds to stimulate more research. China also determined that they will give more access to their research platforms, S&T reports, and research data. There is a lot to dissect from this, but the most important thing to note is China’s aim to increase interaction with its private sector and other enterprises. As seen from the previously mentioned illustration on the interaction between public-private sectors

by Chinese MCF researchers (refer to **Figure 1.**), there is little interaction spent with the private sector. Also, China’s decision to provide more access to their data cuts time spent on research from the private sector and their enterprises. Now that there is clear indication that China is working on implementing an ideal MCF Strategy, the opportunities to boost their R&D budget into emerging technologies will increase their potential as the leading developers of such technologies. President Xi Jinping emphasized this goal by urging the delegates of a plenary meeting during the first session of the 14th National People’s Congress (NPC) to strengthen capabilities in emerging technologies in order for them to gain an advantage in national development and international competitions.³⁰ In this case, developing deep sea capabilities needed to achieve advantage over their competitors.

DEVELOPING CHINA’S DEEP SEA CAPABILITIES

As noted by China’s strategic intent, they develop capabilities suited to what their nation needs whether it be science and technology, economic, or military. Before China aimed for their current plans for the deep sea, they had already skimmed over the deep sea for long-term opportunities. Their manned submersible, *Jiaolong*, was designed in 2002 purely by Chinese engineers and technicians to conduct deep sea exploration operations.³¹ While the *Jiaolong* is not entirely China’s display of deep sea technology, it can be hypothesized that China has established the basic technology for exploring the deep sea, and that they have already initiated technological transfers for military applications through MCF. Further, it is certain that they will use *Jiaolong*’s operational experience along with what they have learned from developing *Jiaolong* to augment the PLA Navy (PLAN) with their best practices in designing deep

sea technology. Of course, the necessary resources required by deep sea technology are not cheap. With this in mind, China ensures to continue their deep sea's technological advancement by controlling necessary economic resources that will also augment their R&D.

To facilitate such demands for economic resources, China continues to hold on to their illegal maritime claims in the South China Sea (SCS). Much of China's rationale for this is to ensure that their access to maritime resources shall fuel their economic and scientific needs as well as protecting their own sea lines of communications (SLOCs) from their potential adversaries. With China's wide maritime claims, the PLAN is currently not capable of conducting multiple sea operations at the same time because of its limited credible deterrence at sea. The PLAN currently possesses a total of six Type 094 *Jin*-class nuclear-powered ballistic missile submarines (SSBN), with two Type 094A modified variants that are more silent than their initial models.³² Unfortunately, other conventional diesel-electric models, which make up the rest of China's submarine fleet, do not have the same level of credible deterrence at sea with their nuclear-powered counterparts. China is also aware of the US' seapower projection and its potential capabilities, which prompted them to build a so-called, "Underwater Great Wall" on the seabed of the SCS composed of surveillance systems for civilian and military applications.³³ Somewhere in the South China Sea, the network of seabed acoustic sensors is comparable to the US' Sound Surveillance System (SOSUS) during the Cold War era. China's network of sensors also possess deep sea unmanned submersibles and autonomous underwater vehicles (AUV) that will respond to undersea adversaries either automatically

or launched from a mothership.³⁴ Some of these AUVs pose a danger to underwater adversaries, as some of them can be equipped with sensors and weapons.³⁵ Of course, this poses another strategic issue for the US fleet, as China's enterprises and universities have already facilitated around 159 undersea vehicle research projects.³⁶ Putting China's MCF strategy into picture, their combined industrial strength alongside with its S&T research, China has the potential to fast-track the development of their deep sea capabilities.

Indeed, China has developed multiple technologies aimed towards the deep sea. As China continuously experiments with submarine technology, they also made sure to augment the gaps left by their still-developing nuclear-powered submarine technologies through seabed sensors, AUVs, and possibly more advanced robotics in the future. The US Navy's SSN fleet, currently numbered at sixty-seven (67), outnumbers China's SSN fleet.³⁷ However, China's industrial proficiency, along with its developing MCF integration with multiple sectors, has the potential to catch up with the US Navy's SSN fleet. While China has not yet developed an SSN fleet equal to that of the United States, there is a reasonable hypothesis to believe that China will utilize its resources to develop undersea capabilities to counter the US Navy's SSN fleet. With China's strategic intent towards the deep sea, China may employ the use of advanced robotics equipped with sensors and weapons like that of their current AUVs. Likewise, having China's SOEs access to the seabed for REEs, China's industries recognize that there is a need to develop or refine their deep sea technologies, which will also benefit their militaries.

DEEP SEA THREATS FOR THE PHILIPPINES

The deep sea is indeed a new field to study due to its multiple opportunities for the development of multiple industries dedicated to warfare and science altogether. From seabed mining to automated drone technology, China is grounded on utilizing its resources to find new ways of defending and forwarding its interests. Thus, as one of China's targets for their aggressive goals in the South China Sea, the Philippines may face new threats displayed by China's strong intent for the deep sea. With this in mind, it is advisable that the Philippines must stay aware of emerging technologies in order to keep an advantage against China.

One of the major potential threats surrounding China's deep sea capabilities is its industrial capability to develop low-cost yet effective AUVs. Once China achieves its deep sea goals and projects for S&T, their industries then will have the potential to mass produce deep sea capabilities, such as weapon or sensor-equipped AUVs,³⁸ which may even become fully operational and compatible with their Underwater Great Wall of sensors in the SCS. To note, China's network of sensors will be crucial against undersea targets. This was demonstrated in the recent wargame conducted by CSIS where Japan's undersea network was effective against Chinese submarines.³⁹ In this case, the transformative nature of deep sea operations essentially strengthens China's claim to the SCS. As a result, China's technological advantage may amplify their aggressive tactics, especially when they have technology that can counter the capabilities of the United States. With this potential threat in mind, the US and their submarine-capable allies, specifically Japan, South Korea, Australia, will have difficulty responding to a possible

Taiwan invasion. Considering that China has established their hold in their claimed waters, it is sure that the *first island chain* will be what comes to mind if China seeks to capitalize its technological advantage against its adversaries.⁴⁰ The *first island chain* encompasses the East China Sea (ECS) and the SCS. If China secures the two bodies of water, then they can prevent further reinforcements from the US coming in from the Pacific Ocean. Further potential threats in the aforementioned seas for the US and their allies have been released, as Chinese researchers have written about how pre-positioned undersea platforms can strategically deter interference from the US and their allies in a regional conflict. A project team from Chinese Academy of Sciences' Shenyang Institute of Automation published a journal announcing the *Abyss*, a prototype undersea system that can deploy an AUV to conduct ISR operations.⁴¹ The lead scientist mentioned that it will eventually be developed further into a more sophisticated and powerful system for military application. Thus, undersea systems like the *Abyss* have the potential to transform deep sea warfare, and will likely transform how the US perceive China as a threat in the deep sea as well.

Currently, the Armed Forces of the Philippines (AFP) is still modernizing its assets. Latest ASW capabilities were the Agusta Westland AW159⁴² Wildcat Helicopter that can deploy sonobuoys to track submarines in the ocean. The two helicopters are carried by their respective *Jose Rizal*-class frigates,⁴³ which also possess ASW capabilities of sonar and radar for undersea adversaries. However, current ASW capabilities of the Philippines are not fitted entirely for its new reconfigured strategy. As stated by current Chief of Staff of the AFP General Romeo Brawner Jr., the AFP is shifting its strategy

to include the Exclusive Economic Zone (EEZ) and the Philippine-held islands in its defense. General Brawner added that this new defense strategy is comparable to the United States' "forward defense" strategy.⁴⁴ In contrast to this, China's goals for asserting their presence affirms that they will continue with their illegal claims in the SCS. Some of the claims unfortunately include the West Philippine Sea (WPS) that blocks the Philippines' economic potential growth and development, especially the oil deposits in the Spratlys Islands.⁴⁵ Economic implications from China's assertiveness indeed affects the Philippines' potential natural gas, mineral and oil exploration in its own EEZ. Capturing our potential resources found in the seabed may help advance our industries, and may even provide opportunities for our own defense industries. Nevertheless, the additional economic impact on the country necessitates proper capability buildup to advance the Philippines' "forward defense strategy." Without proper capabilities that can be on par with China's fast-growing technologies, the Philippines will have to rely on strategic deterrence to impede any sign of Chinese aggression in the SCS. These can be done through naval patrols augmented with ASW capabilities to ensure that the Philippines has sea control in the WPS. However, gaining advantage will be difficult without the US and their allies, an unfortunate reality that China hopes to achieve. Once the US and their allies are out of the region, then the threat of China's reunification plan puts the Philippines, along with its neighbors, closer to China. To prevent such scenarios, the Philippines must continuously study China's potential deep sea capabilities, and explore other ASW capabilities to gain an advantage over a fast technologically developing China.

POLICY RECOMMENDATIONS

The Horizon 3 of the AFP Modernization Program is set from 2023-2028, thus any acquisitions made may be deemed operational at a further date. On the same note, the projected development of China's fast emerging technologies may soon catch up with its S&T goals and may soon integrate military applications to forward its national interest in the region. With this, the Philippines should consider capabilities that are easily integrated for ASW-specific operations. Short-term considerations for ASW capabilities should also augment the Philippine Navy to complement the future Horizon 3 projects in the long term. For the Philippines, the Philippine Navy may consider capabilities that can be utilized in identifying undersea threats. The aforementioned emerging technologies from China have yet to operate in their respective missions, and will certainly pose a threat to the region once fully utilized by the PLAN. With this in mind, the Philippines will have an edge if it explores more on deep sea capabilities while continuing its modernization of assets by procuring ASW capabilities.

Invest in more ASW capabilities to augment Philippine deterrence for China's deep sea capabilities

Currently, the Philippine Navy is planning to acquire more ASW assets in line with its modernization program. More specifically, two additional AW159 helicopters to augment the upcoming missile corvettes from South Korea.⁴⁶ The missile corvettes are equipped with ASW capabilities that will serve as strategic deterrence against undersea threats in the WPS.⁴⁷ It is ideal for the Philippine Navy to have the aforementioned corvettes carrying AW159 helicopters to complement the ASW capabilities in naval patrols and even ASW

joint exercises with strategic partners and allies. Further, the integration program for the AW159 will be more efficient for the Philippine Navy, and will enhance commonality and interoperability for future operations.

With this in mind, the DND should consider the acquisition of AW159 to fully equip the upcoming corvettes from South Korea.

Explore AUVs for potential maritime surveillance against undersea threats

Drone technology should be considered by the DND because they are uncrewed/unmanned while also equally capable of being equipped with a range of mission-specific capabilities. In terms of defense research, the DND may further explore drone technology for future augmentations to the current ASW capabilities of the Philippines. If appropriate, the DND then can explore how AUVs can be configured and integrated to the Philippine Navy for specific operations.

The AFP is already familiar with this type of technology, as the US provided *ScanEagle* unmanned aerial vehicles (UAV) with ISR capabilities to the Philippine Air Force.⁴⁸ While the AFP's modernization program is yet to be fulfilled, perhaps the possibility of acquiring AUVs can be considered in the future. The US-made AUVs of *TeleDyne Brown Engineering* can be explored for this, since their *Slocum* AUV gliders can be configured for different mission-specific operations.⁴⁹ The wide array of sensor configurations complement the Philippine Navy's current ASW capabilities as it can be dropped from helicopters.⁵⁰ With this, the *Slocum* gliders can augment our ASW exercises along with our AW159 helicopters and *Jose Rizal*-class frigates.

The aforementioned AUV technology provides cost-effective alternatives for the Philippine Navy, especially as the

Philippines endeavors to complete its modernization program. Thus, this technology is worth exploring for future modernization projects

Explore the R&D potential of the Philippines by utilizing Public-Private Partnerships (PPP)

Indeed, purchasing defense capabilities abroad will strengthen credible defense. The aforementioned AUVs developed by the US are plausible procurements for deep-sea operations. However, there are also R&D opportunities for the Philippines to stimulate its technological progress and scientific advancements for defense needs. While we cannot achieve the same level of deep integration of MCF, the Philippines can still make use of its existing mechanisms and platforms to stimulate domestic industries. However, like the MCF, there is much to gain from tapping the civilian institutes and industries if we are to explore the field of robotics and AI for military applications. Exploring domestic industries will be advantageous not only for defense capability build-up but also for the economy. By referring to the Philippine Development Plan 2023-2028, the current priorities on developing defense industries of the Philippines show that there are R&D opportunities for the Philippines to build its defense science and technology industries.⁵¹ However, the existing constraints, one of which is the supply chain issue, for developing its defense industries must be kept in mind if the Philippines attempts to pursue a future on domestic technological progress and scientific advancement.⁵²

Considering the existing constraints and possibilities, there are still opportunities for the DND to explore and revisit, such as their partnership with the Department of Science and Technology (DOST). Relevant R&D milestones like the Project BUHAWI (or Building a Universal Mount for

Heavy-Barrel Automated Weapon Integration) showed the R&D potential from inter-agency collaboration.⁵³ If the private sector were given the same opportunities, perhaps the Philippines can cultivate its scientific needs for its future defense needs relevant to the deep sea.

Ensure the acquisition of diesel-electric submarines

Whether nuclear or diesel-electric, submarines are still at the apex of undersea warfare due to the deterrence they provide. The previously discussed Chinese deep sea technologies can be countered with a properly configured ASW force in the West Philippine Sea. However, according to the AFP, the acquisition of the two diesel-electric submarines are expected to be set in the Horizon 3 Modernization program.⁵⁴ Acquiring such capabilities will greatly increase the country's sea control owing to the submarine's stealth capabilities. In any case, it will still take some time before the Philippines can fully utilize its submarines. The Philippine Navy would have to train its personnel to have an operational fleet, and China may use the opportunity before their regional adversaries become fully capacitated for their aggressive maritime campaign.

Therefore, the Philippines must ensure the acquisition of diesel-electric submarines for the Philippine Navy. The earlier they are acquired, the better chances we have in

establishing deterrence against China's aggressive actions in the West Philippine Sea.

CONCLUSION

China is set on its goals for the deep sea, which clearly manifests in their intentions the way how China provides national guidelines for its relevant industries and research institutes. By projecting the trends of their scientific developments, it is expected for China's deep sea technology to gain progress relevant to their national interests. Their recent interest in deep sea mining indicates how China may be developing technologies utilized by the rare earth elements they find in the deep sea. As such, through their civilian industries and institutions, China has the capacity to direct its attention towards emerging technologies that will also benefit their military capabilities.

Mindful of China's potential capabilities, the Philippines then faces possible deep sea threats from China. With this, the Philippines is urged to consider short-term and long-term acquisition of anti-submarine warfare capabilities that will strategically deter potential threats to the country.

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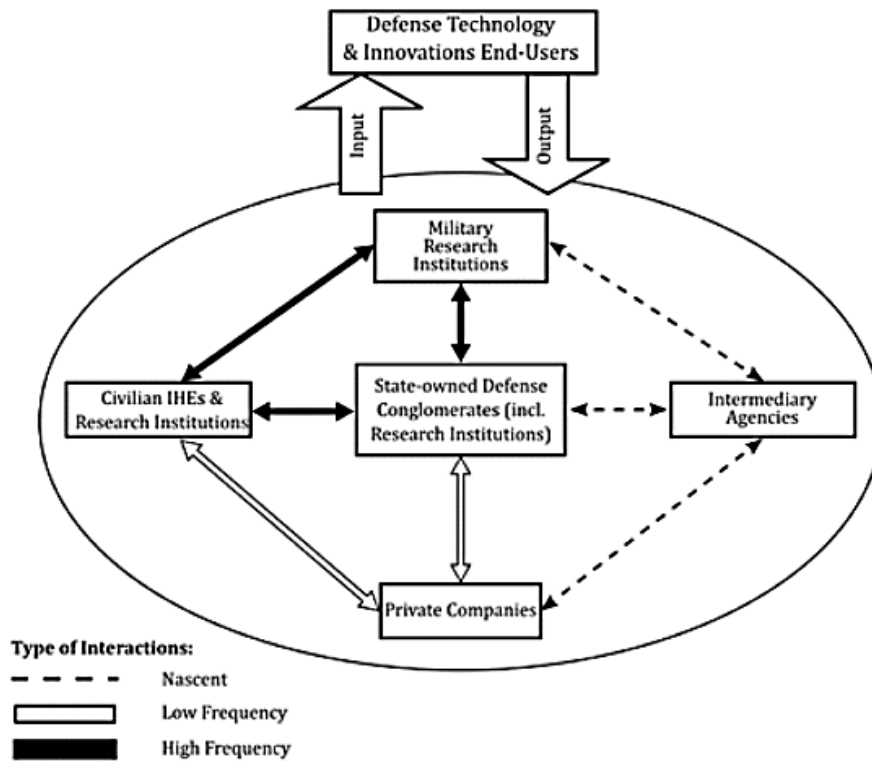


Figure 1

Illustration of the Current Innovation Base
Source: Hongliang 2019¹

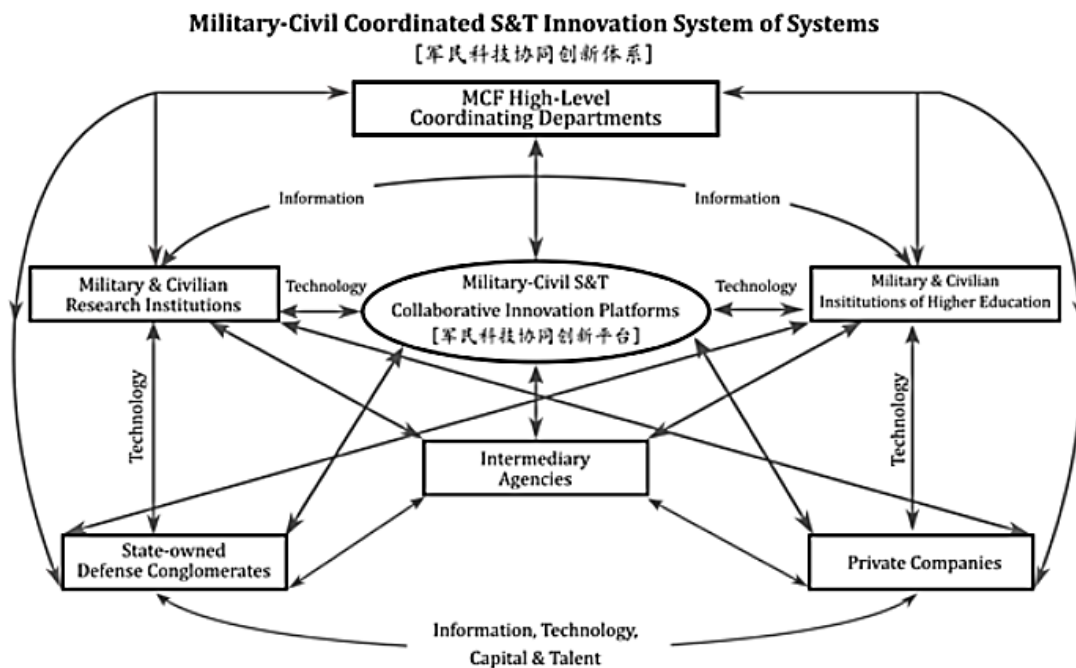


Figure 2

Illustration of the Ideal Innovation Base
Source: Li 2016²

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