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China's Navy Embraces Technology: Western Science, Chinese Culture?

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Summary

China's naval abilities are improving dramatically in the twenty-first century. Beijing's most significant national security challenges all have a maritime focus, including Taiwan, disputes with Japan in the East China Sea, and disputes in the South China Sea. Aspiration does not equal capability, however, and the issues China's navy is focused on are the motivation for, and are enabled by, technology. How effective has Beijing been in developing—either indigenously or by reverse engineering—the technology necessary for an effective navy in 2012?

The People's Liberation Army Navy (PLAN) launched a significant modernization program in the mid-1990s, spurred by the Taiwan Strait Crisis of 1995–1996 and a host of other strategic factors. This naval modernization program has increasingly drawn on state-of-the-art naval technology to improve its capabilities as an instrument of national security statecraft.

Computers, unmanned vehicles, robotics, and advanced electronics continue to have significant impact on the conduct of operations at sea. Recent dramatic advances in naval technology focus on space as a new theater of operations. China is fully aware of, and striving to take advantage of, these technological advances as it deploys a twenty-first century navy. For example, PLAN Commander Admiral Wu Shengli demanded in December 2008 that task groups deploying to the Gulf of Aden on counter-piracy operations must be given full access to satellite communications resources.

CHINA'S SHIPBUILDING INDUSTRY AND THE PLAN

This demand reflects the PLAN's full realization of the crucial importance of space-based assets in providing a naval commander with several possible advantages. First, and most basic, is command and control, or C2, which is the core decision-making process that directs the employment of a force at sea.

China possesses the capability to produce the hulls and propulsion systems of modern warships, a basic requirement for building an effective navy. The PLAN relies heavily on China's civilian shipbuilding industry, which is certainly understandable given the nation's ranking as the world's number one shipbuilder.

China's shipbuilding industry is improving in technology as well as in capacity (see Policy Brief 6). Modular hull construction, computer-aided design, and better production equipment are all being utilized. However, systems integration remains a weak area, as do propulsion design and manufacture.

Another weakness in the shipbuilding industry is the limited ability to manufacture many of the vital systems and sub-systems that allow a ship to operate at maximum effectiveness. A survey of new PLAN combatants reveals a pattern of propulsion, command and control, sensors, and weapons components either purchased or reverse-engineered from foreign sources.

The requirement second only to ship building capability is a Chinese military-industrial complex able to produce increasingly complex sensor and weapons systems. Beijing's program of naval modernization during the past two decades has been steady but moderate, except for submarines. China has led the world in submarine construction since 2000. No naval platform is more dependent on technology and on personnel capable of maintaining and operating that technology.

GULF OF ADEN DEPLOYMENTS

Current counter-piracy operations are carried out with a task group composed of three of the PLAN's newest ships: a Luyang II-class (Type 052C) destroyer, a Jiangkai II-class frigate (Type 054A), and a Fuchi-class replenishment at sea (RAS) support ship, AORH-887. PLAN ships in the Gulf of Aden draw on far more advanced technology than did their predecessors in the Chinese Navy. Its newest ships depend on state-of-the-art technology. Significantly improved mission capabilities include anti-air warfare, surface warfare, and operations across the electro-magnetic spectrum, addressed as electronic warfare and information warfare.

Each counter-piracy task group relies on information warfare to cover the crucial interstices among the standard naval warfare domains. PLAN operations in the Gulf of Aden take full advantage of the electromagnetic environment.

NAVAL MODERNIZATION: TECHNOLOGICAL AND OTHER DIMENSIONS

China's naval modernization programs have focused on hardware, such as new platforms, missiles, and sensors, but also reflect maturing doctrinal procedures. However, no matter how advanced and refined the technology, including the inculca-

tion of intelligent design into shipboard sensor and weapons systems, the human element still plays a vital role in command and control. China recognizes the challenge of training and then retaining intellectually capable personnel to operate and, more importantly, maintain complex systems.

The PLAN is in the midst of remarkable technological advances. The new cyber and space domains have dramatically expanded avenues of maritime conflict. The PLAN's campaign to seize and utilize the newest technology in its platforms and systems is directed by China's civilian leadership and endorsed by its uniformed commanders.

Technologically advancing naval warfare is a multifaceted challenge. Technology's role in transforming naval warfare is huge, but must be accompanied by doctrinal change and personnel preparations. It is often difficult to determine which new technology will work, and new technology rarely is definitive. Seasoning at sea in most cases is required for a technological advance to become mature and effective.

While China recognizes that technological advances are performed by individuals, supporting educational institutions are crucial to the effective maritime employment of state-of-the-art technology. New technology requires extensive development before it is ready to go to sea. Systems including or based completely on new technology must be compatible with older systems already installed in a ship. However, as China continues to demonstrate, foreign systems can successfully be integrated with indigenously produced designs and equipment.

As demonstrated by China, innovation cannot be overly centralized. This dispersed research and development process may be facilitated by modern computational power and collaborative organizations. Linking all these facets of technological innovation is the availability and exchange of information, processes complicated by the need to maintain security.

CONCLUSION

The Chinese navy is riding a technological revolution, especially in the cyber and space domains. Beijing is clearly attempting to harness both civilian and military research and development sectors to bring the latest advances to its forces at sea. These advances will go a long way to defining the employment, operation, and use of naval power in this century.

Bernard D. COLE, Ph.D., served thirty years in the navy before joining the faculty of the National War College in Washington, D.C., where his research focuses on Chinese military and Asian security issues.