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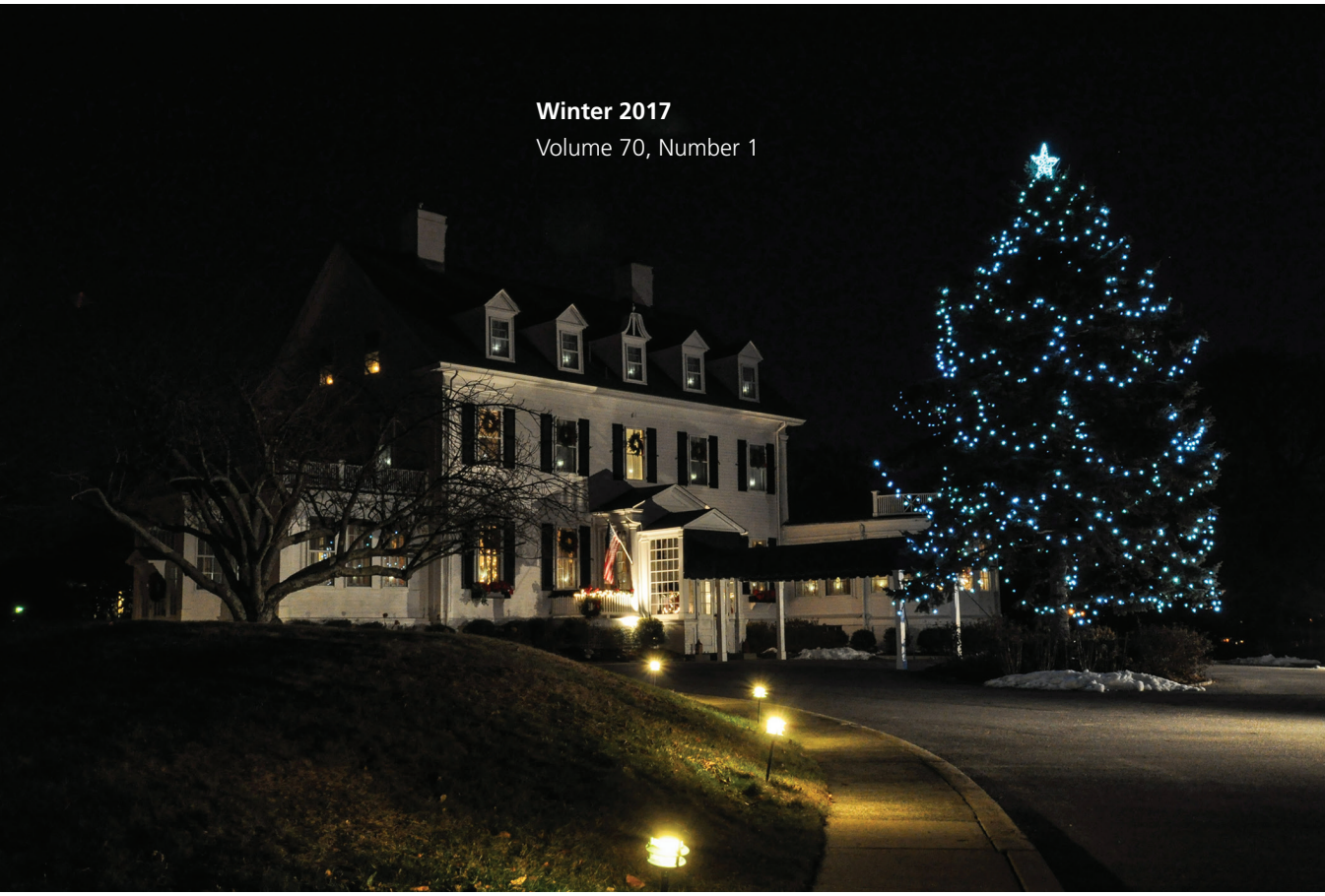
Cover

Caption: U.S. Coast Guard Cutter Kiska (WPB 1336) in waters off Hawaii. In March 2002, Coast Guard officers from Kiska and FBI agents took PRC national Shi Lei off the Seychelles-registered, Taiwan-owned fishing vessel Full Means II in international waters and arrested him for murder. Shi was tried, convicted, and sentenced to prison in the United States. This remains the only instance of U.S. assertion of jurisdiction and prosecution under the implementing legislation for the 1988 SUA Convention, subsequently updated. In "Effective Implementation of the 2005 Convention on the Suppression of Unlawful Acts against the Safety of Maritime Navigation," James Kraska explains that many states have not acceded to the 2005 treaty, and most of those that have done so have not taken the steps required to implement it effectively, even though the need to do so is perhaps even greater today. USCG photo by CPO Sara Mooers.

NAVAL WAR COLLEGE REVIEW



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FROM THE EDITORS

It is well to be reminded that the global maritime domain is a vast, largely ungoverned realm where good order particularly requires effective international coordination under well-understood legal regimes. In "Effective Implementation of the 2005 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation," James Kraska uses the opportunity of the tenth anniversary of the signing of the SUA Convention (as it is generally called) to review the status of this important international agreement, which was designed to combat both maritime terrorism and transnational criminal activity. He concludes that the international community has been remiss in developing appropriate procedures to implement the agreement, and suggests a way forward for remedying this (surprising and dismaying) state of affairs. James Kraska is Howard S. Levie Professor in the Stockton Center for the Study of International Law at the Naval War College. Rick Button, in "International Law and Search and Rescue," provides a comparable overview of the current status of international maritime law relating to search and rescue of vessels and persons in distress. Here again, considerable progress has been made in codifying the legal parameters and best practices that apply in this area, but much additional work remains to be done, particularly in clarifying the very difficult issues involving the handling of large numbers of seaborne migrants and refugees in the Mediterranean and elsewhere. Rick Button is a senior official in U.S. Coast Guard Headquarters in Washington, DC.

As John Hanley reminds us, war gaming has been a hallmark of the Naval War College since the late nineteenth century, and played a particularly important role during the interwar years in preparing senior officers of the U.S. Navy to prosecute the Pacific War to its successful conclusion. In "Changing DoD's Analysis Paradigm: The Science of War Gaming and Combat/Campaign Simulation," Hanley provides an authoritative account of the evolution of military operations analysis in the American defense community over the last half-century. He argues that recent advances in chaos and complexity theory call for a rethinking of the now-dominant "analysis paradigm" that relies on large-scale computer modeling, in favor of a return to a more traditional approach to operations research and gaming. John Hanley is a former U.S. naval officer who has served

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in a number of capacities in the U.S. government, most recently as director for strategy in the Office of the Director of National Intelligence.

In "A Himalayan Challenge: India's Conventional Deterrent and the Role of Special Operations Forces along the Sino-Indian Border," Iskander Rehman offers an authoritative and timely account of the Indian government's growing appreciation of the potential importance of special operations forces (SOFs) in strengthening the deterrent value of its regular armed forces in the face of the continuing modernization and expansion of the Chinese military presence along the two countries' vast and inhospitable shared frontier. The situation on the China-India border has been overshadowed completely in recent years by China's aggressive actions in the South and East China Seas, but it is well to remember that this land border never has been demarcated to the satisfaction of the parties (and indeed occasioned a short war between them in 1962); and China's so-far-successful recourse to so-called gray-zone tactics on its maritime frontier may embolden it under certain circumstances to undertake a similar campaign in the Himalayas. As Rehman also notes, India's very recent use of SOFs in surgical cross-border operations against Pakistan in Kashmir seems to reflect a significant reevaluation of the utility of such forces in the (historically very conventionally minded) Indian military. Iskander Rehman is a senior fellow at the Pell Center for International Relations and Public Policy at Salve Regina University.

Finally, Shang-su Wu, in "The Development of Vietnam's Sea-Denial Strategy," provides important insight into the reaction of another neighbor to China's rise as a major regional military power. Vietnam, like India, has been the victim of a Chinese border incursion in the not-very-distant past, and also has clashed with China in a shooting incident in the South China Sea (see Toshi Yoshihara, "The 1974 Paracels Sea Battle: A Campaign Appraisal," in our Spring 2016 issue). The author concludes that the Vietnamese have made intelligent use of their limited resources to build a maritime force that poses a credible sea-denial threat to the People's Republic, should current frictions in that area escalate again to open military operations. Shang-su Wu is a research fellow at the S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore.

IF YOU VISIT US

Our editorial offices are now located in Sims Hall, in the Naval War College Coasters Harbor Island complex, on the third floor, west wing (rooms W334, 335, 309). For building-security reasons, it would be necessary to meet you at the main entrance and escort you to our suite—give us a call ahead of time (401-841-2236).

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Robert Ayer, Managing Editor

Rear Admiral Jeff Harley is the fifty-sixth President of the U.S. Naval War College. He attended the University of Minnesota, graduating with a bachelor of arts in political science, and received master of arts degrees from the Naval War College and the Fletcher School of Law and Diplomacy, Tufts University. Additionally, he served as a military fellow at the Council on Foreign Relations in New York and is a member of the council.

Admiral Harley is a career surface warfare officer whose sea-duty assignments have included command of USS Milius *(DDG 69), Destroyer Squadron 9, and Amphibious Force Seventh Fleet. Additionally, he has served as Director, White House Situation Room; Vice Director, Strategy, Plans, and Policy (J5) at U.S. Central Command; President, Board of Inspection and Survey; and, most recently, Assistant Deputy Chief of Naval Operations for Operations, Plans, and Strategy.*

PRESIDENT'S FORUM

Meeting Operational Needs

IN MY FORUM in the Autumn 2016 issue of the *Review* I highlighted a three-pronged agenda for the coming years, designed to focus our collective efforts to operationalize, navalize, and futurize the College's endeavors. In the paragraphs that follow, I'd like to address several initiatives that are helping us to be of more value to the operating forces.

The Naval War College (NWC) plays a key role in helping our military and civilian leaders make informed decisions about issues of global importance. Since good decisions must be based on accurate knowledge and reasonable assumptions, we have expanded and reenergized the important work of our highly regarded China Maritime Studies Institute, and launched a new academic and research center with a focus on Russia's ongoing advances in its maritime forces.

In the late summer of 2015, as civil war raged in Syria and President Bashar al-Assad's government crumbled, Russian military forces began arriving in the region in an effort to stabilize the regime and roll back the opposition. Among the combat platforms sent to Syria were warships from Russia's Black Sea Fleet, which took up station in the eastern Mediterranean Sea and have remained there since. That October, Russian Buyan-M missile corvettes from the Caspian Flotilla fired advanced Kalibr cruise missiles to strike targets in Syria from over nine hundred miles away. Since then, Russian navy vessels have been key enablers of Russia's intervention in the Syrian civil war. These are dramatic advances for a navy that, fifteen years earlier, could muster barely a week of at-sea duty time for its individual surface ships.

The Syria deployment is emblematic of Russia's return to the sea. The last decade has seen Russia surmount many of its post–Cold War challenges and reassert itself in regions it considers strategically vital, including the Black Sea,

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the Baltic Sea, the eastern Mediterranean, and the Arctic. To better understand and evaluate the implications of Russia's return to the sea, NWC established the Russia Maritime Studies Institute (RMSI) in August 2016.

RMSI's mission is to conduct research into a range of Russian maritime issues. These include Russian naval developments, but RMSI's analytical scope also encompasses shipbuilding, maritime law, energy issues, and technological development, among other topics. It is a truly collaborative enterprise, drawing on expertise from across the College to execute a research agenda that is responsive to the needs of our Navy.

RMSI's faculty members have been very busy in the institute's short existence. In addition to initiating a handful of research projects, they have traveled to U.S. Naval Forces Europe and Sixth Fleet headquarters, where they met with fleet leadership, supported staff planning efforts, and provided a series of educational briefings to the staff. RMSI faculty also traveled to the headquarters of the U.S. Pacific Fleet, where they provided leadership with an overview of Russian maritime issues and consulted with planners.

There is still much to be done as RMSI gets its sea legs. In the next year, there will be staff to hire, research to complete, and relationships to build. While the institute's operating bandwidth is currently limited, my intention is to grow RMSI into a world-class research institute that puts the best traditions of scholarly research at the service of the Navy.

As another way we can deliver value to the fleet, we are taking steps to ensure that we are providing the best possible gaming and analysis support to our operating forces. In his "Design for Maintaining Maritime Superiority," the Chief of Naval Operations (CNO) charged the Navy with testing and refining naval power concepts "through focused wargaming, modeling, and simulations" that will connect directly to fleet exercises and training. Implicit in this charge is the challenge that operations research and analysis across the Navy enterprise must be conducted in a cohesive or holistic manner that is sufficient for USN leadership to make fully informed decisions. To that end, the College is committed to increasing the connections among experimentation, campaign analysis, and war gaming.

In November 2016, we hosted a Navy Operations Research and Analysis Workshop in Newport as a forum for leaders from across the Navy enterprise to share existing gaming, experimentation, and analytical processes so as to identify beneficial connections and opportunities to provide better analytical products for Navy decision makers. Representatives from OPNAV N3/5, N81, U.S. Fleet Forces Command, the Naval Postgraduate School, the Navy Warfare Development Command, and the Naval War College participated in the two-day event. Attendees presented their current processes for conducting, integrating, and

disseminating research results. This was followed by a structured discussion to capture the key elements, both formal and informal, that connect those processes and results across the spectrum of Navy operations and research. We expect that the postworkshop report will be a comprehensive integration map that includes recommendations for ways in which the Navy enterprise can be linked more effectively to provide innovative support for the CNO's goal of strengthening naval power at and from the sea. We anticipate that this event will be just the first step in helping all our institutions and organizations keep connected, with the result being increased impact from research, gaming, and experimentation that will keep our maritime forces ahead of the curve.

The Naval War College remains committed to aggressively delivering products and concepts that will help ensure the nation's continued maritime superiority. Watch this space for future updates!

JEFFREY A. HARLEY
Rear Admiral, U.S. Navy
President, U.S. Naval War College

James Kraska is Howard S. Levie Professor in the Stockton Center for the Study of International Law at the Naval War College in Newport, Rhode Island. He is also a distinguished fellow at the Law of the Sea Institute, University of California, Berkeley, School of Law, and senior fellow at the Center for Oceans Law and Policy at the University of Virginia School of Law. He is a lifetime member of the Council on Foreign Relations and a senior fellow at the Foreign Policy Research Institute. He is the author or editor of seven books, including Maritime Power and the Law of the Sea: Expeditionary Operations in World Politics *(Oxford, 2011).*

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EFFECTIVE IMPLEMENTATION OF THE 2005 CONVENTION FOR THE SUPPRESSION OF UNLAWFUL ACTS AGAINST THE SAFETY OF MARITIME NAVIGATION

James Kraska

In 2005, the 167 member states of the International Maritime Organization (IMO) adopted the 2005 Protocol to the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA). The resulting 2005 SUA Convention is a comprehensive treaty on maritime security that streamlines and integrates efforts to prevent and disrupt maritime terrorism. In the decade since its adoption, however, many states have not acceded to the new treaty, and most of those that have done so have not taken the steps the treaty requires to implement it effectively, even though the need to do so is perhaps even greater today. This article provides a road map for implementation of the 2005 SUA Convention to realize the vision for an effective global regime to combat maritime terrorism.

After the attacks of September 11, 2001, the fear was palpable that there would be follow-on catastrophic attacks in the maritime domain. Suddenly states worried about the global marine transportation system, especially its vulnerability to terrorism. Ships could be used to smuggle weapons of mass destruction or persons, conduct attacks on port infrastructure or bridges to paralyze commerce, or attack oil and liquefied natural gas tankers to attempt to produce large secondary explosions. The most recent manifestation of this heightened risk is from the Islamic State, which has examined the feasibility of mass-casualty attacks against cruise ships.[1]

In response, the member states and secretariat of the IMO developed a slate of initiatives to counter these threats, including amendments to the International

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Convention for the Safety of Life at Sea (SOLAS) that emerged as the 2002 International Ship and Port Facility Security (ISPS) Code.[2] The ISPS Code attempted to develop a culture of threat-based security throughout the maritime cargo supply chain on which the global economy depends.[3]

The ISPS Code is a government-industry partnership designed to make the commercial shipping industry a less attractive, or at least a more difficult, target for maritime crime. The code entered into force in 2004. Simultaneously, states took action to facilitate prevention or disruption of terrorist attacks against ships and fixed platforms on the continental shelf. In November 2001, the IMO Assembly adopted Resolution A.924(22) as a response to UN Security Council Resolution 1373 (2001), which decided that states shall take the necessary steps to prevent the commission of terrorist acts.[4]

Resolution A.924(22) called for a review of maritime security architecture and prevention of maritime terrorism.[5] The resolution requested that the IMO Legal Committee undertake a study to determine appropriate updates to the IMO Circular on Passenger Ferry Security as well as the SUA and its Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf.[6] Thereafter, the Security Council adopted Resolution 1540 (2004), which recognized the urgent need to take more effective measures to prevent the proliferation of nuclear, chemical, and biological weapons and their means of delivery.[7]

The IMO study mandated by A.924(22) unfolded over six sessions plus several intersessional meetings from 2002 to 2005, and culminated in two draft protocols that were adopted at a diplomatic conference at IMO in October 2005. The 2005 Protocol built a comprehensive regime for counterterrorism at sea and maritime security, and the new instrument that includes the 1988 Convention as amended by the 2005 Protocol is referred to as the 2005 SUA Convention.

The 2005 SUA Convention entered into force in 2010. Now that more than ten years have passed since its adoption and more than five years since its entry into force, it may be beneficial to assess how far we have come and, more importantly, to consider how emerging threats stack up against the existing regimes. In particular, implementation of the 2005 SUA Convention has been lackadaisical, and it is unclear how well the treaty will contend with current trends and emerging threats, which include unmanned systems, lasers, and maritime cyber attacks. The remainder of this article assesses these issues and provides a way forward for states.

This article first looks at how threats from unmanned aerial, surface, and subsurface systems fall within the scope of the 2005 SUA Convention. The convention was crafted with the realization that the shipping industry would be

confronted with a proliferation of unmanned systems and a profusion of commercial, off-the-shelf technologies that could be used to endanger vessels and life at sea.

Second, the convention covers dual-use materials: those that may have civilian or commercial applications, but also may be misdirected for unlawful purposes.

Third, the convention covers asymmetric criminal activities, such as seizure of a ship by force or the use or attempted use of ships as weapons. States party to the convention will have to examine and adjust their national laws to ensure they are committed to criminal prosecution of these almost unique offenses.

Fourth, the convention requires states party to designate a "competent authority" to receive and respond to requests for decisions or assistance from other states. So far, however, most states party have not done so—leaving a gaping hole in implementation. There already exists a similar contact list for senior officials who coordinate law-enforcement counterdrug operations. This article concludes that states party to the 2005 SUA Convention should develop and publish a similar list that will facilitate implementation of their treaty obligations.

UNMANNED SYSTEMS—ARTICLE 1(1)

It has become commonplace for civil aircraft to encounter unmanned drones, especially near airports. We may expect that the regularity of drone flights and the controversy over issues of safety, privacy, and security will expand from airspace to the water. The barrier to entry for making unmanned systems has fallen, and terrorist groups and criminal organizations can develop and employ unmanned systems using commercial, off-the-shelf components.[8] Underwater and surface vehicles provide ample standoff distance from the target, may be used to sequence attacks over time, and can be operated in swarms to overwhelm ship defenses.[9]

One of the most interesting features of the 2005 Protocol is that article 1(1) of the SUA, as revised, defines a *ship* as "a vessel of any type whatsoever not permanently attached to the sea-bed." The definition includes "dynamically supported craft, submersibles, or any other floating craft." This definition appears to include an unmanned underwater vehicle (UUV) or unmanned surface vehicle (USV) under "a vessel of any type whatsoever." Similarly, the U.S. Rules of Construction Act, which dates to 1873, defines a "vessel" as any "description of water-craft or other artificial contrivance used, or capable of being used, as a means of transportation on the water."[10] In the case of *Charles Barnes Co. v. One Dredge Boat,* the U.S. federal court for the Eastern District of Kentucky held that a vessel is defined as a "navigable structure, capable of being used for transportation, regardless of intent or actual use."[11] Thus, the use of either a UUV or a USV in the commission of an offense, as well as acts committed against them, would be covered under

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the 2005 SUA Convention. In this respect, the 2005 SUA Convention is well positioned to address threats to or posed by unmanned vessels.

DUAL-USE ITEMS AND MATERIALS—ARTICLE 3*BIS*

The structure of the 2005 SUA Convention criminalizes acts that by their nature or purpose are conducted to intimidate a population or to compel a government or an international organization with high explosives or biological, chemical, or nuclear devices; the discharge of natural gas or other hazardous substances; or the use of a ship in a manner that causes death or serious injury or damage. The legal standard for "serious injury or damage" includes not only serious bodily injury or death but "extensive destruction" of a public place that results in "major economic loss," and "substantial damage to the environment."[12]

[I]mplementation of the 2005 SUA Convention has been lackadaisical, and it is unclear how well the treaty will contend with . . . unmanned systems, lasers, and maritime cyber attacks.

The 2005 SUA Protocol is unique among counterterrorism conventions in that it covers the misuse of dual-use materials—the transport on board a ship of legitimate items, products, and materials intended to cause or in a threat to cause death, serious injury, or damage.[13] The proscription includes explosive and radioactive materials and equipment designed to process special fissionable material, when intended for use in a nuclear explosive activity that is not part of an International Atomic Energy Agency (IAEA) comprehensive safeguards agreement. Finally, the 2005 Protocol covers "any equipment, materials or software or related technology that significantly contributes to the design, manufacture or delivery of a BCN [biological, chemical, and nuclear] weapon, with the intention that it will be used for such purpose."[14] This provision is exceptional because it provides a means to criminalize civilian, commercial, off-the-shelf and dual-use items on the basis of their intended use and purpose.

As noted, BCN weapons are those that include biological, chemical, or nuclear devices. *Biological weapons* are "microbial or other biological agents, or toxins." *Chemical weapons* are "toxic chemicals and their precursors," excluding those intended for "(A) industrial, agricultural, research, medical, pharmaceutical or other peaceful purposes; (B) or protective purposes, namely those purposes directly related to protection against toxic chemicals and to protection against chemical weapons." Law-enforcement chemicals, such as riot-control agents, and those used for military purposes are not included within the definition of chemical weapons.[15]

The treaty is integrated with other international security regimes in several ways. First, the list of proscribed items includes *toxic chemicals* and *precursor*

chemicals, as those terms are defined in the Biological Weapons Convention and the Chemical Weapons Convention (CWC). The SUA also covers nuclear weapons and *nuclear explosive devices,* although radiological weapons are not mentioned specifically. Radiological "dirty bombs" are a more likely threat than nuclear bombs. Furthermore, amended article 1 also covers *toxic chemical* and *precursor* by adopting the definitions contained in the CWC. *Toxic chemical* means a substance that through "chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals." A *precursor chemical* reacts at any stage in the production of a toxic chemical.[16]

The terms *place of public use, state or government facility, infrastructure facility,* and *public transportation system* are drawn from the Terrorist Bombing Convention.[17] Similarly, the terms *source material* and *special fissionable material* have the same meanings in article 1(2)(b) of the SUA as they have in the statute of the IAEA (1956).[18]

In its construction of criminal offenses, the 2005 Protocol also leverages the offenses in the major multilateral terrorism conventions.[19] This approach attempts to weave a tighter, more-integrated legal structure to counter terrorism vertically throughout the spectrum of land, sea, and air, as well as horizontally along the continuum of crime and violence from planning and conspiracy to carrying out a violent attack.

ASYMMETRIC MARITIME CRIME—ARTICLE 3*BIS*

The 2005 SUA Convention avoids the thorny issue of defining "terrorism," instead simply creating three separate groups of offenses. The first category comprises unlawful and intentional acts of violence against ships or persons on board ships. This category includes seizure of a ship or exercise of control over a ship by force or threat of force, acts of violence that endanger the safe navigation of a ship, destruction of a ship or its cargo, emplacement of a weapon on board a ship, destruction of navigational facilities, or communication of false information that endangers a ship.[20]

The second category encompasses acts of transport of certain dangerous materials or weapons on board a ship for the purpose of intimidating a population, government, or international organization.[21] This category includes transporting aboard a ship explosive devices or radioactive material, with the intent to cause death or serious injury or damage; a BCN weapon; fissionable material; or dual-use material.[22]

The third category includes acts of commission through a conspiracy, acts as an accomplice, or attempts to commit crimes included in the prior two categories.[23]

The stable of new offenses offers a flexible definition focused on the intention of the act or the conduct of violence, rather than murky political motivations. The

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offenses were designed broadly to cover emerging and new threats, and it bears consideration whether the use of a laser against a ship imperils the vessel or its crew to the extent that it falls under articles 3, 3*bis,* and 3*quater*. However, it is unclear where the line is drawn for certain new or emerging acts of intimidation such as a cyber attack against a ship's navigation or communications systems or the aforementioned direct action against a vessel using a laser.

In the case of a cyber attack, article 3(1)(e) proscribes any unlawful and intentional act that "seriously interferes with" maritime "navigational facilities" and that is "likely to endanger the safe navigation" of a ship. Consequently, cyber crimes that endanger a ship are included within the scope of criminal conduct in the 2005 SUA Convention.

It is less certain, however, whether other asymmetric attacks are included in the definition. In particular, does the use of a laser against the pilothouse of a vessel constitute an "act of violence" against a person on board a ship that is "likely to endanger the safe navigation" of the ship?[24] This issue turns on the definition of what constitutes an "act of violence." Violence in the law generally is considered to be "moving, acting, or [conduct] characterized by physical force, especially by extreme and sudden or by unjust and improper force."[25] This focus on "reproaches produced or effected by physical force" raises the question whether use of a laser against a ship constitutes an "act of violence." The Israeli Penal Act of 1977 is more circumspect; it defines an "act of violence or terror" as "a crime that causes harm to a person's body or that endangers him for death or for severe injury."[26] The use of lasers opens a lacuna in the definition of what constitutes an "act of violence" that states should address in implementing legislation. The IMO may serve as a fusion point for governments' views on this issue to facilitate uniformity.

COMPETENT AUTHORITY—ARTICLE 8*BIS*

Article 8*bis* of the 2005 SUA includes a comprehensive framework to facilitate boarding of suspect vessels at sea. In particular, the new provision seeks to ensure better coordination during incidents at sea between a warship attempting to board a suspicious vessel and the flag state that exercises jurisdiction over that vessel. Generally, the flag state has exclusive authority to authorize boarding of one of its ships, but in the past states have not always responded to such requests in a timely fashion. Article 8*bis* requires states party to "co-operate to the fullest extent possible to prevent and suppress unlawful acts covered by this Convention . . . and . . . respond to [boarding] requests . . . as expeditiously as possible."[27]

The boarding regime does not change the existing international law of the sea or infringe on exclusive flag-state control or traditional rights and freedoms of

navigation. The boarding regime provides a framework for expedited decision making that states party may adopt to facilitate coordination.

The 2005 SUA Convention sets forth a process for cooperation and procedures for boarding a ship flying the flag of another state party when the requesting party has "reasonable grounds" to suspect that the ship or a person on board the ship is, has been, or is about to be involved in the commission of an offense under the convention.

States have a general obligation to cooperate "to the fullest extent possible" among the states party and to respond to requests from other states party "as expeditiously as possible."[28] Requests for boarding should be accompanied by, inter alia, the name of the vessel, its IMO ship identification number, and its port of registry.[29]

The provision is exceptional because it provides a means to criminalize civilian, commercial, off-the-shelf and dual-use items on the basis of their intended use and purpose.

Article 8*bis*(3) is a reminder that it is often impossible to conduct a thorough inspection of either a small craft or a large commercial vessel at sea, and often the best course of action is to bring the ship into port to facilitate the inspection. This provision requires the boarding state to consider the particular "dangers and difficulties" involved in boarding a ship under way.

Article 8*bis*(4) provides a mechanism whereby a state party with reasonable grounds to suspect that an offense delineated in article 3, 3*bis,* 3*ter,* or 3*quater* has been, is being, or is about to be committed "involving a ship flying its flag" may request the assistance of other states party.[30] The requesting party that encounters beyond the territorial sea a ship of another country that is suspected of an offense under article 3, 3*bis,* 3*ter,* or 3*quater* must follow the steps set forth in the new article. The flag state should confirm the nationality of the vessel, and if nationality is confirmed the flag state has four options: (1) it may authorize the requesting state authority to board; (2) it may conduct a boarding and search with its own forces; (3) it may conduct a boarding with its forces working in tandem with the boarding forces of the requesting state; or (4) it may decline the requesting state permission to board.[31]

When the requesting party boards a foreign-flagged ship and finds evidence of offenses under article 3, 3*bis,* 3*ter,* or 3*quater,* the flag state may authorize the requesting party temporarily to detain the ship, cargo, and persons on board, pending receipt of further instructions from the flag state. In any case, the requesting party must inform the flag state of the results of the boarding, search, and detention, including discovery of evidence of a violation of article 3, 3*bis,* 3*ter,* or 3*quater* or illegal conduct that is not a subject of the convention.[32]

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These interactions between the flag state and the requesting state are facilitated through the designated "competent authority" of the flag state, and the success of cooperation hinges on responsive and iterative engagement. States party agree to designate within one month of becoming a party an official authority (or authorities) to serve as a liaison with other nations on time-sensitive issues arising under the treaty, such as receiving and responding to requests for assistance, confirmation of vessel nationality, and seeking authorization to take appropriate law-enforcement measures.[33]

Each state is to make the designation to the IMO secretary-general, who promulgates it among member states.[34] However, out of forty states, such notification has been made by only four: Latvia, San Marino, Sweden, and the United States. Latvia has designated the Naval Forces Coast Guard Service as the appropriate authority to receive requests for assistance, and the Security Police and Prosecutor General's Office as the points of contact for confirmation of nationality and authorization to take appropriate measures. Similarly, Sweden has designated the Swedish Coastguard Regional Command as the authority to receive and respond to requests for confirmation of ship nationality, and the Ministry of Justice as authority for requests to take measures against Swedish vessels. San Marino and the United States have a single point of contact each, the Civil Aviation and Maritime Navigation Authority and the U.S. Coast Guard Liaison Office to the U.S. State Department, respectively. This low rate of compliance for designation of a competent authority risks atrophy of the 2005 SUA Convention, and remedial action by states party is required.[35]

The Vienna Drug Convention offers a clear model for effective coordination of maritime interdiction and boarding at sea or in port. Under article 17 of the convention, states party are obligated to cooperate to suppress illicit drug trafficking by sea. States party that have reasonable grounds to suspect a vessel flying a foreign flag is engaged in illicit traffic may notify the flag state and request confirmation of registry and authorization to take appropriate measures against the suspect ship. In such a case, the flag state may authorize boarding, search, and seizure of evidence in accordance with agreements or arrangements between the two states. States party "shall respond expeditiously" to inquiries, and states that take action against a foreign-flag ship shall "promptly inform the flag State."[36]

To facilitate these interactions and ensure efficient and effective communications and decision making, the United Nations Office of Drugs and Crime (UNODC) has produced a *Directory of Competent National Authorities*.[37] The directory provides points of contact and decision-making authorities for requests for extradition, mutual legal assistance, and cooperation against illicit traffic by sea, including the smuggling of migrants and firearms.[38] The IMO and member states should develop a similar directory of competent authorities to facilitate

requests made pursuant to the 2005 SUA Convention, with the goal of perhaps combining the points of contact for maritime interdiction under article 17 of the UNODC directory with the IMO directory to render a comprehensive volume on government points of contact and decision making for maritime matters.

After the United Nations Convention on the Law of the Sea (UNCLOS), the 2005 SUA Convention has the potential to become one of the most important instruments for maritime security, on the order of SOLAS. However, there is no question that, for now, it is woefully undersubscribed and underutilized. The slow implementation of the 2005 SUA Convention is reminiscent of that for the 1988 Convention, which, while widely accepted (with some 150 states party), has been used only once (as far as I know) to assert jurisdiction over a suspected criminal.

The 2005 Protocol attempts to weave a tighter, more-integrated legal structure to counter terrorism vertically throughout the spectrum of land, sea, and air, as well as horizontally along the continuum of crime and violence from planning and conspiracy to carrying out a violent attack.

In that case, *United States v. Shi,* the U.S. government asserted jurisdiction over the defendant, whom U.S. Coast Guard officers picked up sixty nautical miles off the coast of Hilo, Hawaii, from the F/V *Full Means No. 2,* a Taiwan ship registered in the Seychelles.[39] Shi was a Chinese crew member who killed the captain and first mate of the ship after they beat him severely and demoted him from cook to deckhand. Subsequently, Shi was overpowered by the crew and held captive until turned over to the Coast Guard and the Federal Bureau of Investigation. Shi's conviction by the federal district court in Hawaii was upheld by the U.S. Ninth Circuit.[40]

The United States asserted jurisdiction over Shi under 18 U.S.C. § 2280(b)(1)(C), the U.S. implementing legislation for the 1988 SUA Convention.[41] That legislation was adopted to assert U.S. jurisdiction in accordance with the convention, which requires states party to extradite or prosecute offenders regardless of where the offenders' acts occurred. Title 18 U.S.C. § 2280 authorizes federal jurisdiction over any offender "later found" in the United States, and the district court found that it had jurisdiction over Shi.[42] Congress's authority to establish jurisdiction by statute is granted in the "offense clause" of the Constitution, which empowers Congress to "define and punish Piracies and Felonies committed on the high Seas, and Offenses against the Law of Nations."[43]

The *Shi* case is remarkable and important today for two reasons. First, the United States used its implementing legislation for the 1988 SUA Convention to establish jurisdiction over Shi, and this action did not require any liaison or

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correspondence with other nations involved: neither the flag state of the ship nor the authorities of Shi's nationality (China) nor those of the nationalities of his two victims (Taiwan and Chinese). The successful prosecution underscores the successful operation of implementing legislation to prosecute crimes committed under the 1988 Convention. Second, the *Shi* case is the only known example of a criminal prosecution under the 1988 Convention, underscoring the gulf that lies between what legal realists might say is "law on the books" and "law in action."[44]

In crafting and adopting the 2005 SUA Convention, the member states of the IMO and the IMO secretariat have advanced the program of the rule of law in the oceans and furthered the goal of greater maritime security. The convention is a cornerstone instrument for bringing the rule of law to the oceans, but it is only a first step. As with much of international law, the success of the 2005 convention lies in its implementation, not merely its adoption at the international level. States must integrate their IMO commitments into effective national action that includes domestic rules, interagency resources and authorities, and mechanisms for real-time collaboration. Toward this end, states might explore how to approach new threats and define new crimes based on unmanned systems, dual-use materials, and asymmetric attacks on ships, as well as ensure they have built out "backroom" procedural and logistical mechanisms, such as designation of competent authorities to facilitate international collaboration to enforce maritime security measures.

NOTES

This article is adapted from James Kraska, keynote presentation ("Conference on Piracy, Refugees, War Risks, and Sanctions: The Impact on Maritime Trade," held at the International Maritime Organization, London, 2 June 2016).

1. Larisa Brown, "ISIS's Next Target Could Be Cruise Ships in the Med: Top NATO Commander Says Jihadists' Spread into Libya Casts an 'Uncomfortable Shadow,'" *Daily Mail,* 29 January 2016, www.dailymail.co.uk/news/.
2. Resolutions of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea 1974, adopted 12 December 2002, Conference Resolution 2 Annex: International Code for the Security of Ships and of Port Facilities.
3. See generally Thomas A. Mensah, "The Place of the ISPS Code in the Legal International Regime for the Security of International Shipping," *WMU Journal of Maritime Affairs* 3, no. 17 (2004), pp. 26–27.
4. UN Security Council, Resolution [hereafter UNSCR] 1373, 28 September 2001, para. 2(b).
5. International Maritime Organization [hereafter IMO], Review of Measures and Procedures to Prevent Acts of Terrorism Which Threaten the Security of Passengers and Crews and the Safety of Ships, 22 January 2002, IMO Doc. A.924(22).
6. IMO, Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, Rome, 10 March 1988, 1 March 1992, IMO Doc. MSC/Circ. 754, 27 I.L.M. 672 (1988), UN Law of the Sea Bull. no. 11, July 1988, at 14, 1678 U.N.T.S. 221; IMO, Convention for the Suppression of Unlawful Acts against the Safety of Maritime

Navigation, London, 14 October 2005, 28 July 2010, IMO Doc. SUA.3/Circ.11, 4 May 2010 [hereafter SUA 2005]

7. UNSCR 1540, 28 April 2004.
8. Mark R. Patterson and Susan J. Patterson, "Unmanned Systems: An Emerging Threat to Waterside Security" (paper presented at the International WaterSide Security Conference, Institute of Electrical and Electronics Engineers [IEEE], 3–5 November 2010), available at www.vims.edu/.
9. Ibid.
10. Definition of a "vessel" as including all means of water transportation, 1 U.S.C. § 3 (1947), ch. 388, 61 Stat. 633.
11. Charles Barnes Co. v. One Dredge Boat, 169 F. 895, 896 (E.D. Ky. 1909).
12. SUA 2005, art. 1(c).
13. Ibid., art. 3*bis*(1)(b)(i).
14. Ibid., art. 3*bis*(1)(b)(iv).
15. Ibid., art. 1(d).
16. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (Biological Weapons Convention), done at Washington, London, and Moscow on 10 April 1972; Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (Chemical Weapons Convention), done at Paris on 13 January 1993.
17. 1997 International Convention for the Suppression of Terrorist Bombing, 2149 U.N.T.S. 256 (2002).
18. For the unanimous adoption of the statute, see Off. Rec. of the 1956 Conference on the Statute of the International Atomic Energy Agency, IAEA/CS/OR.39; for the text of the statute, see IAEA/CS/OR.40, T.I.A.S. 3873, pp. 11–15.
19. SUA 2005, art. 3*ter.* The treaties are appended as annexes.
20. Ibid., art. 3.
21. Under ibid., art. 3*bis,* a person commits an offense if he or she "unlawfully and intentionally" commits an act the purpose of which, "by its nature or context, is to intimidate a population, or to compel a government."
22. Ibid., art. 3*bis*(1)(b)(i)–(iv).
23. Ibid., art. 3*quater.*
24. Ibid., art. 3(1)(b).
25. *Black's Law Dictionary,* 6th ed. (1990), p. 1570.
26. Israeli Penal Act of 1977, reproduced in *Laws of the State of Israel,* special vol., *Penal Law,* 5737-1977.
27. This new article was created by article 8(2) of the 2005 SUA Protocol.
28. SUA 2005, art. 8*bis.* This general obligation is reflected in and derived from article 17(1) of the 1988 UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1582 U.N.T.S. 165 (no. 27627), 28 I.L.M. 493 (1989) [hereafter 1988 Vienna Narcotic Drug Convention] and article 7 of the Protocol against Smuggling of Migrants by Land, Sea and Air, supplementing the UN Convention against Transnational Organized Crime [hereafter Migrant Smuggling Protocol].
29. SUA 2005, art. 8*bis*(2).
30. This provision is derived from article 17(2) of the 1988 Vienna Narcotic Drug Convention and article 8(1) of the Migrant Smuggling Protocol. The prerogative of the flag state is reaffirmed in article 8*bis*(8), in accordance with articles 91 and 92 of UNCLOS and articles 5 and 6 of the 1958 Convention on the High Seas.
31. SUA 2005, art. 8*bis*(5).
32. Ibid., art. 8*bis*(6).
33. Ibid., art. 8*bis*(15).
34. The provision is similar to article 17(7) of the 1988 Vienna Narcotic Drug Convention and article 8(6) of the Migrant Smuggling Protocol.
35. IMO, "Status of Multilateral Conventions and Instruments in Respect of Which the International Maritime Organization or Its Secretary-General Performs Depositary or Other Functions," 19 April 2016, pp. 430–31.
36. 1988 Vienna Narcotic Drug Convention, art. 17(7)–(8).
37. Directory of Competent National Authorities, UN Office of Drugs and Crime (UNODC) Doc. ST/NAR.5/2014/2 (E/NA) (2014).
38. Ibid., p. ix.

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39. United States v. Shi, 396 F. Supp. 2d 1132 (D. Haw. 2003).
40. United States v. Shi, 525 F.3d 709 (9th Cir. 2008).
41. 27 I.L.M. 672 (1988).
42. United States v. Shi, 396 F. Supp. 2d 1132 (D. Haw. 2003). The case is consistent with U.S. criminal procedure, which permits courts to assert jurisdiction over defendants even when brought within the jurisdictional territory of the court against their will. See Frisbie v. Collins, 342 U.S. 519, 522, 72 S.Ct. 509, 96 L.Ed. 541 (1952); Ker v. Illinois, 119 U.S. 436, 7 S.Ct. 225, 30 L.Ed. 421 (1886).
43. U.S. Constitution, art. I, sec. 8, cl. 10.
44. See Roscoe Pound, "Law in Books and Law in Action," *American Law Review* 44, no. 12 (1910), pp. 12–36. See also Karl Llewellyn, "A Realistic Jurisprudence—the Next Step," *Columbia Law Review* 30, no. 431 (1930), pp. 444–57.

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INTERNATIONAL LAW AND SEARCH AND RESCUE

Rick Button

Treasury Department
Office of the Secretary
Washington, D.C.
November 15, 1897

Sir: The best information obtainable gives the assurance of truth to the reports that a fleet of eight whaling vessels are icebound in the Arctic Ocean, somewhere in the vicinity of Point Barrow, and that the 265 persons who were, at last accounts, on board these vessels are in all probability in dire distress. These conditions call for prompt and energetic action, looking to the relief of the imprisoned whalemen. It therefore has been determined to send an expedition to the rescue. Believing that your long experience in arctic work, your familiarity with the region of Arctic Alaska from Point Barrow, south, and the coast line washed by the Bering Sea, from which you but recently returned, your known ability and reputation as an able and competent officer, all especially fit you for the trust, you have been selected to command the relief expedition. Your ship, the Bear, *will be officered by a competent body of men and manned by a crew of your own selection. The ship will be fully equipped, fitted, and provisioned for the perilous work in view, for such it must be under the most favorable conditions. . . .*

You are hereby given full authority and the largest possible latitude to act in every emergency that may arise, and while impossibilities are not expected, it is expected that you, with your gallant officers and crew, will leave no avenue of possible success untried to render successful the expedition which you command. . . .

Mindful of the arduous and perilous expedition upon which you are about to enter, I bid you, your officers and men, Godspeed upon your errand of mercy, and wish you a successful voyage and safe return.[1]

The search for and rescue of persons in distress is a centuries-old, time-honored tradition. The above instructions provided to Captain Francis Tuttle of the U.S. Revenue Cutter Service over a century ago, as he prepared his crew to rescue whalers trapped in ice in the Arctic Ocean, epitomize the dedicated efforts of mariners and coastal states in saving lives at sea.

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This lifesaving tradition continues unabated today, albeit with new challenges. The long-standing challenges provided by harsh weather and sea conditions, long distances, and limited available search-and-rescue (SAR) resources remain the same. However, since Captain Tuttle's successful rescue, international and national SAR organizations, practices, procedures, capabilities, and technologies have continued to improve. There is now a greater commitment and resolve by the international community to work together to save lives at sea.

Owing to the unique hazards encountered by ships as they ply the world's oceans and by aircraft on transoceanic flights, as well as the challenges to coordinating and conducting maritime lifesaving operations, coastal states implemented national SAR systems and SAR organizations to search for and rescue those in distress at sea. However, prior to the 1970s there was no standardized system globally for organization, coordination, and conduct of SAR operations. Seeking to harmonize these organizations and procedures, the international community, through the International Maritime Organization (IMO), established in 1979 the International Convention on Maritime Search and Rescue (SAR Convention). The SAR Convention provides an internationally standardized foundation and framework for coastal states to work together in implementing a global maritime SAR system.[2] The IMO describes how the SAR Convention was developed to provide a plan for and implementation of a system to save the lives of persons in distress at sea more effectively:

> The 1979 Convention . . . was aimed at developing an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea will be co-ordinated by a SAR organization and, when necessary, by co-operation between neighbouring SAR organizations.
>
> Although the obligation of ships to go to the assistance of vessels in distress was enshrined both in tradition and in international treaties . . . there was, until the adoption of the SAR Convention, no international system covering search and rescue operations. In some areas there was a well-established organization able to provide assistance promptly and efficiently, in others there was nothing at all.[3]

Under the internationally recognized foundation provided through the SAR Convention, each coastal state organizes its maritime SAR authorities and organization on the basis of its available SAR resources, unique geographic challenges, political considerations, cultural influences, available funding, and domestic SAR legal framework. Each country's national and agency-specific SAR organizations then develop policies, procedures, tactics, and training to implement their respective national SAR system, which then becomes an integral component of the global SAR system. Through this internationally standardized and organized framework, coastal states work together in responding to and rescuing those imperiled at sea.

This article pursues several objectives. First, it seeks to provide a broad overview of the global SAR system's international framework and organization as set forth in the annex to the SAR Convention and implemented by coastal states. Despite that implementation over the past forty-five years, many people remain unaware of the existence of a standardized, global, maritime SAR system. While not perfect, the global SAR system provides an important basis on which coastal states can build cooperative relationships to enable them to conduct this important lifesaving mission more effectively.

Second, the article focuses on the specific SAR responsibilities and international legal requirements placed on shipmasters and coastal states as they work together in coordinating and conducting maritime SAR operations; both are important lifesaving partners. Passenger ships, cargo ships, and warships of all types transit across the world's oceans every day. In many instances, one of these ships may be the only available SAR resource in the vicinity of a person in distress, and could make the difference between life and death. The coastal state is responsible for coordinating the SAR operation and supporting the responding shipmaster. The article discusses several international conventions that form the legal basis for this important lifesaving relationship. The responsibilities of a warship in rendering assistance to persons in distress also are considered.

This section also will discuss the tragic issue of mixed migration by sea from a SAR perspective. The question that needs to be considered is whether these mixed-migration incidents—in which thousands of persons are taking to the sea, in many instances fleeing for their lives—and the ensuing response actions should even be considered SAR operations conducted under the SAR Convention, or instead law-enforcement / national border security incidents.

Third, this article will address two additional situations that SAR legal advisers and policy makers should consider and for which they should develop policy and prepare SAR responders.

First, under international law the responsibilities and requirements of a ship or aircraft when conducting a rescue operation within another coastal state's territorial sea will be considered. The shipmaster's duty to render assistance to persons in distress does not stop at a coastal state's territorial sea boundary. When such a situation occurs, can a ship at sea, on being notified of persons in distress, enter a coastal state's territorial sea to render assistance? Can an aircraft enter into a coastal state's airspace over its territorial sea to assist in a rescue operation? Seven different scenarios will be presented to highlight the distinctions and limitations of rescue operations within a coastal state's territorial sea.

Second, this article will address the issue of forcibly evacuating a person from a vessel when doing so is, in the judgment of the SAR responders on scene, the only way to save the person's life. May the SAR responder use force to compel a

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person to abandon his vessel? What type of force should be considered? SAR authorities should develop policies and procedures in preparation for the day when a person in distress does not want to leave his vessel even in a life-threatening situation.

This article does not provide exhaustive legal analyses of these various issues. Its purposes are to provide a synopsis of the international law addressing these subjects, and to address questions that SAR authorities and responders should consider in developing future SAR policies and procedures. It is my hope that this article will provide the reader with a better understanding of the legal framework for the global SAR system and serve as an impetus for further discussion of these important topics.

OVERVIEW: GLOBAL SEARCH-AND-RESCUE SYSTEM

> *The thing I constantly think about—we were so, so very lucky. The difference between our ship and the* Titanic *is we weren't caught in the middle of the ocean. . . . If we had been caught in the middle of the ocean, most of these people wouldn't have survived.*
>
> MIKE KAJIAN, PASSENGER ON BOARD *COSTA CONCORDIA*

The world's oceans constitute a dangerous environment that covers approximately 70 percent of the earth's surface.[4] The centuries-old duty of the mariner transiting the world's oceans to render assistance to those in distress at sea was implemented formally through several international conventions.[5] However, large-scale disasters at sea in the early twentieth century, many involving significant loss of life, continued to plague the shipping community. The continued loss of life made it apparent that, alone, this duty to render assistance was insufficient; an international SAR system for organizing, coordinating, and conducting rescues at sea was required.

Before the adoption of the SAR Convention, there was no overarching international plan for coordinating the conduct of maritime lifesaving operations. Some maritime regions did have coastal states that implemented robust, effective, national SAR systems, while others had very limited or no SAR resources or coordinating structures to render assistance to persons in distress. There was no internationally recognized system to coordinate and conduct SAR operations, because there was no governing international regime to standardize SAR processes and procedures.

The adoption of the SAR Convention filled this gap by instituting a framework under which coastal states could implement their respective national SAR systems,[6] including the establishment of rescue coordination centers (RCCs) and rescue sub-centers (RSCs) to coordinate operations within a coastal state's SAR region.[7]

Soon after the IMO's SAR Convention came into force in 1985, it became apparent that additional guidance was required. To assist states in meeting their SAR obligations under the SAR Convention, as well as the comparable requirements the International Civil Aviation Organization (ICAO) mandated in the Convention on International Civil Aviation ("Chicago Convention"),[8] both organizations jointly developed the three-volume *International Aeronautical and Maritime Search and Rescue Manual* (IAMSAR manual).[9] This reference provides guidelines and procedures to assist states in developing and harmonizing their respective aeronautical and maritime SAR organizations, planning, and operations, as well as providing the basis for coordinating and conducting SAR operations among states.

Developed for the SAR manager, the IAMSAR manual, volume 1 *(Organization and Management),* "attempts to ensure that managers understand the basic concepts and principles involved in SAR, and to provide practical information and guidance to help managers establish and support SAR services."[10] Volume 2 *(Mission Co-ordination)* provides guidance and information to personnel who plan and coordinate SAR operations.[11] Volume 3 *(Mobile Facilities)* was developed for carriage on board vessels and aircraft that may be called on to assist in a SAR operation.

Volume 1 explains the IMO and ICAO's purpose for developing the IAMSAR manual:

> ICAO and IMO jointly developed this Manual to foster co-operation between themselves, between neighbouring States, and between aeronautical and maritime authorities. The goal of the Manual is to assist State authorities to economically establish effective SAR services, to promote harmonization of aeronautical and maritime SAR services, and to ensure that persons in distress will be assisted without regard to their locations, nationality, or circumstances. State authorities are encouraged to promote, where possible[,] harmonization of aeronautical and maritime SAR services.[12]

Within the global SAR system, roles and responsibilities also have been developed to provide for the efficient organization and implementation of a coastal state's national SAR system. There are three primary levels of coordination: (1) the SAR coordinator (SC) is that person or agency with the responsibility for the management and oversight of a coastal state's SAR organization;[13] (2) the SAR mission coordinator (SMC) is the official temporarily assigned to coordinate, direct, and supervise a SAR operation;[14] and (3) an on-scene coordinator (OSC) may be assigned by the SMC to coordinate SAR operations on scene when multiple resources are working together within a specified area.[15] Additionally, an aircraft coordinator (ACO) can be assigned by the SMC or OSC in a SAR operation if the response involves multiple aircraft. The ACO would be responsible for flight safety and for ensuring effective use of the aircraft in the conduct of the operation.[16]

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Search-and-Rescue Regions

Implementation of the international SAR framework mandated by the SAR Convention necessitated the division of the world's oceans into a patchwork quilt of maritime SAR regions in which each coastal state assumed responsibility for coordinating and conducting SAR operations.[17] It is commonly assumed that coastal states establish their SAR regions unilaterally. However, SAR region lines of delimitation are only provisional; the SAR Convention mandates that coastal states with adjacent SAR regions enter into cooperative agreements to establish their respective SAR regions formally.[18] These SAR agreements not only delimit the SAR regions but ideally serve as the basis for cooperation and coordination between coastal states in the conduct of SAR operations.[19]

One practical benefit in developing a global SAR system is that with the worldwide assignment of maritime SAR regions, states are not required to provide SAR services for their own citizens wherever they travel. Coastal states provide SAR services to anyone in distress within a SAR region, without regard to the person's nationality, status, or circumstances.[20]

Two other important factors need to be understood regarding coastal states' implementation of SAR services within their maritime SAR regions.[21] First, a maritime SAR region is not an extension of a coastal state's national "boundaries" but rather a geographic area in which the coastal state accepts responsibility to coordinate SAR operations.[22] This is an especially important concept to understand, since a coastal state may extend a large portion of its maritime SAR region into the high seas.[23] Second, the SAR Convention does not mandate that a coastal state must have all the SAR resources necessary to respond to a distress within its entire maritime SAR region. As previously stated, SAR regions only define a geographic area in which a coastal state is responsible for "coordinating" SAR operations.[24] The requirements of the SAR Convention build on the time-honored tradition of shared responsibility for coordinating and conducting lifesaving operations at sea. All available resources should be used to save lives: local, regional, national, and international; volunteer; commercial and shipping; aircraft; etc.[25] The circumstances of a particular distress incident should dictate what available resources can and should be used most effectively.

Rescue Coordination Center / Rescue Sub-center

The coastal state's RCCs and RSCs are the backbone of the global SAR system. They are responsible for the organization of SAR services and the coordination and conduct of SAR operations within maritime SAR regions.[26] The annex to the SAR Convention requires assignment of one RCC or RSC to each maritime SAR region.[27] The RCC should be located where it can perform its coordination function most effectively, have twenty-four-hour availability, be staffed with trained

personnel, have the ability to receive distress alerts, and maintain plans of operation for different types of distress scenarios.[28]

In situations in which an RCC may not be able to coordinate SAR services effectively over a specific geographic area within its SAR region, a coastal state's SAR authority can establish an RSC to exercise responsibility for coordinating SAR operations within a designated search-and-rescue subregion (SRS).[29] The RSC, which can be just as capable as an RCC, may be delegated authority to coordinate SAR operations independently within its SRS. However, an RSC generally has fewer responsibilities than its associated RCC.[30]

The global SAR system, while not perfect, continues to improve every year as nations work together to save lives at sea. SAR authorities worldwide understand their responsibilities under the SAR Convention. Lessons learned from SAR cases are developed and shared among international SAR authorities and organizations. Coastal states in many regions of the world are realizing that effective SAR services cannot be provided independently. In these regions, coastal states are working together to develop regional SAR plans and cooperative arrangements to implement regional SAR systems based on the framework mandated in the SAR Convention. There is still plenty of work to be accomplished, but through the IMO and ICAO positive improvements to the global SAR system continue to be made.

OBLIGATIONS OF THE SHIPMASTER AND THE COASTAL STATE: PERSONS RESCUED AT SEA

In May 2014, a U.S. rescue coordination center was notified that a passenger ship, transiting on the high seas, had come across what appeared to be a dilapidated vessel with a large number of persons on board in the vicinity of a coastal state. On the basis of the size and condition of the vessel and the presence of thirty-nine persons on board, the passenger ship embarked the persons, consistent with its international obligation to render assistance to those in distress at sea.

Even though the passenger ship was in the vicinity of this coastal state, the rescue of the thirty-nine survivors occurred in the maritime SAR region of a second coastal state. After the thirty-nine survivors were safely on board, the passenger ship resumed its transit to the second coastal state, its next port of call. During its transit, the shipmaster notified the authorities of the rescue and that his ship had embarked the thirty-nine survivors. However, upon arrival, the authorities made no effort to coordinate the disembarkation of the survivors in their country or to another place of safety, as required by the SAR Convention. As a result, the passenger ship was forced to retain the thirty-nine survivors on board when it departed for its next port of call, in the United States.

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Because of the coastal state's failure to meet its obligation to coordinate the disembarkation of the survivors to a place of safety as required by the SAR Convention, the passenger ship was forced to continue to bear the burden of caring for the thirty-nine survivors upon departure. Subsequently, the U.S. Coast Guard was notified of the situation, contacted the passenger ship, and arranged for a rendezvous at sea between the passenger ship and a Coast Guard cutter. As planned, the passenger ship met with the cutter, which facilitated the at-sea transfer of the thirty-nine survivors without incident.

In effect, the United States, in particular the U.S. Coast Guard, was forced to assume the responsibility to coordinate the disembarkation and disposition of the survivors rescued by the passenger ship on behalf of the coastal state. Once the transfer was complete, the passenger ship was released from its obligations and continued its transit to the United States.[31]

This actual incident illustrates what is required of ships transiting the world's oceans and of coastal states implementing the global SAR system. In this incident, the shipmaster fulfilled his duty to render assistance to persons rescued at sea. However, the coastal state refused to assist in coordinating the disembarkation of the survivors or to relieve the shipmaster of his obligation to care for the survivors. As a result, in this instance the global SAR system failed. It cannot be stressed enough that both the shipmaster *and* the coastal state must be active participants in the global SAR system—both must be committed to saving lives at sea.

What follows is a description of the duties and obligations of shipmasters and coastal states in ensuring the success of maritime lifesaving operations. It is important for both to be cognizant of their responsibilities, as well as for each to develop processes and procedures to implement the global SAR system.

Shipmaster

Ships at sea are the eyes and ears of the global SAR system. In many instances, it is ships that receive notification of persons in distress, and they can be the first SAR resources available to render assistance. Ships conduct lifesaving operations every day in the world's oceans, and generally welcome the opportunity to save lives.

Three international conventions formally enshrine in international law the important duty of the shipmaster to render assistance to persons in distress at sea.[32] Compliance with this duty is essential to preserving the integrity of the global SAR system.

First, the Safety of Life at Sea (SOLAS) Convention of 1974 is one of the most important treaties concerning merchant ship safety.[33] Chapter V, regulation 33, states:

> The master of a ship at sea which is in a position to be able to provide assistance, on receiving information from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance, if possible informing them or the search and rescue service that the ship is doing so. This obligation to provide assistance applies regardless of the nationality or status of such persons or the circumstances in which they are found. If the ship receiving the distress alert is unable or, in the special circumstances of the case, considers it unreasonable or unnecessary to proceed to their assistance, the master must enter in the log-book the reason for failing to proceed to the assistance of the persons in distress, taking into account the recommendation of the Organization to inform the appropriate search and rescue service accordingly.[34]

Second, the United Nations Convention on the Law of the Sea (UNCLOS), in article 98, provides that shipmasters have a duty to render assistance to persons in distress:

> 1. Every State shall require the master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers:
>
> (a) to render assistance to any person found at sea in danger of being lost;
>
> (b) to proceed with all possible speed to the rescue of persons in distress, if informed of their need of assistance, in so far as such action may reasonably be expected of him;
>
> (c) after a collision, to render assistance to the other ship, its crew and its passengers and, where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call.[35]

Note that article 98 is addressed to the flag state; it is the flag state that must ensure that any ship flying its flag renders assistance to persons in distress at sea. The shipmaster has the duty to render assistance "so far as he can do so without serious danger to the ship, the crew or the passengers."[36]

Third, the Salvage Convention in article 10 states:

> 1. Every master is bound, so far as he can do so without serious danger to his vessel and persons thereon, to render assistance to any person in danger of being lost at sea.
> 2. The States Parties shall adopt the measures necessary to enforce the duty set out in paragraph 1.
> 3. The owner of the vessel shall incur no liability for a breach of the duty of the master under paragraph 1.[37]

Notably, there are circumstances in which a shipmaster would *not* be duty bound to aid persons in distress. For example, a shipmaster is not required to place his ship and crew in undue peril in order to attempt to render assistance.[38]

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In addition, there is no duty to attempt to render assistance in instances where doing so would be impracticable or futile.[39]

All three conventions affirm the shipmaster's duty to render assistance to persons in distress at sea and to treat any rescued survivors humanely while on board the ship.[40] Most shipmasters realize that, if the situation were reversed and they themselves were in distress, they would want another ship to provide the same assistance.[41]

Does the same treaty law concerning the shipmaster's duty to render assistance to persons in distress apply to warships?[42] The complex nature of military operations at sea means that diverting a warship to assist in a SAR operation and embark survivors can pose a challenge, especially when attempting to coordinate survivor disembarkation with a coastal state's SMC. And while conducting a maritime SAR operation can be difficult for a warship during peacetime, it can be even more complicated during armed conflict.

Interestingly, the SOLAS (chapter V, regulation 33) and Salvage (article 10) Conventions do not apply to warships and other noncommercial, state-owned vessels; the conventions do not mandate that these classes of vessels render assistance to persons in distress.[43] However, it remains customary international law[44] for states to ensure their warships act in a manner consistent with this requirement.[45] By comparison, UNCLOS does impose this obligation on the flag state to require masters to comply with article 98. The SAR Convention, as previously stated, provides the framework for coastal states to implement the global SAR system; however, it does *not* "carve out" an exemption for certain classes of vessels from complying with its requirements. A party to the SAR Convention is obligated to ensure that *all* ships under its flag render assistance to persons in distress.[46]

Under the SAR Convention, a coastal state may receive notification of a person in distress, assume the role of SMC, and have its RCC contact a warship in the vicinity of a distress incident to divert and render assistance. If the warship is in a position and is able to render the assistance, the commanding officer (CO) should do so when the SMC so requests. If it is the CO who becomes aware of persons in distress, he should contact the coastal state whose SAR region the ship is transiting and relay any information concerning the distress incident. The coastal state would assume SMC and coordinate the response with the CO, including the disposition of any survivors once embarked on the warship.

Can the CO of a warship at sea decide *not* to render assistance to persons in distress, even if the warship is in a position to do so and could provide timely assistance, but—owing to other "operational commitments"—is considered "not available"? Who would decide, in a particular instance, whether the CO of a warship can be relieved of his duty to render assistance to persons in distress?

While this may be considered a difficult situation, the overall answer is *no*. For example, under U.S. Navy and Coast Guard policy, the CO always retains the duty to render assistance to persons in distress at sea if able to do so.[47] It also can be argued that, with this historical and universal principle enshrined in the SOLAS Convention, the Salvage Convention, and UNCLOS, the CO's duty to render assistance to persons in distress constitutes customary international law as well. This is especially relevant during peacetime when, considering the circumstances of the distress incident, a warship may be the only available resource capable of conducting a lifesaving operation. The circumstances on scene and the CO's coordination with the SMC and his operational chain of command should dictate the best course of action to ensure that persons in distress are rescued.

The Coastal State

Under the SAR Convention, a state has the responsibility to implement the global SAR system.[48] To fulfill this mandate, the coastal state establishes a national SAR system that effectively coordinates SAR operations to render assistance when notified of persons in distress.[49] If the most effective SAR resource available for a particular SAR operation is a merchant ship (or any other vessel best suited to render the assistance), the SMC should divert the ship to save lives.

As the shipmaster fulfills this duty to render assistance to persons in distress, he has an expectation that the coastal state will fulfill its own obligation to assist in coordinating the disembarkation of survivors rescued at sea to a place of safety and to minimize the impact on his ship. For example, the SMC should do everything possible to limit the deviation of a ship from its intended course to assist persons in distress. Granted, there are times when a particular ship is the only SAR resource available. However, diversion of a merchant ship in particular should be limited, if at all possible. Additionally, the SMC should reconsider ever diverting a merchant ship from its intended port of call to a different port to disembark rescued survivors. Such a diversion can cause significant logistical and liability challenges for the ship, shipping company, and shipping agent, and should be avoided.[50] While these types of SAR cases may be challenging for the SMC, who very well may be required to coordinate survivor disembarkation and disposition with another coastal state, the global SAR system will benefit when the shipmaster knows the SMC will minimize the impact on his ship's intended voyage when he renders assistance to persons in distress.[51]

This relationship between the shipmaster and the coastal state is crucial to the effectiveness of the global SAR system. While the shipmaster has the duty to render assistance to persons in distress, the coastal state is obligated to coordinate the SAR operation effectively and efficiently in support of the responding shipmaster. Without a cooperative relationship, a ship has limited incentive to render

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aid to a distressed vessel, as opposed to passing by so as to meet its arrival time at its next port of call. Coastal-state support of ships saving lives at sea is a critical component of the global SAR system, and is enshrined in the SAR Convention:[52]

> Parties shall co-ordinate and co-operate to ensure that masters of ships providing assistance by embarking persons in distress at sea are released from their obligations with minimum further deviation from the ships' intended voyage, provided that releasing the master of the ship from these obligations does not further endanger the safety of life at sea. The Party responsible for the search and rescue region in which such assistance is rendered shall exercise primary responsibility for ensuring such co-ordination and co-operation occurs, so that survivors assisted are disembarked from the assisting ship and delivered to a place of safety. . . . In these cases, the relevant Parties shall arrange for such disembarkation to be effected as soon as reasonably practicable.[53]

As mentioned above, a "place of safety" is an important concept in the global SAR system for both the coastal state and the shipmaster. The IAMSAR manual, volume 1, describes a "place of safety" as

> [a] location where rescue operations are considered to terminate; where the survivors' safety of life is no longer threatened and where their basic human needs (such as food, shelter and medical needs) can be met; and, a place from which transportation arrangements can be made for the survivors' next or final destination. A place of safety may be on land, or it may be on board a rescue unit or other suitable vessel or facility at sea that can serve as a place of safety until the survivors are disembarked at their final destination.[54]

Identifying a place of safety should be coordinated between the shipmaster and the coastal-state SMC responsible for coordinating the SAR operation. The priority always should be to minimize the impact on the ship that conducted the rescue and has survivors on board.[55] A place of safety may not be necessarily a location that is most advantageous to the survivors. However, it should be a location where all the criteria defining a place of safety can be achieved. It cannot be overemphasized that the SMC has the primary responsibility for determining the place of safety, in coordination with the ship that rendered the assistance.[56]

Additionally, the coastal state's SMC, in coordinating a SAR operation, must remember that under the SAR Convention a ship diverted to render assistance[57] is considered a *SAR facility,* not a *SAR unit,* and should not be considered necessarily a place of safety simply because the survivors are no longer in distress.[58] Unlike a SAR unit, which has the equipment and trained personnel to conduct SAR operations, a ship diverted to render assistance to persons in distress may not have the resources on board to care for what may be large numbers of survivors properly, nor to meet the criteria for a place of safety.[59] When a ship is diverted to render assistance, the coastal state, in coordinating disembarkation,

should take into consideration the number of survivors rescued, the ship's estimated time of arrival at its next port of call, the survivors' condition, and other critical factors.[60] Normally, the SMC would coordinate survivor disembarkation at the ship's next port of call or with another coastal state[61] to limit complications and minimize the impact on the ship that conducted the rescue.[62]

If either the coastal state or the shipmaster fails to fulfill the obligations under international law, the global SAR system becomes ineffective. If a shipmaster ignores persons in distress because of the potential time delay and logistical challenges associated with rescuing the survivors, or if the coastal state does not fulfill its obligation to coordinate SAR operations within its maritime SAR region as well as to disembark rescued survivors, the system is threatened—and lives imperiled on the world's oceans can be lost. Both the shipmaster and the coastal state are responsible for saving lives at sea.

Mixed Migration by Sea

Mixed migration by sea is a difficult problem that afflicts many regions of the world.[63] Tragically, lives are lost every year when overloaded boats are overturned and hundreds, if not thousands, of people perish; others perish in extremely poor and hazardous conditions in overloaded boats unfit to make an ocean voyage. People engage in at-sea migrations for many reasons; these include desperate pursuit of a better life, if not survival. Regional problems and challenges have resulted in these mass migrations; proposing solutions goes well beyond the scope of this article. However, the sheer number of "persons in distress" has stretched the limits of the global SAR system. Merchant ships, other vessels, and coastal-state resources are tasked to render assistance. Many are not equipped or manned to support dozens, if not hundreds, of persons who may remain on board an assistance-rendering vessel for several days.

In March 2015, a meeting to address unsafe mixed migration at sea took place at IMO headquarters on Albert Embankment, London, United Kingdom.[64] Participants at the meeting included representatives of the IMO member states, intergovernmental organizations, and nongovernmental organizations, as well as senior representatives from the IMO, the UN High Commissioner for Refugees (UNHCR), the International Organization for Migration (IOM), and several other UN agencies. Challenges concerning mixed migration at sea were discussed. In his opening address, Koji Sekimizu, IMO secretary-general, succinctly stated the problem: "The issue of mixed migration by sea, including irregular migration, has been a serious concern for decades—if not longer. But, in recent years, it has reached epidemic proportions, to the extent where the whole system for coping with such migrants is being stretched up to, and sometimes beyond, its breaking point."[65]

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Several statistics presented at the meeting highlight the critical nature of this problem:

- "The conflict in Syria, which enters its fifth year in March 2015, has caused the largest displacement crisis of our time. There are now more than 3.2 million Syrian refugees, a number that is growing by 100,000 every month."[66]
- In 2014, over two hundred thousand people were rescued and over three thousand deaths were reported in the Mediterranean Sea alone as a result of unsafe, irregular, and illegal sea passages.[67]
- In the first six months of 2015, 137,000 refugees and migrants crossed the Mediterranean Sea.[68] This compares with 75,000 in the same period in 2014, marking an 83 percent increase over 2014.[69]
- More than 1,800 migrants have perished in at-sea migration attempts so far in the first six months of 2015.[70]
- In mid-April 2015, eight hundred people died in the largest maritime refugee disaster on record, highlighting the significant increase in migrants dying or missing at sea.[71]
- There are reports of dozens of migrants dying from hypothermia after being recovered by SAR resources, demonstrating the dangerous nature of these unsafe maritime transits in dilapidated vessels.[72]
- In the first three months of 2015, over seven hundred merchant vessels were diverted from their routes to recover and rescue migrants making unsafe passages just in the Mediterranean Sea alone.[73]

The interplay between mixed migration by sea and SAR presents an extremely difficult challenge because of the complex humanitarian nature of these operations. Many coastal states consider each mass migrant incident a SAR case that should be conducted under the SAR Convention and coordinated by a coastal-state SMC, through the RCC. However, this is not the case.[74] Some incidents may include persons in distress; however, many more appropriately could be considered law-enforcement or border security events.[75] In addition, care must be taken to ensure that migrants are not refugees.[76] Refugees should be afforded the protections required under the Convention Relating to the Status of Refugees, 1951 (Refugee Convention).[77]

The condition of the vessel, the weather on scene, and the persons on board as well as the judgment of the SAR unit or facility on scene and the SMC should dictate whether a migrant incident triggers the rendering of assistance to persons in distress under the SAR Convention or its treatment as a national border / law-enforcement action. Determining whether large numbers of persons in a

mass-migration scenario are in distress can be particularly challenging for the SMC. The global SAR system is activated when a person declares he is in distress or when SAR authorities are notified of a person in distress. However, in many recent mixed-migration-at-sea operations, migrant vessels have been declaring that they are "in distress" so that their "survivors" will be transferred to a merchant ship or other SAR unit and transported to a place of safety. This continues to be an ongoing, difficult problem in the Mediterranean Sea, in particular.

Another difficulty is that, while the shipmaster is required to embark persons assisted, the coastal state has no specific international mandate to receive the survivors from the ship.[78] The RCC is required to coordinate the disembarkation of rescued survivors; however, some coastal states refuse to assist the ship and receive the migrants. Unfortunately, the SAR Convention does not impose a duty for a coastal state to accept migrants from a merchant ship, even if the incident occurred within the coastal state's SAR region.[79] Kathleen Newland provides a good summary of this problem:

> The intersection of maritime law and refugee law thus leaves ship owners, masters, and crews in a quandary. They must pick up refugees and asylum seekers whose lives are in danger, but no state is required to take them in.
>
> The ship itself cannot be considered a "place of safety"—indeed, carrying a large number of unscheduled passengers may endanger the crew and passengers themselves, owing to overcrowding, inadequate provisioning, and the tensions of life in close quarters. The inability to disembark rescued passengers in a timely fashion and return to scheduled ports of call creates a profound disincentive for the maritime industry to engage actively in search and rescue missions.[80]

The IMO may want to consider developing an international convention to provide the international community with a basis for coordinating and conducting these challenging mixed-migration-at-sea operations.[81]

ASSISTANCE ENTRY

The United States Coast Guard received notification that a vessel was hard aground on rocks in a coastal state's territorial sea, with three persons on board. The Coast Guard diverted a Coast Guard cutter that was available to render assistance. The Coast Guard notified the coastal state's authorities of the incident. The Coast Guard cutter arrived, remained outside the territorial sea, and established communications with the vessel aground. Those on the vessel communicated their concern regarding the deteriorating condition of the vessel and adverse weather conditions. The vessel stated that the coastal state's authorities were on scene but were not providing any assistance. The coastal state's authorities notified the Coast Guard that the on-scene Coast Guard cutter was not authorized to enter the state's territorial

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sea to conduct a rescue operation, and indicated that the vessel in distress should arrange for local commercial salvage.

Because of the deteriorating on-scene conditions, in which the vessel was listing sixty degrees and taking on water; the adverse weather; the lack of support from the coastal state's authorities on scene in assisting the vessel; and the presence on board of a sixty-five-year-old crewmember who began to experience symptoms of a heart attack, the Coast Guard cutter made the decision to enter the territorial sea to conduct a rescue operation. The Coast Guard cutter rescued the three persons on board and their personal property.[82]

The incident described above highlights the complex challenges, from an international law and policy perspective, facing any shipmaster or aircraft commander attempting to fulfill his duty to render assistance to persons in distress, particularly in another coastal state's territorial sea.[83] Does the shipmaster have a duty to rescue persons in distress even in another coastal state's territorial sea? Are aircraft also obliged to conduct these types of rescue operations? What are the implications for a warship or military aircraft conducting a rescue operation in a coastal state's territorial sea?[84] The problem is that these rescue operations can cause unintended concern for the coastal state if the ship's or aircraft's purpose for entering its territorial sea is misconstrued.

While not specifically defined, the principle of assistance entry (AE) is established through international conventions[85] and customary international law.[86] In support of this mandate to rescue persons in distress anywhere on the seas, the U.S. Coast Guard developed policy for the conduct of AE rescue operations within a coastal state's territorial sea by Coast Guard ships and aircraft.[87] To ensure compliance with international conventions, AE rescue operations policy should respect three principles: (1) the sovereign right of a state to control and regulate entry into its territorial sea; (2) the humanitarian need to assist persons in distress quickly and effectively without regard to nationality or circumstances; and (3) that entry into a coastal state's territorial sea does not require seeking or receiving permission from the coastal state to conduct the rescue operation in its territorial sea.[88]

What follows is seven different AE scenarios that SAR authorities and legal advisers should consider in developing national and agency-specific AE policies, accompanied in each case by an overview of the applicable international legal and policy concerns. It is important to work through the issues and prepare positions that can be provided to the shipmaster and the aircraft commander for guidance. When persons are in distress and a government ship or aircraft is in a position to render assistance, valuable time should not be wasted seeking guidance and legal advice before rendering the necessary assistance.[89] These discussions should

occur; however, legal positions and policies should be developed *before* any of these scenarios are encountered.

Scenario A

A government ship transiting on the high seas receives a distress broadcast and diverts to render assistance to a person in distress in a coastal state's territorial sea. Does the ship need to obtain the coastal state's consent to enter its territorial sea to render assistance to the person in distress?

In this scenario, the government ship would not be required to obtain consent from the coastal state before rendering assistance to persons in distress in the coastal state's territorial sea. However, the shipmaster should notify the coastal state of his intention to render the assistance, the approximate distress location, and the ship's intention to transit into the state's territorial sea to conduct the rescue operation. UNCLOS and the SOLAS and Salvage Conventions mandate that the shipmaster has the duty to render assistance to persons in distress throughout the oceans.[90]

While the coastal state exercises sovereignty over its territorial sea, that sovereignty is not unlimited. In the case of AE, the coastal state has limited ability to interfere with the entry of a ship conducting a rescue operation.[91] Likewise, the assisting ship is also limited in its operations within a coastal state's territorial sea. For example, (1) there must be persons in distress before a government ship may enter into a coastal state's territorial sea to render assistance, and (2) there is a limitation on what activities the ship may conduct during an AE rescue operation. Specifically, the government ship is limited to *rescuing* persons in distress only.

There are conditions that should be met for a ship to conduct AE. For example, U.S. Coast Guard policy affirms that a Coast Guard SAR unit may conduct AE into a coastal state's territorial sea to render assistance to a person in distress if, in the judgment of the CO, the on-scene situation meets the following three criteria: (1) there is reasonable certainty (on the basis of the best available information, regardless of source) that a person is in distress; (2) the distress location is reasonably well known; and (3) the SAR unit (or SAR facility) is in position to render timely and effective assistance.[92]

Additionally, because of the urgency to take immediate action to rescue persons in distress, AE should not be delayed while the coastal state is notified of the government ship's intention to render assistance in its territorial sea. Even if the assistance to a person in distress already is being coordinated by the coastal state's RCC, as envisioned in the SAR Convention, the government ship's duty to render timely assistance remains.[93]

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Scenario B

A government ship transiting on the high seas receives a distress broadcast and diverts to render assistance to a person in distress in a coastal state's territorial sea. Can the ship use its embarked helicopter and small boat to assist in the rescue operation? Can a military aircraft transiting in oceanic airspace also divert and enter a coastal state's airspace to assist in the rescue operation, or must the aircraft first obtain permission from the coastal state? Can a military aircraft enter a coastal state's territorial sea even if no surface unit is participating in the rescue operation?

There is no international instrument that expressly prevents a government ship from using its embarked aircraft or small boat in rendering assistance to a person in distress. Embarked aircraft and small boats should be considered an extension of the ship;[94] all available resources necessary to the lifesaving operation should be used, even if the location of the distress incident is in a coastal state's territorial sea.[95]

In addition to a ship using an embarked aircraft for an AE rescue operation, any other available aircraft made aware of a distress can and should divert to render assistance in a coastal state's territorial sea.[96] The use of an aircraft for an AE rescue operation would be governed by the same criteria placed on use of a surface rescue unit.[97]

The legal justification for the use of an aircraft in the conduct of an AE rescue operation cannot rest solely on UNCLOS; both articles 18 and 98 are silent on whether aircraft can assist persons in distress in a coastal state's territorial sea.[98] However, the SAR Convention *does* consider the use of aircraft in the conduct of SAR operations.[99] This makes sense, since the purpose of the SAR Convention is to implement the global SAR system, which provides the international framework for organizing and standardizing SAR processes and procedures in the coordination and conduct of lifesaving operations. To carry out this purpose, the SAR Convention supports the use of any and all rescue capabilities that can be used during a SAR operation, including rescue operations within any coastal state's territorial sea.[100]

Scenario C

Can a government ship "rescue" property while rendering assistance to a vessel in distress (e.g., personal property on board the vessel, floating in the water, etc.) in a coastal state's territorial sea, in addition to rendering assistance to persons in distress? To render the necessary assistance, can the ship tow the imperiled vessel into safe waters? After the ship brings any survivors on board, can it "rescue" the vessel and property, if they are still salvageable?[101]

The international conventions mandating a shipmaster's duty to render assistance to persons in distress do not contemplate the "rescue" or "recovery" of

property in an AE rescue operation in a coastal state's territorial sea.[102] It is a person in distress who is assisted, not property. Therefore, the requirements for the conduct of an AE rescue operation should not be applied to the recovery of property. However, it can be argued that the recovery of property incidental to the conduct of an AE rescue operation is appropriate. This may include, for example, the recovery of critical medicine a survivor may require, towing a vessel that would facilitate the rescue of the persons in distress, and towing a disabled vessel.

Unless other arrangements are made between the shipmaster and the coastal state, the government ship contemplating the recovery of property *not* incidental to the AE rescue operation and within the coastal state's territorial sea should (1) complete the AE rescue operation, (2) depart the coastal state's territorial sea, and (3) seek permission to reenter the territorial sea to recover or salvage the property. This also would include the recovery of illegal contraband that could be used for any prosecution of the survivors if they were conducting a smuggling operation (e.g., narcotics).

Scenario D

A government ship transiting on the high seas receives a distress broadcast and enters a coastal state's territorial sea to render assistance to a person in distress. After a reasonable amount of time, it cannot locate the distress incident location. Can the ship conduct a search in an attempt to locate the person in distress?

While no international instrument permits a coastal state to refuse entry of a government ship into its territorial sea to conduct an AE rescue operation, the SAR Convention does require authorization from the coastal state to conduct a search for persons in distress. If the ship conducting the AE rescue operation is unable to locate the persons in distress in a reasonable amount of time, then the proper course of action would be (1) to depart the coastal state's territorial sea and (2) to seek permission to conduct a search coordinated by the coastal state's SMC through the RCC responsible for the SAR region in which the person in distress is (presumably) located.[103]

Scenario E

A government ship transiting on the high seas receives a distress broadcast from a vessel taking on water in a coastal state's territorial sea. The shipmaster notifies his command authority that he is diverting to render assistance. The command authority coordinates notifying the coastal state that the ship is entering its territorial sea to render assistance to the vessel. The coastal state notifies the command authority that its SAR facility is en route to provide assistance and advises the ship that its assistance is not required. What should the shipmaster do? What should the ship's command authority do?

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A government ship's duty to conduct an AE rescue operation is not nullified because the coastal state reports it has dispatched SAR facilities or units to rescue a person in distress. If, in the judgment of the shipmaster, the coastal state's assistance is inadequate or not timely, then the distress still may be ongoing, and his duty would continue regardless of the coastal state's assertions or intent. This decision must rest with the shipmaster on scene, who has the duty to render the assistance.[104] However, if the coastal state's SAR unit is able to arrive on scene and conduct the rescue, the shipmaster's duty to render assistance is fulfilled.

Scenario F

Do the same requirements for a government ship to render assistance in a coastal state's territorial sea apply in international straits while transiting?[105]

The shipmaster's duty to render assistance to persons in distress applies throughout the ocean, whether in the territorial sea, in straits used for international navigation, in archipelagic waters, in the exclusive economic zone, or on the high seas.[106]

Scenario G

A government ship transiting on the high seas receives a distress broadcast from a vessel under attack by armed robbers while transiting through a coastal state's territorial sea. The government ship diverts to render assistance. Would this incident be considered an AE rescue operation?

This scenario should not be considered AE; UNCLOS (article 98), as well as the SOLAS (chapter V, regulation 33) and Salvage (article 10) Conventions, would not apply. Additionally, if the incident is not considered a rescue operation, then the SAR Convention also would not apply.[107] The issue is whether a vessel under attack should be considered to be "in distress" (from a SAR perspective), with any response to be coordinated under the requirements of the SAR Convention. Interestingly and appropriately, there is no formal definition of *distress* in the SAR Convention or any other international convention.[108] This gives a person in extremis wide latitude in determining whether to declare distress and seek assistance. However, a vessel under attack should not be considered in distress, with any response to be coordinated under the SAR Convention; it would be more appropriate to consider this type of incident a law-enforcement or military operation.[109]

This does not mean, however, that a coastal state's RCC cannot coordinate a response in support of law-enforcement authorities or military resources that may be used to assist the ship under attack. The coordination and conduct of this type of operation would be implemented through a coastal state's national policies and procedures. In addition, if persons are injured during the response, the operation could include the medical transport of injured persons, which would be considered a SAR operation.

This position—that a vessel under attack is not considered "in distress"—was affirmed in a 2015 legal ruling in the U.S. Court of Appeals for the Fourth Circuit. The case highlighted the important distinction among antipiracy, law-enforcement, and military actions and SAR operations. The court's ruling provides an important distinction that warrants consideration by law-enforcement, military, and SAR authorities; in some coastal states, the coordination, policies, processes, procedures, and resources used to conduct these types of actions very well may not be the same as those used to conduct SAR operations.[110]

In 2011, during NATO-conducted antipiracy operations in the Gulf of Aden and the Indian Ocean, a U.S. warship engaged *Jin Chun Tsai 68 (JCT 68),* a fishing vessel from Taiwan that pirates had hijacked more than a year earlier and were using as a mother ship for pirate operations. On board *JCT 68* were pirates and three hostages; the latter consisted of the original shipmaster, Wu Lai-Yu, and two Chinese crewmembers. During the engagement, the warship used disabling fire to stop the vessel. After the pirates surrendered, the warship's boarding team went on board *JCT 68*. Three of the pirates and Wu had been killed during the warship's use of disabling fire. Subsequently, the pirates and the two remaining Chinese crewmembers were removed from the vessel. The following day, *JCT 68* was sunk intentionally—with Wu's body still on board, as the NATO task force commander directed.

Wu's widow subsequently initiated legal action against the United States in the District Court for the District of Maryland, seeking damages for her husband's death and the loss of *JCT 68.* The court granted the government's motion to dismiss the legal action, reasoning that the complaint was not a legal issue to be decided in a court of law. Wu's widow appealed the ruling in the Court of Appeals for the Fourth Circuit; the court of appeals affirmed the district court's decision to grant the government's motion. In determining whether a vessel under attack is considered "in distress," any response to which would fall under the requirements of the SAR Convention, the court of appeals affirmed an important distinction concerning the action the warship in question conducted:

> Plaintiff is likewise mistaken in categorizing the USS *Groves*'s engagement with the *Jin Chun Tsai 68* as a "Good Samaritan" action, or a "rescue operation" analogous to the rescue by the U.S. Coast Guard of distressed mariners. . . . The focus of the USS *Groves*'s operation was to stop the depredations of the pirates, in part by depriving the pirates of their stolen mother ship. Sinking the *Jin Chun Tsai 68* was part of the course of action worked out by the military commanders to further maritime security. The district court correctly recognized that because the *Jin Chun Tsai 68* was sunk under direct NATO orders, the court could not adjudicate plaintiff's claim that the decision to sink the vessel was negligent or unlawful.[111]

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This distinction is important when considering the conduct of SAR operations under the SAR Convention. Some coastal states may train and equip SAR units that would be responsible for conducting SAR operations only, not law-enforcement or military actions. Additionally, SAR authorities may rely on volunteer SAR organizations or seek the assistance of Good Samaritans in the vicinity of a vessel or persons in distress to assist in a particular SAR operation. The global SAR system was never envisioned to support other types of actions.[112]

In summary, any ship or aircraft conducting an AE rescue operation must notify the coastal state of the intended course of action. Because of the perceived imminence of the distress and the urgency to take immediate action, the shipmaster or aircraft commander is not required to seek permission from the coastal state to fulfill his duty to render assistance and save lives. Even if the coastal state notifies the ship or aircraft rendering assistance that it has dispatched a SAR unit, if the shipmaster or aircraft commander believes the coastal-state SAR unit will not arrive in a timely manner, the duty to render assistance remains, and the shipmaster or aircraft commander must continue the rescue operation. The SAR Convention was never intended to limit or restrict a ship or aircraft that is available to render assistance to persons in distress. However, it would be appropriate for the shipmaster to coordinate the AE rescue operation with the coastal state's RCC, which should assume SMC of the SAR case. The shipmaster or aircraft commander, in communicating his actions to the coastal state, must ensure there is no misunderstanding about the craft's intent to conduct an AE rescue operation. Saving lives is the priority, even in a coastal state's territorial sea.

FORCIBLE EVACUATION FOR SAR

In 2011, the U.S. Coast Guard was notified that a twenty-four-foot sailboat registered in the United States and with one person on board was possibly in distress. The reporting source had received a voice mail from the person's satellite phone late in the evening stating, "Emergency, emergency," and nothing more. The last report received placed the sailboat seventy miles south of the United States and thirty miles offshore. The Coast Guard assumed SMC for the SAR operation and launched a Coast Guard aircraft and diverted a Coast Guard cutter to render assistance.

The aircraft located the sailboat, was able to see the person moving on deck, but was unable to hail him on the radio. It did appear to the aircraft that the sailboat's boom was damaged. The Coast Guard cutter arrived on scene and sent a boarding team to the sailboat to assess the situation. The boarding team confirmed the boom was destroyed and the sailboat's only outboard engine had fallen off the vessel.

The boarding team advised the person that he should evacuate the vessel for his own safety, but he refused. However, the Coast Guard cutter and its boarding team on the sailboat realized that due to the condition of the sailboat the person's

life was in jeopardy. In consultation with the Coast Guard SAR chain of command, the Coast Guard cutter compelled the person to depart the sailboat with the cutter's boarding team. The cutter determined that the sailboat was in such a dilapidated state that it was unsalvageable; the sailboat was marked and abandoned at sea. The survivor was transferred to the Coast Guard cutter and returned to the United States.[113]

Finally, this article considers the challenge of compelling a person to abandon his vessel to save his life. Thankfully, SAR authorities encounter such situations only infrequently; a person in distress who requests assistance normally wants to leave his vessel if the SAR responders on scene believe it necessary for his safety.[114]

The international conventions do not address specifically the use of force to compel a person to abandon his vessel in a life-threatening situation. The intent here is to provide a very brief overview and discussion of this issue, in order for coastal states and SAR authorities to consider whether national and agency-specific SAR policies are adequate and well understood by all levels in the SAR chain of command. As can be seen in the scenario related above and in the fishing vessel *Northern Voyager* SAR case described below (which resulted in a lawsuit against the U.S. Coast Guard), these incidents can and do occur.

SAR authorities should consider several questions:

- What if an SMC is notified that a vessel is in distress and dispatches a SAR unit to render assistance, but the vessel's captain refuses to disembark, even though in the judgment of the SAR unit on scene he will perish if he does not abandon the vessel?
- What if a merchant ship is diverted to render assistance, but the vessel's captain refuses to abandon the vessel? The ship's crewmen most likely would not be trained in the use of force; they are merely fulfilling their duty to assist in the lifesaving operation. What advice should the SMC give to the shipmaster?
- What if the crew or passengers wish to evacuate a vessel in distress, but the vessel's captain refuses to allow them to depart? What should the SAR unit or SAR facility on scene do? Should the use of force be contemplated to allow passengers and crewmembers to disembark the vessel in distress?
- If necessary, should force be used to compel the person in distress to leave his vessel? Does it matter whether the SAR unit is trained in the use of force? What type of force and extent of use should be contemplated?
- What are the legal implications of compelling a person against his will to abandon his vessel in what is perceived to be a life-threatening situation?

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- What if the forcible evacuation of a person is being contemplated on a vessel of a different flag state?[115] How does that complicate the proposed use of force?

These are difficult questions applied to challenging, life-threatening situations—and SAR authorities should address them before this type of incident occurs. Forcibly compelling a person to abandon his vessel presents the SAR responder on scene who is attempting to provide the lifesaving assistance with a difficult situation, and may result in controversy, property loss, and litigation.

In the United States, there is only one lawsuit that primarily discusses a SAR unit compelling a person in distress to abandon his vessel to save his life. In *Thames Shipyard and Repair Company v. United States,* the owner and insurer of the U.S.-documented fishing vessel *Northern Voyager* sued the United States, alleging that the disabled vessel sank, in part, because the U.S. Coast Guard compelled the vessel's captain to leave against his will.[116]

In November 1997, after losing its starboard rudder off the northeastern coast of the United States, the 144-foot *Northern Voyager* experienced significant flooding in the steering compartment, which was threatening to flood the vessel's engineering compartment as well. *Northern Voyager*'s captain notified the Coast Guard of the situation, which assumed SMC and dispatched two SAR units to provide additional pumps and render any other assistance *Northern Voyager* might require. Despite the crew's attempts to curtail the progressive flooding, the fishing vessel developed a port list, settled further in the water, and was threatening to capsize and sink without warning with the crewmembers and Coast Guard personnel on board. The SAR units on scene, in contact with the SMC at the RCC coordinating the response, decided the only course of action left was to evacuate the remaining crewmembers before the vessel sank. When the Coast Guard personnel on *Northern Voyager* informed the captain that it was time to abandon ship, he refused to leave. The Coast Guard personnel informed him that if he did not cooperate, he would be compelled to depart, using force if necessary. As a result, the remaining members of *Northern Voyager*'s crew, the captain, and the assisting Coast Guard personnel evacuated the vessel. The fishing vessel sank a short while later.

Both the district court and the court of appeals held that U.S. law protected the Coast Guard's decision to evacuate the captain forcibly from the life-threatening situation that occurred on *Northern Voyager*.[117] The Supreme Court of the United States declined to review the case.[118]

In contemplation of both the operational and legal difficulties involved in forcibly evacuating a person from his vessel, even in a life-threatening situation, the Coast Guard does provide guidance to SAR units and the Coast Guard SAR

chain of command. Coast Guard policy provides that, if time permits, the SAR unit on scene should consult with the SMC; but that the SAR unit can evacuate a person forcibly from his vessel if it judges that (1) a true life-threatening situation exists, and (2) the vessel to be abandoned in fact does require immediate assistance.[119] If time further permits, the decision to evacuate a person forcibly from his vessel should be made at the most competent operational and legal level in the SAR chain of command.[120]

In summary, SAR authorities should consider whether their current SAR policies and procedures provide adequate guidance for this challenging "forcible evacuation" scenario; if not, they should give further thought to developing new or improved policies and procedures for their SAR chain of command.

The global SAR system, while not perfect and in need of continuous improvement, does provide a means of notification about and response to persons in distress at sea. As long as people continue to sail the world's oceans, there will be a need to provide effective lifesaving services to those who need assistance.

International conventions provide the legal foundation for each coastal state to implement a national SAR organization. Coastal states must develop the SAR processes and procedures and provide the ships, boats, aircraft, and dedicated personnel that conduct lifesaving operations at sea. Ships plying the world's oceans are important contributors to the global SAR system and normally are willing to come to the aid of those in distress. When ships render assistance in a SAR operation, the SMC must work with the shipmaster to coordinate the response and delivery of the survivors to a place of safety, thereby limiting the impact on the shipmaster.

This article considered the conduct of AE rescue operations in a coastal state's territorial sea and some different AE scenarios that may be encountered. While AE rescue operations occur infrequently, SAR authorities nonetheless should develop national and agency-specific policies for ships and aircraft that may be required to conduct these operations and ensure their commanders understand them.

Finally, this article discussed the difficult situation of a person who refuses to abandon his vessel even when the SAR unit on scene believes that evacuation is the only option left to save lives. While SAR authorities encounter such situations very infrequently, national and agency-specific policies and guidelines should be developed to address this type of incident.

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NOTES

1. Lyman J. Gage, U.S. Secretary of the Treasury, to Captain Francis Tuttle, Revenue Cutter Service, "Letter of Instructions," 15 November 1897, in *Report of the Cruise of the U.S. Revenue Cutter Bear and the Overland Expedition for the Relief of the Whalers in the Arctic Ocean, from November 27, 1897, to September 13, 1898* (Washington, DC: Government Printing Office, 1899), pp. 5–10, available at www.uscg.mil/.
2. International Maritime Organization [hereafter IMO], *International Convention on Maritime Search and Rescue, 1979,* 2006 ed. (London: IMO, 2006). Entered into force: 22 June 1985; number of contracting states: 106.
3. "International Convention on Maritime Search and Rescue (SAR)," *International Maritime Organization,* www.imo.org/.
4. Epigraph: Meg Jones, "A Year Later, Oshkosh Survivor of Cruise Ship Crash Still Cruising," *Milwaukee-Wisconsin Journal Sentinel,* 14 January 2013, available at www.jsonline.com/.
5. These international conventions will be discussed in greater detail later in this article.
6. The annex to the SAR Convention mandates (paragraph 2.1.2) that "Parties shall either individually or, if appropriate, in co-operation with other States, establish the following basic elements of a search and rescue service: 1) legal framework; 2) assignment of a responsible authority; 3) organization of available resources; 4) communication facilities; 5) co-ordination and operational functions; and 6) processes to improve the service including planning, domestic and international co-operative relationships and training. Parties shall, as far as practicable, follow relevant minimum standards and guidelines developed by the Organization."
7. The annex to the SAR Convention provides (paragraphs 1.3.4, 1.3.5, and 1.3.6, respectively) the following definitions: "Search and Rescue Region: An area of defined dimensions associated with a rescue co-ordination centre within which search and rescue services are provided"; "Rescue co-ordination centre: A unit responsible for promoting efficient organization of search and rescue services and for co-ordinating the conduct of search and rescue operations within a search and rescue region"; "Rescue sub-center: A unit subordinate to a rescue co-ordination center established to complement the latter according to particular provisions of the responsible authorities."
8. Convention on International Civil Aviation, 7 December 1944, 9th ed. 2006, ICAO doc. 7300.
9. IMO / International Civil Aviation Organization, *International Aeronautical and Maritime Search and Rescue Manual* [hereafter IAMSAR manual] (Croydon, U.K.: CPI Group, 2013).
10. The annex to the SAR Convention defines (paragraph 1.3.3) *search and rescue service* as "[t]he performance of distress monitoring, communication, co-ordination and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources including co-operating aircraft, vessels and other craft and installations."
11. IAMSAR manual, vol. 1, p. v.
12. Ibid., p. 1-1 (paragraph 1.1.3). It should also be noted (paragraph 1.3.1) that SAR services can be established by individual states or regionally: "These services can be provided by States individually establishing effective national SAR organizations, or by establishing a SAR organization jointly with one or more other States."
13. Ibid., p. xiii. The SC is defined as "[o]ne or more persons or agencies within an Administration with overall responsibility for establishing and providing SAR services and ensuring that planning for those services is properly co-ordinated." Volume 2 goes on to state (paragraph 1.2.2) that "SCs have the overall responsibility for establishing, staffing, equipping, and managing the SAR system, including providing appropriate legal and funding support, establishing RCCs and rescue sub-centres (RSCs), providing or arranging for SAR facilities, co-ordinating SAR training, and developing SAR policies. SCs are the top level SAR managers; each State normally will have one or more persons or agencies for whom this designation may be appropriate."
14. Ibid., vol. 1, p. xiii. The SMC is defined (paragraph 1.2.3) as "[t]he official temporarily

assigned to co-ordinate response to an actual or apparent distress situation." See also ibid., vol. 2, p. 1-2.

15. Ibid., vol. 1, p. xii. The OSC is defined (paragraph 1.2.4) as "[a] person designated to co-ordinate search and rescue operations within a specified area." See also ibid., vol. 2, p. 1-3.
16. Ibid., vol. 1, p. xi. The ACO is defined (paragraph 1.2.5) as "[a] person or team who co-ordinates the involvement of multiple aircraft in SAR operations in support of the SAR mission co-ordinator and on-scene co-ordinator." See also ibid., vol. 2, p. 1-3.
17. Comparable to the annex to the SAR Convention, the Chicago Convention's annex 12 (Search and Rescue) provides the framework for contracting states to implement an aeronautical global SAR system. The SAR system under the Chicago Convention also has aeronautical SAR regions worldwide, in which contracting states are responsible for coordinating SAR operations. This global aeronautical SAR system complements, or stands in parallel to, the maritime system.
18. The annex to the SAR Convention states (paragraph 2.1.4): "Each search and rescue region shall be established by agreement among Parties concerned. The Secretary-General shall be notified of such agreements."
19. SAR agreements can be bilateral or multilateral. For example, in 2011, the eight Arctic nations (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States) concluded an agreement that delimited the entire Arctic region into aeronautical (Chicago Convention) and maritime (SAR Convention) SAR regions between the parties. It also formalized SAR cooperation and coordination among the eight states. Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, 12 May 2011, available at oaarchive.arctic-council.org/.
20. IAMSAR manual, vol. 1, p. 1-5 (paragraph 1.6.3).
21. See note 10 for a definition of *search and rescue service.* The coastal state is responsible for the coordination and conduct of SAR operations within its SAR region.
22. The annex to the SAR Convention (paragraph 2.1.7) is very clear on this point: "The delimitation of search and rescue regions is not related to and shall not prejudice the delimitation of any boundary between States." The IAMSAR manual, vol. 1, p. 2-8 (paragraph 2.3.15[e]) goes on to state that "[a]n SRR [SAR region] is established solely to ensure that primary responsibility for co-ordinating SAR services for that geographic area is assumed by some State. SRR limits should not be viewed as barriers to assisting persons in distress. . . . In this respect co-operation between States, their RCCs and their SAR services should be as close as possible."
23. The High Seas Convention, article 1, defines *high seas* as "all parts of the sea that are not included in the territorial sea or in the internal waters of a State." Convention on the High Seas, 29 April 1958, U.N.T.S. 450, p. 11, available at treaties.un.org/. Entered into force: 30 September 1962; number of parties: 77. UNCLOS, which replaced the High Seas Convention, states in article 86: "The provisions of this Part apply to all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State." United Nations Convention on the Law of the Sea, 10 December 1982 [hereafter UNCLOS], available at treaties.un.org/. Entered into force: 16 November 1994; number of parties: 167.
24. The annex to the SAR Convention (paragraph 2.1.9) states: "Parties having accepted responsibility to provide search and rescue services for a specified area shall use search and rescue units and other available facilities for providing assistance to a person who is, or appears to be, in distress at sea." (See note 58 for the definition of *SAR facilities* and *SAR units*.) The annex to the SAR Convention allows for the use of any resources to save lives at sea. The national administration must be able to coordinate the response to persons in distress though the RCC/RSC.
25. The IAMSAR manual, vol. 1, paragraph 2.1.1, provides an excellent overview when describing SAR as an international *system:* "The SAR system, like any other system, has individual components but must work together to provide the overall service. Development of a SAR system typically involves establishment of one or more SRRs, along with capabilities to receive alerts and to co-ordinate and

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provide SAR services within each SRR. Each SRR is associated with an RCC. For aeronautical purposes, SRRs often coincide with flight information regions (FIRs). The goal of ICAO and IMO conventions relating to SAR is to establish a global SAR system. Operationally, the global SAR system relies upon States to establish their national SAR systems and then integrate provision of their services with other States for world-wide coverage."

26. Ibid., p. 2-3, paragraph 2.3.1.

27. The annex to the SAR Convention (paragraph 2.3.1) states: "Parties shall individually or in co-operation with other States establish rescue co-ordination centres for their search and rescue services and such rescue sub-centres as they consider appropriate." It should be noted that under the Chicago Convention's annex 12, the global aeronautical SAR system also requires contracting states to make provision for an aeronautical RCC (ARCC); one ARCC is assigned for each aeronautical SAR region. By comparison, under the global maritime SAR system, a maritime RCC (MRCC) coordinates maritime SAR operations in a designated maritime SAR region. When nations implement a national SAR system in which a particular RCC coordinates both aeronautical and maritime SAR, it is known as a joint RCC. Where a coastal state has instituted both ARCCs and MRCCs, aeronautical and maritime SAR authorities must work closely together to ensure the various types of SAR operations with overlapping aeronautical and maritime SAR regions are effectively coordinated. When considering the coordination between aeronautical and maritime SAR services, the annex to the SAR Convention (paragraph 2.4.1) states: "Parties shall ensure the closest practicable co-ordination between maritime and aeronautical services so as to provide for the most effective and efficient search and rescue services in and over their search and rescue regions." This same imperative is established as a recommendation in the Chicago Convention's annex 12, paragraph 3.2.2.

28. IAMSAR manual, vol. 1, pp. 2-4–2-5.

29. Ibid., p. xiv. *Search-and-rescue subregion* is defined as "[a] specified area within a search and rescue region associated with a rescue sub-centre." For example, the U.S. Coast Guard maintains two RSCs (RSC San Juan, Puerto Rico, and RSC Guam) that coordinate SAR operations with their respective SRSs.

30. Ibid., p. 2-9.

31. The facts portrayed in this vignette are known by the author, who attests to their accuracy. The vignette is presented for consideration of the legal and policy issues involved.

32. *Oxford Dictionary,* s.v. "international law," www.oxforddictionaries.com/: "A body of rules established by custom or treaty and recognized by nations as binding in their relations with one another." *The Commander's Handbook on the Law of Naval Operations* further describes international law as "that body of rules that nations consider binding in their relations with one another. International law derives from the practice of nations in the international arena and from international agreements. International law provides stability in international relations and an expectation that certain acts or omissions will effect predictable consequences. If one nation violates the law, it may expect that others will reciprocate. Consequently, failure to comply with international law ordinarily involves greater political and economic costs than does observance. In short, nations comply with international law because it is in their interest to do so. Like most rules of conduct, international law is in a continual state of development and change." U.S. Navy / Marine Corps / Coast Guard, *The Commander's Handbook on the Law of Naval Operations* (2007) [hereafter *Commander's Handbook*], p. 20, available at www.jag.navy.mil/.

33. The IMO website explains that "[t]he SOLAS Convention in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships. The first version was adopted in 1914, in response to the *Titanic* disaster, the second in 1929, the third in 1948, and the fourth in 1960. The 1974 version includes the tacit acceptance procedure—which provides that an amendment shall enter into force on a specified date unless, before that date, objections to the amendment are received from an agreed number of Parties. As a result the 1974 Convention has been updated and amended on numerous occasions. The Convention in force today is sometimes referred to as SOLAS, 1974, as amended." "International Convention for the Safety of Life at Sea

(SOLAS), 1974," *International Maritime Organization,* www.imo.org/.

34. IMO, *SOLAS, Consolidated Edition, 2009* (London: IMO, 2009), p. 268. The SOLAS Convention applies to vessels on international voyages, commercial vessels in particular. SOLAS allows exceptions for warships (and others) but encourages these ships to act in a manner consistent with its provisions. Entered into force: 25 May 1980; number of contracting states: 162.
35. UNCLOS, article 98.
36. *Commander's Handbook,* p. 1-1, states: "Although the United States is not a party to the 1982 LOS Convention, it considers the navigation and overflight provisions therein reflective of customary international law and thus acts in accordance with the 1982 LOS Convention, except for the deep seabed mining provisions." Additionally, the duty for U.S. shipmasters to render assistance is stipulated in the United States Code (USC); 46 USC § 2304(a)(1) states: "A master or individual in charge of a vessel shall render assistance to any individual found at sea in danger of being lost, so far as the master or individual in charge can do so without serious danger to the master's or individual's vessel or individuals on board." Additionally, "A master or individual violating this section shall be fined not more than $1,000, imprisoned for not more than 2 years, or both." However, as further stated in 46 USC § 2304, this obligation does not apply to U.S. warships.
37. International Convention on Salvage, 28 April 1989, available at www.imo.org/. Entered into force: 14 July 1996; number of contracting states: 67.
38. E.g., the Salvage Convention, article 10, requires a shipmaster to render assistance "so far as he can without serious danger to his vessel, her crew and her passengers." This is also stipulated in the SOLAS Convention, chapter V, regulation 33, paragraph 1, quoted in the text above, where the shipmaster must make a determination about whether he can render assistance to a person in distress.
39. E.g., the annex to the SAR Convention (paragraph 4.8.1) states: "Search and rescue operations shall continue, **when practicable,** until all reasonable hope of rescuing survivors has passed" (emphasis added). According to paragraph 4.8.4, "If a search and rescue operation on-scene becomes **impracticable** and the rescue co-ordination centre or rescue sub-centre concludes that survivors might still be alive, the centre may temporarily suspend the on-scene activities pending further developments, and shall promptly so inform any authority, facility or service which has been activated or notified" (emphasis added).
40. SOLAS Convention, chapter V, regulation 33, paragraph 6, states: "Masters of ships who have embarked persons in distress shall treat them with humanity, within the capabilities and limitations of the ship."
41. IMO Resolution MSC.167(78), *Guidelines on the Treatment of Persons Rescued at Sea* (adopted 20 May 2004), provides general guidance (paragraph 5.1) for shipmasters. "SAR services throughout the world depend on ships at sea to assist persons in distress. It is impossible to arrange SAR services that depend totally upon dedicated shore-based rescue units to provide timely assistance to all persons in distress at sea. Shipmasters have certain duties that must be carried out in order to provide for safety of life at sea, preserve the integrity of global SAR services **of which they are part,** and to comply with humanitarian and legal obligations" (emphasis added).
42. UNCLOS, article 29, defines *warship* as "a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline." See also *Commander's Handbook,* p. 2-1.
43. The SOLAS Convention, chapter I, regulation 3, lists the following classes of ships that are exempted from complying with the regulations unless specifically stated in a particular regulation: (1) ships of war and troopships; (2) cargo ships of less than five hundred gross tons; (3) ships not propelled by mechanical means; (4) wooden ships of primitive build; (5) pleasure yachts not engaged in trade; and (6) fishing vessels. Additionally, the Salvage Convention, article 4, details the nonapplicability of the convention to "State-owned vessels": "1. Without prejudice to article 5, this Convention shall not apply to warships

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or other non-commercial vessels owned or operated by a State and entitled, at the time of salvage operations, to sovereign immunity under generally recognized principles of international law unless that State decides otherwise.

"2. Where a State Party decides to apply the Convention to its warships or other vessels described in paragraph 1, it shall notify the Secretary-General thereof specifying the terms and conditions of such application."

44. In *Hasan v. United States of America* (2010), the U.S. District Court for the Eastern District of Virginia, in its opinion and order, provided an overview of customary international law: "[the] body of rules that nations in the international community universally abide by, or accede to, out of a sense of legal obligation and mutual concern." Available at www.unicri.it/. In addition, the Statute of the International Court of Justice, article 38(1)(b), describes customary international law as "a general practice accepted as law." Available at www.icj-cij.org/. This understanding of customary international law is further affirmed in the *Commander's Handbook,* which states (p. 20): "The general and consistent practice among nations with respect to a particular subject, which over time is accepted by them generally as a legal obligation, is known as customary international law. Customary international law is the principal source of international law and is binding upon all nations."

45. For example, in the United States, the requirement for COs of warships to render assistance to persons in distress at sea is mandated in *U.S. Navy Regulations* (1990), article 0925 (Assistance to Persons, Ships and Aircraft in Distress): "1. Insofar as can be done without serious danger to the ship or crew, the commanding officer or the senior officer present as appropriate shall: a) proceed with all possible speed to the rescue of persons in distress if informed of their need for assistance, insofar as such action may reasonably be expected of him or her; b) render assistance to any person found at sea in danger of being lost; c) afford all reasonable assistance to distressed ships and aircraft; and d) render assistance to the other ship, after a collision, to her crew and passengers and, where possible, inform the other ship of his or her identity." *U.S. Coast Guard Regulations* (1992), article 4.2-5 (Assistance), provides a similar mandate for the COs of U.S. Coast Guard ships to render assistance to persons in distress. These respective regulations make no distinction between peacetime and wartime operational requirements. (Note: rendering assistance to persons in distress under the law of armed conflict is not considered within the scope of this article.)

46. The annex to the SAR Convention applies to its contracting states. It is the contracting state that is obligated to ensure its ships comply with their obligation to render assistance at sea. See also paragraph 2.1.10.

47. The disembarkation of survivors can be conducted in several ways: (1) by the warship transferring survivors at sea to another craft to ensure it can resume normal operations; (2) by the SMC coordinating disembarkation with the coastal state that would be the warship's next port of call; or (3) in any other way that would relieve the warship of its burden to care for the survivors. As stated previously, the SMC should strive to minimize the impact on the warship (SAR Convention, paragraph 3.1.9).

48. The annex to the SAR Convention (paragraph 2.1.1) states: "Parties shall, as they are able to do so individually or in co-operation with other States and, as appropriate, with the Organization, participate in the development of search and rescue services to ensure that assistance is rendered to any person in distress at sea."

49. Additionally, the coastal state must coordinate the SAR response regardless of who the persons in distress are. The annex to the SAR Convention (paragraph 2.1.10) makes this requirement very clear: "Parties shall ensure that assistance be provided to any person in distress at sea. They shall do so regardless of the nationality or status of such a person or the circumstances in which that person is found."

50. A more appropriate course of action than diverting a ship from its next port of call would be to have the ship rendezvous with and transfer SAR survivors to a SAR unit for further transport to a place of safety.

51. IMO Resolution MSC.167(78) provides the priorities for rendering assistance to persons

rescued at sea. Paragraph 3.1 states in part: "When ships assist persons in distress at sea, co-ordination will be needed among all concerned to ensure that all of the following priorities are met in a manner that takes due account of border control, sovereignty and security concerns consistent with international law: 1) **Lifesaving:** All persons in distress at sea should be assisted without delay; 2) **Preservation of the integrity and effectiveness of SAR services:** Prompt assistance provided by ships at sea is an essential element of global SAR services; therefore it must remain a top priority for shipmasters, shipping companies and flag States; and 3) **Relieving masters of obligations after assisting persons:** Flag and coastal States should have effective arrangements in place for timely assistance to shipmasters in relieving them of persons recovered by ships at sea" (emphasis added).

52. The SAR Convention is the means by which parties have agreed to fulfill their duty to render assistance in most circumstances. However, the duty to render assistance continues to exist for every mariner. If it appears that the process agreed to in the SAR Convention will not result in timely and effective assistance in a particular situation, a shipmaster is still under obligation to come to the aid of the person in distress.

53. Annex to the SAR Convention, paragraph 3.1.9.

54. IAMSAR manual, vol. 1, p. xiii.

55. A place of safety very well may be the ship's next port of call. The goal of the SAR Convention is to minimize the impact on the ship. However, a life raft, even with ample rations, is *not* considered a place of safety. According to the SOLAS Convention, a life raft is considered a lifesaving appliance and does not meet the requirements for or the definition of a place of safety. The SOLAS Convention, chapter III, regulation 3, explains that a lifeboat or life raft is a *survival craft,* "capable of sustaining lives of persons in distress from the time of abandoning the ship." Persons afloat in a life raft must still be considered "in distress" until appropriate assistance is rendered and the persons are delivered to a place of safety.

56. The Convention on Facilitation of International Maritime Traffic of 1965 mandates that it is states that must coordinate the disembarkation of persons rescued at sea. Section 7.C (Emergency Assistance) affirms this important requirement, stating in part, "7.8 Standard. Public authorities shall facilitate the arrival and departure of ships engaged in: . . . the rescue of persons in distress at sea in order to provide a place of safety for such persons." In addition, standard 7.9 states, "Public authorities shall, to the greatest extent possible, facilitate the entry and clearance of persons, cargo, material and equipment required to deal with situations described in Standard 7.8." Convention on Facilitation of International Maritime Traffic, 9 April 1965, available at www.ifrc.org/. Entered into force: 5 March 1967; number of contracting states: 115.

57. Or any other vessel that diverts to render assistance to persons in distress.

58. The annex to the SAR Convention (paragraph 1.3.7) defines *search and rescue facility* as "[a]ny mobile resource, including designated search and rescue units, used to conduct search and rescue operations." By comparison, *search and rescue unit* is defined (paragraph 1.3.8) as "[a] unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations." The IAMSAR manual, vol. 1, goes on to state (p. 2-10, paragraph 2.5.3) that SAR units "may be under the direct jurisdiction of the SAR service or other State authorities or may belong to non-Governmental or voluntary organizations."

59. IMO Resolution MSC.167(78) stipulates (paragraph 6.13) that "[a]n assisting ship should not be considered a place of safety based solely on the fact that the survivors are no longer in immediate danger once aboard the ship. An assisting ship may not have appropriate facilities and equipment to sustain additional persons on board without endangering its own safety or to properly care for the survivors. Even if the ship is capable of safely accommodating the survivors and may serve as a temporary place of safety, it should be relieved of this responsibility as soon as alternative arrangements can be made."

60. IMO Resolution MSC.167(78) further explains (paragraph 6.15) this important aspect of coordinating the disembarkation of any persons rescued at sea: "The Conventions, as amended, indicate that delivery to a

place of safety should take into account the particular circumstances of the case. These circumstances may include factors such as the situation on board the assisting ship, on scene conditions, medical needs, and availability of transportation or other rescue units. Each case is unique, and selection of a place of safety may need to account for a variety of important factors."

61. On 10–11 December 2014, the U.S. Coast Guard participated in the annual Dialogue on Protection Challenges, in Geneva, Switzerland, on the theme "Protection at Sea." The meeting, sponsored by the UNHCR, focused on mixed migration at sea. During the meeting, an International Chamber of Shipping (ICS) representative made an excellent point: It is the shipmaster who must determine whether to deviate from his intended voyage and transit to the "nearest port of call" or to continue to the ship's "next port of call." Coastal states need to understand and support the shipmaster's decision, which will take into account important on-scene conditions as well as other logistical and risk factors. The "nearest port" may not be a viable option for the shipmaster. The coastal state needs to respect the shipmaster's decision and coordinate disembarkation of survivors accordingly. "Shipping Industry Calls on Governments to Address Migrants at Sea Crisis," *International Chamber of Shipping,* www.ics-shipping.org/.

62. In 2015 IMO/UNHCR/ICS jointly published an excellent resource: *Rescue at Sea: A Guide to Principles and Practice as Applied to Refugees and Migrants (2015 Rescue at Sea Guide)*. In discussing the action required by governments and RCCs in coordinating a merchant ship rendering assistance to persons in distress, it states: "Governments have to coordinate and cooperate to ensure that Masters of ships providing assistance by embarking persons in distress at sea are released from their obligations with minimum further deviation from the ship's intended voyage, and have to arrange disembarkation as soon as reasonably practicable." It goes on to state (p. 12) that "the Government responsible for the SAR region in which the rescued persons were recovered is primarily responsible for providing a place of safety or ensuring that such a place of safety is provided." Available at www.imo.org/.

63. Judith Kumin, "The Challenge of Mixed Migration by Sea," *Forced Migration Review,* no. 45 (February 2014), available at www.fmreview.org/, provides a good overview of what is considered *mixed migration by sea:* "Contemporary irregular migration is mostly 'mixed,' meaning that it consists of flows of people who are on the move for different reasons but who share the same routes, modes of travel and vessels. They cross land and sea borders without authorisation, frequently with the help of people smugglers. IOM and UNHCR point out that mixed flows can include refugees, asylum seekers and others with specific needs, such as trafficked persons, stateless persons and unaccompanied or separated children, as well as other irregular migrants. The groups are not mutually exclusive, however, as people often have more than one reason for leaving home. Also, the term 'other irregular migrants' fails to capture the extent to which mixed flows include people who have left home because they were directly affected or threatened by a humanitarian crisis—including one resulting from climate change—and need some type of protection, even if they do not qualify as refugees."

64. IMO Secretariat, "Outcome of the Inter-agency High-Level Meeting to Address Unsafe Mixed Migration by Sea: Note by the Secretariat" (LEG 102/INF.3), *Legal Committee 102nd Session* (9 March 2015), pp. 1–2, available at www.imo.org/.

65. Koji Sekimizu, IMO Secretary-General, opening comments (High-Level Meeting to Address Unsafe Mixed Migration by Sea, London, March 2015), p. 1, available at www.imo.org/.

66. Glaucia Boyer, "Development Dimensions of Mixed Migration" (presentation, High-Level Meeting to Address Unsafe Mixed Migration by Sea, London, March 2015), p. 10, available at www.imo.org/. Mrs. Boyer added, "The scale and protracted nature of the crisis is challenging the ability of the international community to meet the continuing need for essential, life-saving humanitarian aid."

67. Sekimizu, opening comments, p. 1.

68. United Nations High Commissioner for Refugees [hereafter UNHCR], *The Sea Route to Europe: The Mediterranean Passage in the*

Age of Refugees (1 July 2015), p. 2, available at www.unhcr.org/.

69. "Unsafe Mixed Migration by Sea," *International Maritime Organization,* www.imo.org/.
70. Ibid.
71. UNHCR, *The Sea Route to Europe,* p. 2.
72. IMO Secretariat, "Outcome of the Interagency High-Level Meeting," p. 2.
73. Ibid.
74. The summary conclusions from an 8–10 November 2011 UNHCR experts meeting in Djibouti, "Refugees and Asylum-Seekers in Distress at Sea—How Best to Respond?," state (paragraph B.7): "The specific legal framework governing rescue at sea does not apply to interception operations that have no search and rescue component." Available at www.unhcr.org/.
75. Considering the level of concern for the safety of persons or craft that may be in danger, the SMC will determine in which emergency phase (uncertainty, alert, or distress) to classify the SAR incident. (IAMSAR manual, vol. 2, paragraph 3.3.1.) In particular, the annex to the SAR Convention (paragraph 1.3.13) defines *distress phase* as "[a] situation wherein there is a reasonable certainty that a person, a vessel or other craft is threatened by grave and imminent danger and requires immediate assistance." In many mixed-migration operations the SAR Convention would not apply necessarily because the circumstances of the incident may not meet the criteria for any of the three emergency phases.
76. It is important to understand the differences among *refugees, asylum seekers,* and *economic migrants*. (1) The *2015 Rescue at Sea Guide* provides a good description of the difference between a refugee and an asylum seeker. An asylum seeker is a person who "is seeking international protection and whose claim has not yet been finally decided. Not every asylum-seeker will ultimately be recognized as a refugee. Refugee status is 'declaratory'—that is, determining refugee status does not make a person a refugee, but rather recognizes that a person is a refugee." The guide goes on to state that "[r]escued persons who do not meet the criteria of the 1951 Refugee Convention definition of a 'refugee,' but who fear torture or other serious human rights abuses or who are fleeing armed conflict may also be protected from return to a particular place ('refoulement') by other international or regional human rights or refugee law instruments." (2) There is also a difference between refugees and economic migrants. In its fiftieth-anniversary issue, "The Wall behind Which Refugees Can Shelter," of its *Refugees* publication the UNHCR states: "An economic migrant normally leaves a country voluntarily to seek a better life. Should he or she elect to return home they would continue to receive the protection of their government. Refugees flee because of the threat of persecution and cannot return safely to their homes in the circumstances then prevailing." "Most Frequently Asked Questions about the *Refugee Convention,*" *Refugees,* no. 123 (2001), p. 16, available at www.unhcr.org/.
77. The Refugee Convention, article 1A(2), defines *refugee* as a person who, "owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion, is outside the country of his nationality, and is unable to or, owing to such fear, is unwilling to avail himself of the protection of that country." Available at www.unhcr.org/. Convention entered into force: 22 April 1954; number of parties: 145.
78. Annex to the SAR Convention, paragraph 3.1.9.
79. Patricia Mallia, "The MV *Salamis* and the State of Disembarkation at International Law: The Undefinable Goal," *American Society of International Law Insights* 18, no. 11 (15 May 2014), www.asil.org/. Ms. Mallia adds that "the SAR Convention only lays down an obligation of coordination and cooperation and does not necessarily entail an explicit duty to allow disembarkation in a particular port."
80. Kathleen Newland, "Troubled Waters: Rescue of Asylum Seekers and Refugees at Sea," *Migration Information Source* (1 January 2003), www.migrationpolicy.org/. This was also affirmed in the report (paragraph C.10) from the previously mentioned UNHCR experts meeting in Djibouti in 2011: "Fundamentally, a core challenge in any particular rescue at sea operation involving asylum-seekers and refugees is often the timely identification of a place of safety for

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disembarkation, as well as necessary follow-up, including reception arrangements, access to appropriate processes and procedures, and outcomes. If a shipmaster is likely to face delay in disembarking rescued people, he/she may be less ready to come to the assistance of those in distress at sea. Addressing these challenges and developing predictable responses requires strengthened cooperation and coordination among all States and other stakeholders implicated in rescue at sea operations."

81. The IAMSAR manual, vol. 2, p. xviii, defines *mass rescue operation* (MRO) as "[s]earch and rescue services characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to search and rescue authorities are inadequate." The question is whether a mixed-migration-at-sea incident would actually include "persons in distress"; and, if there are large numbers of persons involved, would the incident be classified as an MRO? In many instances, these incidents could be considered illegal trafficking in persons; it would seem that the United Nations Convention on Transnational Organized Crime (TOC Convention)—in particular annex II, Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children—would be more applicable than the SAR Convention. The TOC Convention and protocols are available at www.unodc.org/. Entered into force: 29 September 2003; number of parties: 185. If mixed-migration-by-sea incidents do not primarily constitute the rescue of persons in distress, and are not adequately addressed in the TOC Convention, the international community may want to consider developing an international instrument that would serve as the basis for the coordination and conduct of these maritime operations.

82. The facts portrayed in this vignette are known by the author, who attests to their accuracy. The vignette is presented for consideration of the legal and policy issues involved.

83. In defining *territorial sea,* UNCLOS, article 2, states: "1. The sovereignty of a coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea. 2. This sovereignty extends to the air space over the territorial sea as well as to its bed and subsoil." Article 3 continues, "Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with this Convention."

84. The *Commander's Handbook* (paragraph 2.4.1) defines *military aircraft* as "all aircraft operated by commissioned units of the armed forces of a nation bearing the military markings of that nation, commanded by a member of the armed forces, and manned by a crew subject to regular armed forces discipline."

85. For example, AE is envisioned in UNCLOS. In describing innocent passage, article 18 provides for the assistance of persons in distress: "2. Passage shall be continuous and expeditious. However, passage includes stopping and anchoring, but only in so far as the same are incidental to ordinary navigation or are rendered necessary by *force majeure* **or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress**" (emphasis in bold added).

86. At the 1991 convening of IMO's Sub-Committee on Lifesaving, Search and Rescue, the United States submitted to the subcommittee a note, "SAR on or over Foreign Territorial Seas" (LSR 22/8/4, 19 January 1991), which argued (paragraph 3) the U.S. position that "[t]he obligation to rescue persons in distress regardless of nationality is based on the principle and time-honored tradition that those at sea will, wherever they can without undue risk, assist others in danger or distress. . . . Thus, coastal state's right to control activities in its territorial seas is balanced with the requirement to rescue those in distress from perils of the sea." This U.S. paper was also discussed at the sixty-fifth session of IMO's Legal Committee (1991) and duly recorded in its "Report of the Legal Committee on the Work of Its Sixty-Fifth Session" (LEG 65/8, 11 October 1991). While several delegations shared the U.S. position, the committee agreed "that there existed no right of assistance entry in public international law **at present;** this principle is neither embodied in any convention, nor established by customary law. Many delegations emphasized in this connection that it was important not to upset the delicate balance between the duty

to render assistance, on the one hand, and the sovereign right of coastal States to control entry into or operation in their waters on the other" (emphasis added). Over the two decades since the Legal Committee reached this conclusion, the concept of AE has continued to become established as a standard principle enshrined through international conventions and customary international law.

87. This article uses the term "AE rescue operation," not "SAR operation." When a ship or aircraft enters a coastal state's territorial sea to render assistance to persons in distress, the purpose is to *rescue,* not *search* for, survivors. Scenario D addresses this distinction further.

88. *United States Coast Guard Addendum to the United States Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual,* COMDTINST M16130.2F (January 2013) [hereafter *USCG Addendum*], p. 1-45, paragraphs 1.8.1.4 and 1.8.1.5, available at www.uscg.mil/. See also the Chairman of the Joint Chiefs of Staff instruction *Guidance for the Exercise of Right-of-Assistance Entry,* CJCSI 2410.01D (3 September 2013) [hereafter CJCSI], p. 2, available at www.dtic.mil/. Note: the U.S. Coast Guard uses the term "assistance entry" (AE), while the U.S. Department of Defense (DoD) uses the term "right of assistance entry" (RAE) when discussing the conduct of rescue operations in a coastal state's territorial sea.

89. The SOLAS Convention does not apply to warships. UNCLOS and the Salvage Convention do not limit what types of vessels can conduct an AE rescue operation in a coastal state's territorial sea. However, the emphasis of this article is on AE rescue operations conducted by government ships (including warships).

90. UNCLOS, article 98(1)(a), specifically states that the shipmaster has a duty to "render assistance to any person found **at sea** in danger of being lost" (emphasis added). The SOLAS Convention, chapter V, regulation 33, requires "[t]he master of a ship at sea, which is in a position to be able to provide assistance, on receiving information from any source that persons are in distress **at sea,** . . . to proceed with all speed to their assistance" (emphasis added). Similarly, the Salvage Convention, article 10, paragraph 1, requires "[e]very master . . . , so far as he can do so without serious danger to his vessel and persons thereon, to render assistance to any person in danger of being lost **at sea**" (emphasis added). All three conventions make no geographical distinction concerning the obligation of the shipmaster to render assistance to persons in distress. The duty to render assistance should be considered to apply on the high seas and territorial sea of any coastal state.

91. For example, UNCLOS, article 2, states: "The sovereignty over the territorial sea is exercised **subject to this Convention and other rules of international law**" (emphasis added).

92. *USCG Addendum,* p. 1-46, paragraph 1.8.2.4. As will be discussed later in this section, U.S. Coast Guard and DoD SAR policy allows for both aircraft and surface units to conduct AE rescue operations.

93. The SAR Convention was never intended to limit or restrict any available warship or other ship in the conduct of immediate lifesaving assistance to persons in distress, even in a coastal state's territorial sea. The annex to the SAR Convention (paragraph 4.3) states: "Any search and rescue unit receiving information of a distress incident shall initially take immediate action if in the position to assist and shall, in any case without delay, notify the rescue co-ordination centre or rescue sub-centre in whose area the incident has occurred."

94. CJCSI, paragraph 4.d.

95. It should be emphasized that UNCLOS and the SOLAS and Salvage Conventions were never intended to restrict or hamper a ship's use of its available SAR resources (e.g., embarked aircraft or small boat) that could be used in a lifesaving operation.

96. The use of U.S. military aircraft in the conduct of RAE operations is also contemplated. CJCSI, paragraph 6.c(2), states, "An operational commander may render immediate rescue assistance by deploying a U.S. military aircraft (including aircraft embarked aboard military ships conducting RAE operations) into the national airspace within U.S.-recognized foreign territorial seas or archipelagic waters when all four of the following conditions are met:

"(a) A person, ship, or aircraft within the foreign territorial sea or archipelagic waters is in danger or distress from perils of the sea and requires immediate rescue assistance;

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"(b) The location is reasonably well known;

"(c) The U.S. military aircraft is able to render timely and effective assistance; and,

"(d) Any delay in rendering assistance could be life-threatening."

97. For example, the *USCG Addendum,* paragraph 1.8.2.5, states that "Coast Guard rescue aircraft may conduct an AE rescue operation in a coastal State's territorial sea, when in the judgment of the aircraft commander: (a) There is reasonable certainty (based on the best available information regardless of source) that a person is in distress; (b) The distress location is reasonably well known; and (c) The SAR unit (or SAR facility) is in position to render timely and effective assistance."

98. Article 18(2) of UNCLOS concerns *ships* in the conduct of innocent passage in a coastal state's territorial sea. See also note 83.

99. The annex to the SAR Convention promotes using all available means for rendering assistance to persons in distress. For example, in the conduct of search operations, paragraph 3.1.3 states: "Unless otherwise agreed between the States concerned, the authorities of a Party which wishes its rescue units to enter into **or over** the territorial sea or territory of another Party solely for the purpose of searching for the position of maritime casualties and rescuing the survivors of such casualties, shall transmit a request, giving full details of the projected mission and the need for it, to the rescue co-ordination centre of that other Party, or to such other authority as has been designated by that Party" (emphasis added). While paragraph 3.1.3 describes the requirement for aircraft entering into a coastal state's territorial sea for the purpose of *searching,* the aircraft would not be required to seek permission for the conduct of an AE rescue operation. The criteria for the conduct of an AE rescue operation by an aircraft should be met prior to rendering any assistance in a coastal state's territorial sea (see notes 96 and 97).

100. The *USCG Addendum* does provide a note of caution on the use of aircraft and ships in the conduct of an AE rescue operation. Paragraph 1.8.1.6 states: "Customary practice for aircraft conducting AE rescue operations in a coastal State's territorial sea is not as fully developed as for vessels (e.g., nations may recognize the right to conduct AE rescue operations more readily for vessels than for aircraft). In addition, the conduct of AE rescue operations by nonmilitary vessels is apt to cause less coastal State concern than entry by military vessels. Therefore, safety of the rescue unit must be considered in light of the views of the coastal State whose territorial sea or overlying airspace is being entered."

101. The Salvage Convention, article 1(a), defines *salvage* as "any act or activity undertaken to assist a vessel or any other property in danger in navigable waters or in any other waters whatsoever."

102. It is at this point where U.S. Coast Guard and DoD AE policy set forth in CJCSI 2410.01D differ. The *USCG Addendum* states (paragraph 1.8.2.6[b]) that Coast Guard rescue assets shall not conduct an AE rescue operation "[t]o rescue (or salvage) property (other than in limited cases, such as for the retrieval of medical supplies, or other property that may assist in the conduct of the lifesaving operation)." In contrast, CJCSI 2410.01D allows for the rescue of property: "RAE applies only to rescues in which the location of the persons **or property** in danger or distress is reasonably well known" (emphasis added). As mentioned previously (note 88), another difference is that the Coast Guard uses the term "assistance entry," while DoD uses "right of assistance entry." The Coast Guard prefers *AE,* believing the term advances the service's objectives in international engagements. Many nations view AE solely as a duty, not a right, even a limited one. While the distinction between a "duty" and "right" has legal significance, the practical distinctions are minimal, since international support exists for entry into a coastal state's territorial sea to render assistance to those in distress.

103. The annex to the SAR Convention (paragraph 3.1.2) states: "Unless otherwise agreed between the States concerned, a Party should authorize . . . immediate entry into or over its territorial sea or territory of rescue units of other Parties solely for the purpose of **searching** for the position of maritime casualties and rescuing the survivors of such casualties" (emphasis added). As previously noted (note 99), the annex continues (paragraph 3.1.3): "Unless otherwise agreed between the States

concerned, the authorities of a Party which wishes its rescue units to enter into or over the territorial sea or territory of another Party solely for the purpose of **searching** for the position of maritime casualties and rescuing survivors of such casualties, shall transmit a request, giving full details of the projected mission and the need for it, to the rescue co-ordination centre of that other Party, or to such authority as has been designated by that Party" (emphasis added). In addition to Coast Guard policy not authorizing the conduct of an AE rescue operation to recover property or to search for persons in distress, the *USCG Addendum* also states (paragraph 1.8.2.6) that an AE rescue operation cannot be conducted (1) to assist persons not in distress, or (2) within a coastal state's internal waters or over its landmass.

104. The SOLAS Convention, chapter V, regulation 33, requires the master of a ship at sea that is in a position to render assistance to persons in distress to provide that assistance. Stating that the *master* is required to render assistance demonstrates that it is the master who determines whether a person is in distress.

105. The *Commander's Handbook,* paragraph 2.5.3.1, describes *international straits* as follows: "Straits that are used for international navigation between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone are subject to the legal regime of transit passage. Transit passage exists throughout the entire strait (shoreline-to-shoreline) and not just the area overlapped by the territorial sea of the coastal nation(s). Under international law, the ships and aircraft of all nations, including warships, auxiliary vessels, and military aircraft, enjoy the right of unimpeded transit passage through such straits and their approaches." *Transit passage* is defined as "the exercise of the freedoms of navigation and overflight solely for the purpose of continuous and expeditious transit in the normal modes of operation utilized by ships and aircraft for such passage." See also UNCLOS, part III (Straits Used for International Navigation).

106. Myron H. Nordquist, series ed., Satya N. Nandan and Shabtai Rosenne, general eds., *United Nations Convention on the Law of the Sea: A Commentary,* vol. 3, *Articles 86 to 132* (The Hague, Neth.: Martinus Nijhoff, 1995), p. 177.

107. While the annex to the SAR Convention does not explicitly state that law-enforcement actions are not coordinated and conducted within the framework of the global SAR system, the IAMSAR manual, vol. 2, does provide guidance for assistance in "other than SAR operations" (see note 112). Another excellent guide for determining what generally would be considered a "SAR case" is paragraph 4.c of CJCSI 2410.01D, which states that RAE is conducted by U.S. military ships in support of "the time-honored mariners' duty under customary international law of rendering rapid and effective assistance to persons, ships, or aircraft in imminent **peril at sea** without regard to nationality or location" (emphasis added). The CJCSI goes on (paragraph 5.c) to define *perils of the sea* as "accidents and dangers peculiar to maritime activities including storms, waves, and wind; grounding; fire, smoke, and noxious fumes; flooding, sinking, and capsizing; loss of propulsion or steering; and other hazards of the sea." This definition provides not only a good understanding of when U.S. military ships should conduct AE rescue operations, but also a broad characterization for when the SAR Convention would apply and when activation of the global SAR system is warranted.

108. The annex to the SAR Convention does provide (paragraph 1.3.13) a definition of *distress phase* (see note 75). The coastal-state SMC makes the determination of whether this definition applies considering the circumstance of a particular SAR operation. If a person declares that he is in distress, the SMC normally would activate the coastal state's distress phase processes and procedures to provide the necessary assistance.

109. George K. Walker, *Definitions for the Law of the Sea: Terms Not Defined by the 1982 Convention* (Boston: Martinus Nijhoff, 1995), p. 169, provides a good overview of what should be considered a distress: "'Distress,' as used in UNCLOS Articles 18, 39, 98 and 109, and as incorporated by reference in UNCLOS Articles 45 and 54, means an event of grave necessity, such as severe weather or mechanical failure in a ship or aircraft; or a human-caused event, such as a collision with another

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ship or aircraft. The necessity must be urgent and proceed from such a state of things as may be supposed to produce in the mind of a skillful mariner or aircraft commander a well-grounded apprehension of the loss of the vessel or aircraft and its cargo, or for the safety or lives of its crew or its passengers."

110. Wu Tien Li-Shou, plaintiff-appellant, v. United States of America, defendant-appellee, on appeal from the U.S. District Court for the District of Maryland, brief for the United States of America, appellee, No. 14-1206 (4th Cir., 23 January 2015).

111. Ibid., p. 38.

112. The IAMSAR manual, vol. 2, also recognizes this important distinction. In paragraph 7.4.2 it states: "In situations such as piracy or armed robbery against ships where the ship or crew is in grave and imminent danger, the master may authorize the broadcasting of a distress message, preceded by the appropriate distress alerts (MAYDAY, DSC, etc.), using all available radiocommunications systems. Also, ships subject to the SOLAS Convention are required to carry equipment called the Ship Security Alert System (SSAS) for sending covert alerts to shore for vessel security incidents involving acts of violence against ships (i.e., piracy, armed robbery against ships or any other security incident directed against a ship). . . . National procedures can vary but the role of the RCC, if involved, is usually to receive the SSAS alert and inform the security forces authority that will be in charge of the response. Actions taken by the RCC upon receiving a covert SSAS alert include: . . . **place SAR resources on standby, if appropriate, since it may become a SAR case**" (emphasis added). This section in vol. 2 is placed in chapter 7, which is titled "Emergency Assistance Other than Search and Rescue," emphasizing that a law-enforcement action should not initially be considered a SAR operation as envisioned in the SAR Convention; however, a SAR case may arise out of a law-enforcement action.

113. The facts portrayed in this vignette are known by the author, who attests to their accuracy. The vignette is presented for consideration of the legal and policy issues involved.

114. This discussion is based on SAR cases that would be coordinated and conducted under the SAR Convention and would not normally apply to a mixed-migration-at-sea incident, which might or might not constitute a SAR case. The unique nature of mixed-migration-at-sea operations would require development of unique processes and procedures to meet the requirements of those types of operations.

115. The UN Convention on Conditions for Registration of Ships (not in force), article 2, defines *flag State* as "a State whose flag a ship flies and is entitled to fly." Article 1 indicates that a flag state must "exercise effectively its jurisdiction and control over such ships with regard to identification and accountability of shipowners and operators as well as with regard to administrative, technical, economic and social matters." Additionally, UNCLOS article 91 states: "1. Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag. Ships have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship.

"2. Every State shall issue to ships to which it has granted the right to fly its flag documents to that effect." Walker, *Definitions for the Law of the Sea,* pp. 193–95, provides a detailed explanation of the term *flag State* as used in UNCLOS.

116. Thames Shipyard and Repair Company, plaintiff in cross-claim, appellant, v. United States, defendant, appellee; Northern Voyager Limited Partnership; OneBeacon America Insurance Company f/k/a Commercial Union Insurance Company, plaintiffs, appellants, v. United States, defendant, appellee, 350 F.3d 247 (1st Cir., 26 November 2003).

117. In particular, both the district court and the court of appeals held that the discretionary function exception to liability under 46 USC § 742 (the Suits in Admiralty Act, which allows for a limited waiver of the U.S. federal government's sovereign immunity from civil lawsuits) and 46 USC § 781 (the Public Vessels Act, which allows for legal action against the United States for damages caused by a public vessel) protected from further judicial review the Coast Guard's decision to evacuate the master forcibly from *Northern Voyager*.

118. The court of appeals brief included the following comment: "The facts of this case lead

us to conclude that the Coast Guard reacted rationally, and that human life could reasonably have been deemed to be at serious risk had Captain Haggerty and his crew not been removed. The *Northern Voyager,* without steering, was rolling in six to eight foot ocean seas. Water was pouring in. She was developing an increasing port-side list. The fishing boat's only access port was on the starboard side. The Coast Guardsmen on the vessel reported progressive flooding, raising the possibility that the ship would capsize, trapping all on board. While arguments can perhaps be made in light of 20-20 hindsight tending to minimize the potential dangers had the master and his fellows been allowed to remain, we see no basis to doubt the objective reasonableness of the Coast Guard's on the scene decision to remove them." However, Judge Torruella on the Court of Appeals concurred in part in and dissented in part from the majority's recognition of the Coast Guard's authority to compel the master forcibly to abandon his ship, thus preventing him from continuing efforts to save it. He wrote: "With due respect, there is no authority in law, practice, or maritime tradition that validates such action by the Coast Guard, nor am I aware of the government's having claimed such extraordinary powers before the inception of the case." He concluded that the discretionary function exception did not shield the United States from liability, because a decision cannot be shielded from liability if the decision maker is acting without actual authority. In the judge's view, "Such a momentous shift in policy and such an extraordinary grant of authority should not be undertaken absent a clear legislative mandate expressed both in the text of the statute and in its legislative history." For those interested in this issue, this case is well worth reading.

119. Coast Guard SAR policy states that a voluntary evacuation of a person should be considered the preferred alternative to removing the person forcibly from his vessel. The *USCG Addendum* (paragraph 4.2.2) states: "Although the Coast Guard does have the authority to compel a mariner to abandon their vessel in a life threatening situation, it is always preferable that a mariner voluntarily evacuate when necessary. Coast Guard personnel should endeavor to use all means, including powers of persuasion, to encourage a mariner to evacuate, when appropriate. Forcible and/or compelled evacuations should only be conducted when a life-threatening emergency exists, and there is an immediate need for assistance or aid." Additionally, the decision to evacuate a person forcibly from his vessel to save his life should, if possible, be made in consultation with the SMC. The SMC, if time permits, should consult legal counsel. However, if time is of the essence and the situation is life threatening, then SAR policy should allow the SAR unit on scene to make the decision to remove a person forcibly from his vessel to save his life. Policies, procedures, and training must be developed and implemented to ensure that SAR units, SMCs, legal counsel, and the SAR organization chain of command can effectively manage this type of scenario.

120. It should also be noted that from a U.S. legal perspective, a person who refuses to abandon his vessel at the request of the U.S. Coast Guard to save his own life has committed no crime, which makes the contemplated use of force even more difficult.

CHANGING DOD'S ANALYSIS PARADIGM

The Science of War Gaming and Combat/Campaign Simulation

John T. Hanley Jr.

War gaming and military modeling have a well-documented history covering over two centuries, a period that coincides with the inception and evolution of formal professional development for military officers.[1] The term *war game* used here refers to "a warfare model or simulation that does not involve the operations of actual forces, in which the flow of events affects and is affected by decisions made during the course of those events by players representing opposing sides."[2]

Beginning with the early-nineteenth-century Prussian creation of war colleges to augment operational experience, professional military education involved a combination of the study of history and international law, the study of theorists who had written on the nature of war and strategy, practical exercises, and theoretical analysis as the means for understanding and developing military art and science. Carl von Clausewitz's *On War* and Antoine-Henri de Jomini's *The Art of War* competed for attention. Whereas Clausewitz treated war as a social phenomenon, rooted in the age of reason, Jomini believed in the existence of immutable principles of warfare, akin to Newtonian mechanics.

As war gaming became a routine part of Prussian military education, the Prussians attempted to create rigid rules for calculating the outcomes of engagements. Major powers around the world

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believed that war gaming contributed notably to the Prussians' success in 1866 and 1870. However, as the popularity of war gaming spread following the Prussian victories, semirigid and free-form adjudication based on the game director's judgment became more popular.[3]

War colleges used war gaming as a basis for both practical exercises and theoretical analyses. Both war colleges and military staffs used war gaming to develop strategy. In addition, in the early twentieth century, quantitative military modeling outside of war gaming was adopted more widely. New techniques were formulated, such as Lanchester equations, which Frederick W. Lanchester published in 1916.[4]

During World War II, the United States and the United Kingdom instituted operations evaluation groups, consisting of scientists, to quantify the outcomes of military practices and seek improvements. These groups observed operations, collected data, and created models of military operations analogous to the models they used in scientific endeavors. Following World War II, the U.S. government established federal contract research centers to continue this practice in peacetime.[5] The Navy transformed its Operations Research Group into an Operations Evaluation Group that became the Center for Naval Analyses. The Air Force established RAND. The Army established its Operations Research Office at Johns Hopkins University, which became the Research Analysis Corporation. The Joint Chiefs of Staff (JCS) founded a Weapons Systems Evaluation Group that became the Institute for Defense Analyses.[6] Initially these organizations provided mechanisms for contracting university professors; eventually, they developed permanent staffs.

In the long-term competition with the Soviets, the emphasis shifted from operations research to systems analysis: operations research focuses on analyzing operations to support commanders; systems analysis focuses on supporting the Pentagon's policy and procurement bureaucracies by attempting to quantify the effects of proposed platforms and weapons systems employing advancing technology. An expansion of the practice of quantification to optimize operations spread from the military to industry, leading to the creation of operations research as a discipline.

In 1961, coming from Ford Motor Company, Secretary of Defense Robert S. McNamara established the Pentagon's Planning, Programming, and Budgeting System and a Systems Analysis Office to oversee the selection of military systems and force allocation and determine how much was enough to invest in defense.[7] Alain C. Enthoven founded the Systems Analysis Office on well-intentioned tenets.[8] However, competing interests and divisions in staff responsibilities within and among the Office of the Secretary of Defense (OSD), the Joint Staff, and the

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services and the need to align analytical processes with Pentagon staff procedures and budget cycles resulted in these tenets never being followed fully.

Computers rapidly expanded the scale of problems addressed in the 1960s and '70s. Computer-based campaign simulations that strung together and iterated sets of equations modeling combat became the primary method the Pentagon procurement bureaucracy used to undergird arguments for selecting one military platform or technology over another. As the Department of Defense (DoD) expanded its use of contractors to conduct analyses in the 1970s, a sizable industry emerged to support and embed Pentagon analytical practices. "Unfortunately, the trend over the last decades has been for DoD studies to become more focused on standard scenarios and big [computer] models."[9] On 8 May 2015, Deputy Secretary of Defense Robert O. Work and Vice Chief of the JCS Admiral James A. Winnefeld Jr. called for initiatives to renew war gaming within DoD.[10]

Scientific methods form the foundation for operations research. A frequent criticism of war gaming is that it is less scientific, and thus less useful for prediction, than computer-based combat/campaign simulation. This article examines war gaming and combat/campaign simulations against scientific standards to explore their usefulness and limitations and how they complement each other. Computer-based campaign simulation involves much larger uncertainties and indeterminacy than generally realized. Both campaign simulation and war gaming require the use of additional analytical techniques to validate and extend their findings.

Operations research is rooted in an interactive cycle of observing fleet/field operations, collecting data, modeling, collecting more data, proposing changes, then cycling through those results again. The original operations research groups involved interdisciplinary teams of scientists employing models and paradigms from their respective disciplines to understand military operations well enough to predict effects. DoD needs to overhaul its current analysis paradigm and its focus on individual major defense acquisition programs, weaning itself off large, computer-based campaign models. It should adopt analysis campaigns and cycles of research to meet growing security challenges within limited budgets.[11]

SCIENTIFIC INQUIRY

The System and Its States

Bernard O. Koopman begins his study of the logical basis of combat simulation with the following:

> Basic to any scientific examination of nature is the concept of the *system:* the set of interacting things considered. In a military action, the system is the totality of men[/women] and weapons involved, together with their environment: the medium in which the action occurs and which affects its course. And equally fundamental is

> the concept of the set of *states* that the system can be in, just one at any given time. . . . In each case, the state of the system includes its physical state: positions and velocities of the units, condition of armaments, data-gathering status, and all the meteorological specifications. But how far into the mental state of the commanders must one go in defining the "state" of the system? This can only be settled by asking a second question, that of *the evolution of the state of the system with the passage of time.*
>
> Classical physics has traditionally considered that the state of a system is only adequately described if, once the state is given, all later states are *determined:* Given any two similar systems in the same initial states, all their later states will be the same—provided that their environmental influences (external forces) continue the same. Thus, in Newtonian mechanics, the full and exact knowledge of the positions and velocities of the parts of a material system determine its whole future motion. But it is only in the simplest military operations that such an order of determinateness exists.
>
> In far more cases, it is not feasible to specify the state of a system so that its subsequent evolution is determined. What is far more common is to have only *statistical determinateness:* in a large number of similar systems starting in the same state, the same *proportion* will go into any given later state.[12]

The premise of combat/campaign simulation is that the evolution of the states in some future combat can be determined adequately statistically. In war gaming, the state of the system evolves move to move through adjudication of player decisions. Keeping in mind the concept of states helps us consider the scope and limits of computer-based combat/campaign simulation and war gaming.

Scientific Standards

"Standards of scientific excellence, though they may occasionally be self-defeating, on the whole and in the long run make for success."[13] However, one must stipulate carefully what one intends when posing scientific standards, lest they become straitjackets. "The emphasis by historians and philosophers of science is that there is no such thing as *the* scientific method. The more realistic danger is that some preferred set of techniques will become identified with scientific method as such."[14]

As systems analysis took hold in DoD, those seeking to determine "how much is enough" sought to create models using equations that allowed quantitative comparisons to predict the costs and benefits of alternative systems. As computers became more powerful, DoD turned to quantitative combat/campaign simulations as a basis for major decisions, regarding them as more objective, rigorous, and useful than less-formal analytical techniques, such as war gaming. Such simulations were considered to be

- more objective, in the sense that computer models would support major decisions based on explicit criteria of national interest, not on compromises

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among institutional forces, and provide open and explicit analysis (including transparent data and assumptions) available to all parties

- more rigorous, in the sense that computers would provide quantitative answers to support choices among explicit, balanced, feasible alternatives and allow reproducible runs for comparing alternatives
- more useful, in the sense that computers would allow more systematic analysis to predict the effects of decisions[15]

Therefore, objectivity, rigor, and usefulness provide the set of scientific standards used in this examination of combat/campaign simulation and war gaming.

Objectivity. "That is objective which insists on its own rights regardless of *our* wishes, and only experience can transmit its claims to us. Experience is ultimate because it confronts us with a continuous ultimatum. For a man to by-pass experience in the pursuit of truth is to make himself God. . . . The subjectivist lives in a fool's paradise."[16]

Objectivity equates to "the intersubjectivity of findings independent of any one person's intuitive judgment."[17] Demanding intersubjectivity requires that "a scientific observation could have been made by any observer" and "testifies that the observation is uncontaminated by any factors save those common to all observers."[18] "For an enterprise to be characterized as *scientific* it must have as its purpose the explanation and prediction of phenomena within its subject-matter domain and it must provide such explanation and prediction in a reasoned, and therefore intersubjective, fashion. . . . While precise predictions are . . . preferred to vague ones, a discipline which provides predictions of a less precise character, but makes them correctly and in a systematic and reasoned way, must be classified as a science."[19]

Concepts lead to observations, which then lead to theories and laws. Laws have counterfactual force, carry explanatory force, and support prediction. They serve as standpoints from which we can survey for exceptions. They provide the basis for broader theories that advance the understanding of complicated and complex phenomena. A definition of an expert is one who knows what context must hold for a law to apply.[20]

Basic Newtonian physics involves laws strictly determining the relationships between actions and their effects. But even physics requires statistical laws to explain quantum phenomena, thermodynamics, etc., and cannot predict the behavior of many multibody problems and other chaotic systems. Statistical laws permit probabilistic explanations for phenomena involving statistical indeterminacy.[21] Similarly, systems involving human behavior admit quasi laws or tendency laws.[22] "In order for the [quasi] law to be valid, it is not necessary that no apparent exceptions occur, it is only necessary that, if an apparent exception

should occur, an adequate explanation should be forthcoming."[23] Statements such as "fear, honor, and self-interest are the fundamental causes of war" qualify as quasi laws.

Both war gaming and combat/campaign simulations are pseudoexperiments: experiments carried out on a model instead of in reality.[24] The person or team designing the experiment reduces a substantive problem to a conceptual model on the basis of the perception of what is relevant to the problem. This conceptual model is a *world,* defined as the object or system about which a person is concerned. A *state* of the world is a description leaving no relevant aspect undefined. A *true* state of the world is a state that does in fact obtain, i.e., the true description of the world.[25] The conceptual model is reduced further to physical and semantic (quantitative and relational) models, each equating to a theory of behavior of the subject matter, employed in the analysis to determine the true state.[26] If the experiment serves its purpose, this system of models produces an outcome that can be generalized by induction to advance a substantive conclusion.[27]

The character of military (and civil) operations involves both "an evolving physical system, and . . . an unfolding set of plans, intentions, reasoning and counterreasoning of the men [and women] engaged in the action, the commanders."[28]

War gaming addresses the plans, intentions, reasoning, and counterreasoning of the roles represented in the game. It highlights "predictions regarding the behavior of human organizations inasmuch as the latter can be simulated most effectively by having experts play the roles of certain members of such organizations and act out what in their judgment would be the actions, in the situation simulated, of their real-life counterparts."[29] Outcomes result from the interacting decisions and actions of the role players, as adjudicated by game umpires and game-control oversight.

> Epistemologically speaking, the use of an expert as an objective indicator . . . amounts to considering the expert's predictive pronouncement as an integral, intrinsic part of the subject matter, and treating his[/her] reliability as part of the theory about the subject matter.[30] Our information about the expert is conjoined to our other knowledge about the field, and we proceed with the application of precisely the same inductive methods which we would apply in cases where no use of expertise is made. Our "data" are supplemented by the expert's . . . valuations and by his[/her] judgments of relevance . . . , and our "theory" is supplemented by the performance of experts.
>
> In this manner the incorporation of expert judgment into the structure of our investigation is made subject to the same safeguards which are used to assure objectivity in other scientific investigations. The use of expertise is therefore no retreat from objectivity or reversion to a reliance on subjective taste.[31]

Computer-based combat/campaign simulations focus on physical aspects of combat. Human decisions are present and have a substantial impact on the

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output, but are embedded in the simulation construction and the choice of inputs (data and models) rather than the decisions of combatants. To encompass human decision in statistical determinateness, one might turn to doctrine or, absent clear doctrine or future systems, query commanders for their expert opinions regarding decisions they would make given each possible state of the system. To be practical, this approach requires a world with few states. One also might assume that each commander is attempting to do maximum harm and seeks a course of action to minimize the harm to his/her forces, using the *minimax* convention of game theory.[32] "A more general method of this sort is for each commander to maximize his[/her] own value function—not necessarily the negative of his[/her] opponent's."[33] This approach to combat/campaign simulation assumes that once the statistics of human decision are incorporated into the model, what remains is the statistically determinate evolution of the military system. But separating the human from the physical model often leads to erroneous conclusions. Barry Watts's research indicates that, rather than having been let down by their radars and missiles, 80–90 percent of the pilots shot down in Vietnam and Korea never saw their attackers until it was too late to react.[34]

By virtue of the statistical determinateness, the basic process is stochastic. That is, there is a definite probability—the transition probability—that if the system is in state x at time t it will be in state x' at time t'. *"Evidently, if the values of the transition probabilities a(x, t; x', t') were all known, the probabilities of every outcome of the battle would be known—and this for every assumed starting state"* (italics in original). Thus, the whole problem of the quantitative study of military operations is that of finding the transition probabilities from knowledge that can reasonably be obtained. "[A]ll the standard analytical models, Monte Carlo simulations, etc., fit into this scheme."[35] Clearly, one also must have knowledge of the transition rates to specify at which time t' the new state x' obtains.[36]

In practice, analyzing stochastic processes also employs the Markovian assumption, which holds that, faced with the same state, the transition probabilities for the system remain constant throughout the process. In the context of human decision, this means that no learning from previous states, no history, affects the process.

> Of course, when methods of computer simulation are made in the usual way they depend for their validity on the Markov property, but when this does not apply . . . the numerical results, however realistic they may appear, are without logical basis—at least until they are *proved* to give an acceptable degree of approximation. The act of simplifying and still retaining the Markovian character—as well as operational realism—is an art as well as a science. Success is more apt to be achieved by limiting the objective of the study to the answer of a precise question rather than a diffuse multitude.[37]

In summary: to assume that such a use of machines gives even approximately valid information about the military operation is to assume the following:

- The human uncertainties have been removed.
- The combat situation involves a system that is, at any time, in an objectively describable state (presumes transition probabilities and rates are known).
- The situation's state transitions are Markovian.
- Its stochastic equations can be satisfactorily approximated by difference equations without losing their Markovian character.
- The repetition of runs gives, by the law of large numbers, satisfactorily accurate and reliable values of the desired probabilities.[38]

At this point, the number of states involved in a combat simulation is worth considering.[39] Consider an engagement involving m units on the Blue side and n units on the Red side.[40] Indicate that a Blue unit has engaged a Red unit by drawing a blue line between the two units. Similarly, use a red line for a Red unit engaging a Blue unit. "The resulting colored graph indicates the state of our system. How many different graphs are possible? Of the *mn possible* ways of drawing the blue lines, any one can actually be drawn or not. Hence, there are 2^{mn} possibilities for the blue lines; and similarly for the red. Consequently, there are 2^{2mn} possible colored graphs."[41] See the accompanying figure for a depiction of the case for a combined-arms rock-paper-scissors contest in which all "units" could engage simultaneously or in any order. The number of states of this world for a single battle is 2^{18}. If we consider whether each engagement is successful, we double the number of states to 2^{36}. Each additional consideration enlarges the exponent for computing the state space.

We can perform a mind experiment to estimate how large the state space would be for a battle that a "perfect" parallel computer the size of the universe, given the time of the universe, might compute. In this parallel computer, the processors are as small as protons, they operate at the speed of light, and they are packed densely into the volume of our universe. Each processor is assigned a distinct engagement to calculate, can compute the outcome instantaneously, and can fetch a new engagement in 10^{-23} seconds, an approximation of the time it takes light to go the diameter of a proton. Given 10^{45} processors per cubic meter, 10^{81} cubic meters in the universe, 10^{23} calculations per second, and 10 seconds as an epoch a bit longer than the age of the universe, this computer could perform 10^{168} calculations, or about 2^{558}.[42] If $4mn = 558$ and we examine the same number of force elements on both sides, *this "perfect" computer could calculate the states for an engagement with just less than twelve force units per side*. Note that this

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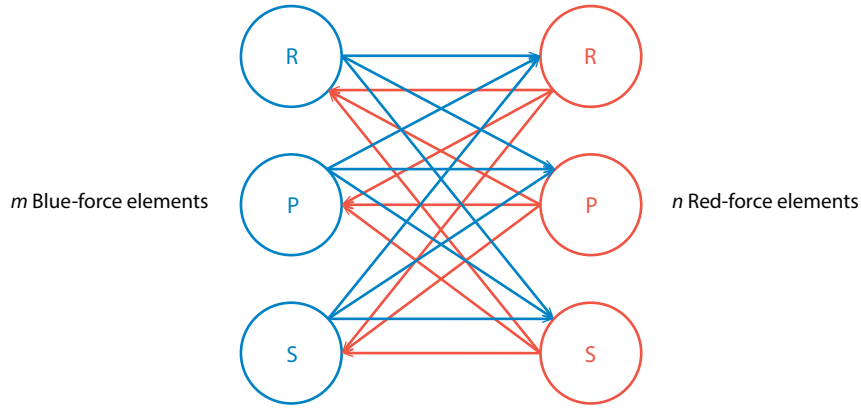
COMBINED-ARMS ROCK-PAPER-SCISSORS



# of states considering successful and unsuccessful engagements = $2^{4mn} = 2^{36}$

Source: Koopman, "A Study of the Logical Basis of Combat Simulation," pp. 871–72.

formulation of the engagement does not consider the timing of engagements, which would vastly increase the possible states of the "world."

Although simulations such as those of one-on-one air or naval combat might be reduced to a computable number of states, force-on-force combat and campaign simulations quickly exceed the number of states that admit of brute-force computation. So, how are these simulations implemented? By using a combination of shortcuts (heuristics) and clever analysis. These heuristics are essentially quasi laws whose application requires the contribution of experts who understand well the scope of those laws' applicability. Combat/campaign simulations often use expected-value models to determine what would happen "on average," rather than Monte Carlo simulations. Increasing the number of runs does not increase statistical prediction by the law of large numbers in these simulations, as the expected value provides a determined outcome for each run. Lanchester equations—developed to help predict the outcome of naval and land battles—most often use expected values, but can employ Monte Carlo techniques.[43] Varying the exponent used in Lanchester equations between square and linear laws essentially reflects the command and control and operational concept employed in the engagement. The complexity of ground models results in heuristic techniques such as weighted effectiveness indices / weighted unit values or qualitative judgment models to calculate engagement outcomes. All these approaches involve subjective judgments and the insights of the analyst/team developing and using the model. In a combat/campaign simulation, the analyst/team must use subjective judgments to anticipate every interaction represented in the simulation,

supplement missing data, and create models that have not been validated in actual operations or exercises.

The works of Wayne P. Hughes, Glenn A. Kent, Bernard O. Koopman, and Paul K. Davis, among others, suggest clever approaches to overcoming computational limitations of brute-force calculations and appropriate forms of analysis.[44] With the development of complexity sciences, computers came to be used to simulate cognitive and other processes, rather than to solve equations. As Deep Blue and AlphaGo have demonstrated, in games of finite size with well-specified rules, computers can use artificial intelligence (AI) techniques to top human performance.[45] However, current DoD computer-based campaign simulations use brute-force calculations. They have yet to incorporate agent-based models, automatons, fitness landscapes, genetic algorithms, or other techniques from complexity science. RAND incorporated some AI techniques into campaign simulations in the 1980s, but DoD chose not to employ those features in the simulations it adopted, instead staying with the types of deterministic and stochastic models Koopman addressed.[46]

So, how do we assess objectivity, given the logics of combat/computer simulation and war gaming?

Guidelines for the practice of operations research, although written with military modeling in mind, apply equally to war gaming and to combat/campaign simulation.[47] Significant distinctions between good operations research practice and other scientific inquiry include a presumption of the existence of a client (sponsor) and the complications presented by security classification and proprietary work. Close cooperation with the client in framing the analysis is good practice common to any technique of analysis.

In war gaming, a design and development team develops the scenario and reference materials (e.g., commander's intent, task organization, subordinates' missions, orders of battle, unit locations, weather) to establish the world and its initial state and develop prebriefings to immerse players into the game. The team identifies the number of competing sides, the scope of disciplines required, the command echelons represented, the bureaucratic verisimilitude desired, and the number and expertise of role players needed to accomplish the game objectives. Team members also design the information conditions: the information available to each side and its flow, the communications techniques and their verisimilitude to accustomed formats, the physical arrangements, the move structure, and the game rate to arrive at a desired culmination point.[48] To facilitate decision making, they construct move forms and provide for feedback among the participants. For adjudication, they select methods and models (quantitative and qualitative) used to change the world state resulting from each game move, and the qualifications

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and organization of game controllers and umpires. They also anticipate control inputs of plausible events (usually wild cards, such as rogue actions or accidents to initiate conflict) to shape player decisions to achieve game objectives.[49]

Combat/campaign simulations similarly frame the world for the purpose of the pseudoexperiment and provide input data to establish its initial state. Whereas war-game design involves detailed considerations of context for role-player decisions—with particular attention to information conditions (who knows what and acts when), as discussed above—combat/campaign simulations remove human decision. Information conditions are embedded in the combat models. The models selected incorporate a theory of command and control and the concept of operations in their code—consciously or not. The analysts / team members develop or choose models and techniques they judge appropriate to the study, on the basis of their expertise. "A fundamental truth in analysis is that scenarios drive the answers. Thus, much effort should go into conceiving and tuning the scenarios used and specifying uncertainty ranges. This should be a deeply analytic affair rather than the result merely of creative people spinning stories that raise interesting issues."[50] Whereas game scenarios are necessarily rich, to provide the context essential for expert role playing, the world of the combat/campaign simulation employs sparse scenarios, with only the data needed to perform the calculations.

In war gaming, a control team and umpires run the simulation. They execute the game design, adjudicating changes in the "true" state of the world using the decisions of the role players, their quantitative models, and their judgments, taking into account the game's objectives. In computer-based combat/campaign simulations, the computer computes the state transitions and the analyst decides what constitutes a stopping point or state for ending the computer run. Both war gaming and combat/campaign simulation also involve analysts who observe, record, analyze, and report on the pseudoexperiments. Costs and time available to design, develop, and run the simulation and subsequent analysis constrain both types of simulation.

Both war games and combat/campaign simulations involve clients, designers, developers, and analysts employing informal reasoning processes and subjective judgment in creating their theory of the world under study. The totality of the participants, models, and data employed in these simulations and the relationships among them represent the theory of the war game or combat/campaign simulation. In the case of games, this includes the role players, umpires, and control team, in addition to any quantitative models used in adjudication. In combat/campaign simulation, it involves the treatment of human decision and the concepts and information conditions embedded in the models, as well as the flow of outcomes from one process into the next (e.g., who attacked whom first).

The motivations, expertise, tastes, beliefs, and reliability of all human participants involved in the pseudoexperiment are thus integral, intrinsic parts of the subject matter, and therefore parts of the theory expressed in the war game or combat/campaign simulation.

Given the subjective judgment involved in defining the world and assessing its true state in both forms of pseudoexperimentation, objectivity comes from intersubjectivity. For combat/campaign models, this involves techniques such as the use of models that have shown value in actual combat (e.g., those developed using combat data in war) or that have been verified in field/fleet exercises employing actual forces. A weaker, but essential, form of verification for assessing the objectivity of scenarios, models, and data is to open them to debate and review—realizing that "sunlight is the best disinfectant"[51]—while recognizing the pitfalls that may result from political logrolling. Interpreting the structure of relationships in and among models and how to sequence these models in pseudoexperiments relies on the subjective judgment of the developers. It also requires developers who know what factors are indeed relevant to the world under study; e.g., attacking air forces on the ground can be a way to gain dominance of the air.[52]

Operational experience is useful in developing the expertise to make such judgments. Gaming has an advantage in this regard: "In operational gaming, the simulated environment is particularly effective in reminding the expert, in his[/her] role as a player, to take *all* the factors into account . . . that are potentially relevant; for if he[/she] does not, and chooses a tactic or strategy which overlooks an essential factor, an astute 'opponent' will soon enough teach him[/her] not to make such an omission again."[53] "People sensitive to a variety of responsibilities collaborate, applying the criteria that are relevant to their own interests, making estimates that reflect their own kinds of knowledge, and putting themselves in a mood to worry about probabilities rather than just a list of possibilities. They really live through a simulated crisis and not only learn things about their plans and their predictions but learn something about the nature of crisis."[54]

Gaming allows all participants—role players, control team, umpires—the right of *reclama* when they need additional information for a decision or question the adjudication of a move. Manual games are particularly useful in this regard. In manual games (which may employ computer calculation in adjudication), players must make decisions from one turn to the next, taking into account the current situation; and procedures used to evaluate the consequences of the players' decisions must be quite clear to the players—simple enough for them to understand.[55]

Gaming achieves objectivity by allowing all experts involved to share both their formal and informal reasoning explicitly and openly. Deficits in knowledge and both consensus and dispute are evident, thus providing a foundation for further inquiry. Critiques provide ways to improve the games continually. By

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contrast, the details of combat/campaign simulations are evident only to the analyst/team that developed the simulation or to someone willing to conduct a detailed study of the data and models used in the simulation.

In all science, good practice calls for independent review. However, in this field the practice is difficult to follow owing to the additional costs and the limitations that security and proprietary concerns impose. Clients often use "need to know" as an excuse to hold details of the pseudoexperiments close. Often, when a contractor performs the analysis, the details of the pseudoexperiment are proprietary. The Operations Research Society of America promulgated "Guidelines for the Practice of Operations Research" as a consequence of a dispute in testimony to Congress over two studies of ballistic-missile defense that supported conflicting recommendations. The guidelines conclude as follows:

> The analyst, *as analyst,* must restrict his[/her] analysis to the quantifiable and logically structural aspects of the problem only. In complex problems, perhaps the most valuable thing the analyst can do is to point out to his[/her] client that there are uncertainties deriving from such factors as:
>
> - Lack of agreement on means of evaluating the worth of complex systems.
> - Uncertainty about the technical capabilities and costs of systems yet unbuilt.
> - Uncertainty about environmental and operational factors that influence performance.
> - Uncertainty about the future capabilities or intentions of possible opposition.
>
> The analyst should be prepared to engage in dialogue with the client and other advisors to consider how other value systems, assumptions, and conditions might influence conclusions. . . . The analyst's job, especially in tough policy questions, is to analyze and help illuminate, and this means having the qualities of humility and openness necessary to participate in open dialogue with the client and other advisors.[56]

Subjective judgment enters once more in deciding what actions to take as a result of the war game or combat/campaign simulation. Here again, gaming has an advantage in that those who will decide what actions to take (or those on their staffs) have participated in the experiment—the decision makers learn directly from the game experience. In contrast, in the case of a combat/campaign simulation, decisions on actions to take depend on how the analyst/team used subjective judgment to frame and report the results, adding another layer of interpretation to the decision process.

A critique of games is that the subjective judgments of the experts involved make them irreproducible. A question for combat/campaign simulation is whether, given the same subject matter, independent teams would select the same

scenarios, models, data, structures, and relationships, among them producing the same results and the same analysis on the basis of those results. A 1973 General Accounting Office (GAO) report following promulgation of the Operations Research Society of America's "Guidelines for the Practice of Operations Research" found shortfalls in independent checks to ensure the accuracy, timeliness, consistency, and overall quality of the data—about 18 percent of the models were considered generally transferable for use by another person or another site—and "[t]he choices of scenarios, equipment performance, and personnel operations are based somewhat upon unknowns and uncertainties. The extent that the model reflects the real-world situation depends on the accuracy of the model-builders' judgment."[57]

Relying on intersubjectivity generates concerns centering on the role of bias in forming belief. Critiques of limitations on human judgment and decision are legion. Irving L. Janis and Leon Mann provide a framework for how people make decisions (unconflicted adherence, unconflicted change, defensive avoidance, hypervigilance—as with a crowd heading for the exits in an emergency—and vigilance).[58] Even vigilant decision making may be subject to cognitive, egocentric (self-serving motives), or affiliative (organizational or social acceptability) constraints.[59] Charles Pierce provides a set of methods for fixing belief similar to those above, including tenacity (such as a child hears from its mother), authority (the will of an institution), apriority (the adoption of self-evident assumptions that are clear to the user, but to no one else), and finally the method of science.[60] Humans are exceptionally poor at assessing subjective probabilities.[61] "When we pit [political] experts against minimalist performance benchmarks—dilettantes, dart-throwing chimps, and assorted extrapolation algorithms—we find few signs that expertise translates into greater ability to make either 'well-calibrated' or 'discriminating' forecasts."[62] Humans make decisions on the basis of their tastes (preferences) and beliefs (subjective probabilities).[63] They persist in even discredited beliefs. The Central Intelligence Agency provides four reasons for this persistence: "We tend to perceive what we expect to perceive; mind sets tend to be quick to form but resistant to change; new information is assimilated to existing images; and initial exposure to blurred or ambiguous stimuli interferes with accurate perception even after more and better information becomes available."[64]

However, "[w]hether a distortion common to all can nevertheless be said to yield something objective is a philosophical question that has no bearing on the conduct of the human enterprise of science. The methodological question is always limited to whether what is reported as an observation can be used in subsequent inquiry even if the particular observer is no longer part of the context."[65]

Thus, for objectivity, the analytical team / rapporteurs in war gaming should note the assumptions and design choices that went into the game, arguments

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both for and against a particular course of action by teams making their decisions, and what outcome the team hoped to achieve, capturing both consensus and disputes. Objectivity in combat/campaign simulation involves using models validated by observation of operations or field/fleet exercises, employing data collected from those exercises. Studies done in advance of actual operations should be compared with what transpired and why.[66] Analysts of both war games and combat/campaign simulations should keep in mind the motivations and beliefs of the participants and should extract from the experiment that which subsequent inquiry could verify or refute.

Rigor. Aristotle said, "A well-schooled man is one who searches for that degree of precision in each kind of study which the nature of the subject at hand admits." Kaplan goes on to note, "Another failing of models—more accurately, of model builders—consists in an undue emphasis on exactness and rigor."[67] Used in this way, rigor too often is equated to precise quantification, usually in the form of increasing the number of significant figures relative to a decimal point. However, the tests of rigor are whether (1) the analytical techniques used are appropriate to the subject matter, (2) we can articulate clearly the details of the method used and how we arrived at conclusions, and ultimately (3) we can state what valid lessons the study produced. Employing analytical techniques that provide overly exact answers that do not reflect the uncertainties and indeterminacy inherent in the subject matter are not rigorous.

Rigor is related closely to objectivity. It demands careful attention to the design of a war game or combat/campaign simulation to achieve the objectivity described above. It also requires efforts to understand the quality of data used in quantitative models, estimating the range of uncertainty in quantitative results, and framing conclusions in quasi law–like statements that reflect the consensus and disagreement of those involved in the pseudoexperiment. New understandings of chaos and complexity also raise questions regarding the treatment of human action in combat simulations.

A first test of rigor is the data used in quantitative and semantic modeling. The most reliable data are collected during operations or exercises that are essentially the same as those represented in the model. Operations research originated during World War II with the collection of data, then the use of those data to develop models of the operation under study.[68] Many of those models and the modeling techniques have persisted, but sustained efforts to collect data at sea or in the field are now rare. The 1973 GAO study found that in 85 percent of the cases submitted to the researchers, DoD activities used data obtained from sources other than field exercises or actual experience.[69]

Beginning with its World War II experience involving malfunctioning torpedoes, the U.S. submarine force began collecting data on every torpedo fired.

When tasked with creating an antisubmarine warfare (ASW) capability in 1949, Submarine Development Group 2 developed a process of designing exercises to test technology and tactics, collecting data on system and platform (including crew) performance during those exercises, using the submarine approach and attack manual to standardize the data, and reconstructing the exercises to quantify the results.[70] Using this process, the submarine force went from having essentially no ASW capability in 1949 to having the world's premier ASW capability in 1969. The process led to continual improvement of the search and combat models used in war games and combat/campaign simulations. At-sea exercises discovered and corrected errors in search models implemented on computers.[71] The Navy used a similar approach in its Tactical Development and Evaluation Program and some equipment-development programs in the 1970s and '80s.[72] However, oddly enough—given accelerating demands for data—as computer simulation became more popular in the Pentagon for platform and weapon systems analysis (what DoD calls program analysis), emphasis on prototyping equipment and collecting data on processes and performance at sea and in the field waned. Structured operational testing and evaluation for systems in development largely replaced mission-oriented operations analysis involving all aspects of the system's use and its effectiveness as one of a suite of systems.

Recent efforts to return to the roots of operations research have encountered difficulties. During Operation IRAQI FREEDOM, initiatives to put analytical teams into the field were severely limited by commanders' concerns about protecting the analysts—and controlling the data. Although we have been fighting in that region for a decade and a half, data on processes and performance from the field have not been the source for modeling and experimentation that they were in World War II.

The majority of friendly-force data used in computer-based combat/campaign simulation come from structured operational testing and evaluation of system performance (which may or may not reflect its performance in actual field/fleet use, with different concepts of employment) or from expectations of future system performance based on key performance parameters used for design. However, data from structured tests have not proved reliable. In World War II, "experimental results overestimated the casualty production rate for tanks by a factor of two; for artillery duels by a factor of three; and for pure infantry actions by a factor of seven."[73] Given the human penchant for survival and the fog and friction of war, structured tests provide overly optimistic estimates.

> Lest you think we are better off now with modern computers and powerful algorithms built into our best models, here is a more recent example. The U.S. Navy depends mightily for defense of the fleet on the Aegis missile system. Using data from controlled experiments at sea, one may calculate that if you shoot two missiles at an

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> incoming missile and they are operationally and statistically independent of each other, and if you also add some point defense, you can expect to shoot down 90 percent or more of the attacking anti-ship cruise missiles. What is the combat record? First, in battles at sea warships of other states have averaged around 75 percent success in defending themselves. On the other hand, all of their success must be attributed to soft kill and point defense weapons, not to surface-to-air missiles [SAMs]. Second, there are several instances of warships that might have defended themselves but did not, illustrated by the recent successful missile attack on the Israeli missile ship *Hanit*. Navy analysts will also remember the Exocet hits on the defendable USS *Stark* and HMS *Sheffield*. Third, in the entire record of over 220 missiles fired on ships at sea starting in 1967, only one anti-ship missile has been shot down by a SAM.[74]

Models predicted the United States would incur thirty thousand casualties in Operation DESERT STORM, not the roughly three hundred that actually occurred; and half of those casualties did not occur in battle.[75] Models for casualty estimates almost never include friendly fire. Even when friendly-force data are available in a combat model, factors such as the reliability and effectiveness of allied and adversary weapons, the proficiency of an adversary in using counterfire or countermeasures that depend on the adversary's training, etc., must be estimated. Key data disputes "often center around order of battle, unit effectiveness, munitions quantities, chemical warfare performance degrade values, advance rates, sortie rates, and concepts of operation [CONOPS]. More time is spent instantiating and refining CONOPS information than systems performance data. Hence the obvious utility of wargames to understand CONOPS and the flow of the warfight."[76]

In World War II, the operations evaluation groups determined that a simple estimate of the error in a model is *the individual percentage error of the data times the square root of the number of data elements*. For a model with five thousand data entries and a tight error range of 10 percent, this equates to a factor of seven.[77] The 1973 GAO report found that 27 percent of the models they examined had over ten thousand coded instructions. Campaign models that DoD currently uses typically have on the order of one hundred thousand data elements and hundreds of equations and semantic models establishing the relationships among the data elements. Mistakes in the internal validity of computer models resulting from treating continuous functions as discrete and stipulating relationships for which no theory or data exist to allow computation compound the errors in the final calculation.[78] Adding detail to a combat/campaign simulation may or may not improve the rigor, but it surely will increase the uncertainty of the calculation.

Understanding this principle, the members of the World War II Operations Evaluation Group used a hemibel (half a decibel, or a factor of about three) rule. If they could not demonstrate factor-of-three improvements in a recommended change, they were uncertain that they had sufficient accuracy to merit

the recommendation, particularly considering the time and costs involved in changing operational practices. At a recent Military Operations Research Society workshop, a section leader informed me that military operations research no longer uses the hemibel rule. Why not is unclear.

The use of combat models to adjudicate war games is subject to the same concerns as is their use in campaign simulations. However, employing models that participants can question and umpires can explain adds both objectivity and rigor to the enterprise.

Whereas combat/campaign simulation requires the analyst/team to represent all indeterminacy as statistical, war gaming specifically addresses strategic and structural indeterminacy. Strategic indeterminacy means that the outcome largely is determined by the interaction of role-player decisions and the adjudication of control/umpires (who may be considered additional actors). Structural indeterminacy involves uncertainties in appropriately bounding the subject under study, determining which elements are relevant to include in characterizing the state of the world, and understanding the relationships among those elements. Manual games are good for the following:

- study of partially understood dynamic processes
- study of partially understood force interactions
- building of players' backgrounds for future study and analysis
- continual game improvement on the basis of players' criticisms[79]

Where the fundamental character of the subject under study involves strategic and structural indeterminacy, war-gaming techniques are more appropriate than combat/campaign simulation. Adding the data and formalities needed for computation detracts from, rather than adds to, rigor.

Usefulness and Value. The final criterion for science under exploration is the value or usefulness of the study or, in our case, the pseudoexperiment. Usefulness is the ability to use the experiment to take appropriate action. It presumes objectivity and rigor.

DoD turned to computer-based combat/campaign simulation because it desired methods that could produce rapid, objective, rigorous simulations to examine contingencies involving different adversaries to predict force requirements, study strategic/operational concepts, and compare costs and effects of alternative new platforms or weapons systems. DoD found these simulations useful in providing a common basis for making comparisons on a timeline consistent with annual program and budget development.

However, the "method of Monte Carlo [or any other form of combat/campaign simulation] has one particular value: its *educative* or *intuition-building*

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effect on those who behold the actual performance of the process. It allows the results of experimental variations of certain factors of the situation to be perceived in a direct and life-like way. This appearance of realism is so great that it has often led observers to forget that they were not in fact observing nature directly: a disastrous error."[80]

The predictive value of a large-scale, complicated combat/campaign computer simulation depends on how the analyst/team represents the results. Good, scientific analysis of computer-based campaign simulation can support quasi laws such as the identification of governing factors, but not strictly statistical or deterministic answers. Also, the premise that changing the characteristics of one system while leaving the rest of the world the same can determine an outcome assumes no feedback between the change and the rest of the system (e.g., that a change in combat capability will not influence commanders' decisions and CONOPS). However, DoD's use of computer-based simulation seeks to predict outcomes rather than to develop deep understanding of the factors governing the outcomes of battles and campaigns. Rarely do reports address governing factors or attempt to quantify the uncertainties inherent in the simulation.[81]

When DoD clients are facing a decision, telling them that their simulation identified topics that require future study is rarely what they want to hear. However, failure to identify unresolved issues from the pseudoexperiment obfuscates important uncertainties that should be considered. Science values the so-called heuristic fertility of studies rich in implications for further observations, experiment, or conceptualization.[82]

Making predictions from games presents challenges similar to making predictions from combat/campaign simulations, with the added proviso that although there is widespread skepticism about accepting any prediction of human behavior —much less quantified predictions—from a game, predictions derived from computer models are widely accepted. Yet although experts making stand-alone predictions are unreliable, "[e]xperience has shown that people often tend to adopt the same solutions to similar problems. Insofar as this is true, a realistic war game may predict the future, or at least some aspects of it[,] quite accurately."[83] Where games have preceded military battles and campaigns, they have demonstrated value in anticipating adversary tactics and courses of action and the many governing factors needed to prosecute battles and campaigns successfully. Examples include the following:

- Naval War College (NWC) games anticipating tactics in the Russo-Japanese War
- battle of Tannenberg gaming by both the Russian and German general staffs
- German general staff gaming of the Schlieffen Plan before World War I

- gaming different strategic approaches for a war with Japan at the College between the world wars
- Japanese gaming of the battle of Midway
- NWC gaming of the naval mining campaign against the Japanese in World War II
- German and Russian general staffs gaming the German invasion of Russia (Operation BARBAROSSA) in World War II
- Israelis' gaming before their operations
- U.S. Joint Staff gaming in anticipation of North Vietnam's Tet offensive

In almost all these cases, the games accurately predicted factors driving the success of future operations. However, in many cases the military system was unable to adapt in a timely fashion or the games had no effect on the political leadership conducting the war. Sometimes senior military leaders rejected game results.[84]

The Chief of Naval Operations Strategic Studies Group (CNO SSG) conducted a game exploring the implications of an Iraqi invasion of Kuwait in February 1990, before the actual invasion in August. Although the game had Iraqi forces advancing into Saudi Arabia toward the oil fields, otherwise it accurately anticipated a need for nontraditional coalitions, challenges in strategic lift, and the inadequate numbers of precision weapons on deployed Navy forces, among other things.[85] Yet many senior officials briefed on the game in March 1990 expressed no interest, viewing Iran rather than Iraq as the adversary of concern. Requests for game documents increased as Iraq conducted the invasion.

"Gaming is a powerful method for simultaneously mastering complexity, enhancing communication, stimulating creativity, and contributing to consensus and a commitment to action."[86] Thomas C. Schelling found the following: "First, the games are intensely stimulating; people are very active; ideas and conjectures get tossed around and analysed by a highly motivated group of people; a great deal of expertise is collected in a single room, expertise that is not often collected together; and people discover facts, ideas, possibilities, capabilities, and arguments that do not in any way depend on the game but nevertheless emerge in it." Players discover important facts that may never have occurred to them or are counter to what they understood (e.g., unprecedented acts excite attention, jurisdictional seams, and overlaps), and ways that players not represented in their usual thinking affect the feasibility and acceptability of possible courses of action.

> [T]he game, as a social and intellectual occasion, tends to be highly productive of little things of this sort. . . .

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> Second, people . . . learn more . . . about a country, by going through a game . . . than by any cram course [of equivalent time]. . . . If somebody were going to be responsible for some operations in the Pacific Islands, or were going to be Deputy Chief of Mission in Finland, or going to run an [Agency for International Development] program in Cyprus, just putting him[/her] into a game for three days focused on the area he[/she] is going to would teach him[/her] more than he[/she] could get by any kind of briefings, lectures, reading program, or other program of self-improvement.

Third, acquaintance is made with people with whom one might have occasion to work in the future involving intense common experience in joint problem solving. These by-products are just preliminary to costs. People can spend the other 362 days of the year pursuing other forms of analysis and learning. "All analytical techniques, all research methods, all stimulants to the imagination are dangerous. This includes games. But games are not much worse in this regard than the other techniques."[87]

A critique of current professional military education is that it does not give officers a detailed appreciation of military geography in theaters of interest or of adversaries' weapons systems and their concepts for using them. Theater-level games are valuable for learning geography, including the military geography of basing; the kinds and ranges of adversary and allied forces that may come into play and the complications they represent; and the logic of adversary concepts, as represented by Red teams. At the tactical level, war games are good for teaching junior officers the capabilities of adversary forces in an experiential way that tends to stick better than reading intelligence reports.[88] As the Prussian and German militaries recognized, games are exceptionally useful for developing an appreciation of command relationships and skills in writing orders and in working through control of forces in complicated situations.

Between the world wars, the German army (Wehrmacht) conducted field exercises during the summer and gamed when in garrison the rest of the year. During winter, each echelon, from the general staff to the company level, gamed their roles in the operations contemplated, then took what they gamed to the field the next year, beginning with company-level exercises and culminating, usually in August, in as large-scale an exercise as they could manage. With the army restricted in size by treaty, the games aimed to teach each rank, career enlisted and officer, how to perform at two ranks senior so the army could expand quickly. During war, these games became rehearsals for upcoming operations and occasionally continued as battles were being fought. The games were of great value to the Wehrmacht for developing concepts such as the blitzkrieg, and for developing its operational competence when it had sufficient forces to retain the initiative.[89]

The interaction of experts trying to achieve opposing aims within the context provided in the scenario helps ensure that relevant factors are not overlooked.

Games provide a basis of shared experience and a common vocabulary.[90] Whereas creativity of the analyst in combat/campaign simulation is reflected in the coding and analysis, the Markov assumption does not allow for learning during the game. Including learning algorithms (e.g., Bayesian calculations) in the code further complicates analysis of the results. In war games, the role players adapt to each state of the world, as provided by game umpires and control. Courses of action that do not provide desired results lead to reexamining possible approaches and objectives. New ideas that do work become apparent to all participants, contributing to the consensus needed to generate commitment to a course of action. Concerns over the appearance of realism in gaming represent the same risks and unintended consequences as those resulting from combat/campaign modeling.[91]

The scope of issues amenable to war gaming exceeds that of combat/campaign simulation. Manual war gaming is uniquely suited to increasing our understanding of and appreciation for the information dimension of warfare.[92] Ultimately, military operations are about influence: deterring or compelling change in others' actions inconsistent with one's political aims, while reassuring and encouraging others' actions that are consistent with one's political aims. The critical feature of a game, as opposed to computer modeling or any other forms of one-sided analysis,

> is that at least two separate decision centers are involved, neither of which is privy to the other's planning and arguing, neither of which has complete access to the other's intelligence or background information, neither of which has any direct way of knowing everything that the other is deciding on. . . . What this mode of organization can do that can not otherwise be done is to generate the phenomena of understanding and misunderstanding, perception and misperception, bargaining, demonstrations, dares and challenger's [sic], accommodation, coercion and intimidation, conveyance of intent, and uncertainty about what each other has already done or decided on. . . .
>
> . . . If I draw a face with a hidden picture there is no way for me to tell how hard it is to see the face except to show the picture to somebody. . . .
>
> It is the peculiar element of collaboration, communication, and bargaining, that is involved in any crisis game, that cannot be captured by "straightforward" unilateral analysis. . . .
>
> . . . [I]n arguments about the treasures or dangers that one may stumble on in games it is significant that there is at least *something* that games can do or generate that cannot be done or generated in any other way.[93]

Another value is that those who participate in a pseudoexperiment learn far more than those who receive a report of the study's findings. Few clients have the time or technical ability to understand the internal details of the combat/campaign simulation; they instead rely on their analytical teams to distill key findings

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relevant to the objectives of the study. In contrast, war gaming facilitates participation by those who must make and implement decisions. Joint planning dictates that, ideally, "the individuals who were deeply involved in the development of the COAs [courses of action]" should participate in the gaming used to develop those COAs.[94] War gaming facilitates recognition-primed decision making that allows commanders and their staffs to adapt rapidly to emerging situations, using their experiences in games "demanding careful sequential analysis of plans, decisions, events, and intelligence."[95]

IMPLICATIONS FOR DOD ANALYSIS AND A WAY AHEAD

The principal implication of this assessment is that DoD should overhaul its analytical paradigm that began with the Systems Analysis Office and evolved with the development of computers. DoD should rely on talented analysts and not again make the mistake of attempting to create universal answer machines through standardized processes and techniques. The focus of analysis for acquisition and force development should shift from individual weapons systems to capabilities to conduct sets of missions. DoD should reinvigorate the examination of warfare and military operations to develop an appreciation of fundamental questions to focus analysis, balancing a marketplace of ideas and approaches with the instincts of its hierarchy to centralize planning. It then should employ analysis campaigns, using cycles of research focused on top decision makers' concerns, that incorporate the following:

- war gaming
- DoD's investment in large-scale campaign models, to develop intuition and help identify factors governing combat outcomes
- field/fleet operations analysis
- intelligence collection
- campaign analysis
- quantitative modeling using simple, understandable models that incorporate only governing factors derived from observation and analysis (as opposed to creating computer code for each combat process and adding more code to already complicated models to address new technologies and phenomena)
- the study of history and recent advances in complexity sciences, and complementary analytical techniques based on advances in artificial intelligence and cognitive and social sciences
- review of study results against actual operations

No new analysis paradigm can meet scientific standards without addressing the roadblocks created by the abuse of need-to-know strictures and proprietary control of analyses.

Avoiding Past Mistakes

With the recent policy to make more use of war gaming, the first principle for a way forward should be to avoid mistakes of the past. Efforts to use large-scale computer modeling to create universal answer machines were misguided. In its search for systematic analysis routines, the natural tendency of the Pentagon will be to create similar standardized systems of war gaming that would allow those developing procurement programs and strategists to "turn the crank" to address issues as they arise. However, even the most objective and rigorous efforts in the past have not produced the desired results, as the following examples indicate.

RAND Strategy Assessment System. In the 1980s, concerns over the ability to analyze a possible war between NATO and the Warsaw Pact leading to a nuclear exchange motivated the OSD Office of Net Assessment to sponsor RAND in developing the RAND Strategy Assessment System (RSAS). The approach was to combine the best features of war gaming and analytical modeling in a comprehensive, farsighted framework for comparing views rigorously and moving toward some conclusions. RAND formed a stellar team to do the work, led by Paul Davis.

To this effort, war gaming provided the following:

- the contextual richness of complete scenarios
- interaction of political and military factors
- operational constraints
- often-ignored features of real war (e.g., unconventional attacks against command-and-control communications)
- asymmetries in objectives and perceptions
- asymmetries in national forces, doctrines, and styles
- relatively realistic descriptions of military campaigns
- action and reaction among the nations involved in the conflict

Analytical modeling provided the following:

- clarity of assumptions and causality
- reproducibility
- logical structure and rigor
- efficiency, permitting many war games (multiscenario analysis)
- depersonalization, by laying issues out on paper logically[96]

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To make gaming more efficient and rigorous, the RSAS approach used AI techniques to replace human teams. To make the process transparent, the design permitted human interaction at all levels, with the exception of some core model and execution coding. The intent was not to eliminate the role of expert judgment but "to capture most of the human-expert contribution in background research reflected in the models."[97] Computer code was written so that analysts knowledgeable in the subject matter did not need to have extensive experience to read and program decision rules.[98] The team intended that analysts and senior decision makers would be able to get definitive explanations and have the opportunity to change assumptions readily.

Departures from traditional analysis included automated game-based simulation to permit multiscenario analysis, heuristic rule-based modeling to make explicit the key assumptions on which outcomes depend, structured military campaign analysis, and interactive force-operations modeling. This would enable the analysis to treat interrelationships among strategic and nonstrategic forces; cut across theater boundaries, military services, and types of warfare; and reflect the effects of special phenomena such as unconventional warfare and failures in command and control.[99] The aim was not to predict outcomes but to understand what affected outcomes most.

In 1986, government agencies received the first installations of RSAS. An RSAS Steering Group, consisting of sponsors, developers, and users, approved requests to use the system. Although the RAND team intended that actual decision makers use the system for policy analysis, it proved too complicated to be of use in evaluating immediate operational situations, and high-level decision makers turned to their own analysts. RSAS was open to review, critique, and improvement. The challenge was that it was akin to an engineering library. One could investigate any subject, but only the developers could comprehend the whole system.[100]

As a spin-off from RSAS, RAND developed the Joint Integrated Contingency Model (JICM). It designed the model to be modular for transparency and to avoid needing to add hundreds of thousands of input variables. "As the model [JICM] was used in later years, however, the optional simplicity fell into disuse as users focused on getting the detailed databases 'right' (meaning agreed upon) for running standardized cases."[101]

Although RSAS and JICM were as objective, rigorous, and comprehensive as was practical, the limited interests and capacity of the DoD bureaucracy defeated RAND's sophisticated efforts to meet exacting standards of science.

Joint Warfare System. In a subsequent effort to allay concerns over the services using their own scenarios, models, and data, in the 1990s OSD began funding the Joint Warfare System (JWARS) to "support multi-billion dollar resource

allocation decisions and critical operational planning." JWARS was "a closed-form analytic simulation" using deterministic and stochastic models, including information operations, and "high-level abstractions of sensor and communications systems, the related information flows, imperfect perception of the battlespace, and command decision making."[102] The aim, as with individual service campaign simulations, has been to create a simulation to determine the effects of varying the characteristics of a system or concept by turning a crank, leaving the rest of the simulation unperturbed.

Given the expansiveness of the state space, the use of models and data based on judgment rather than observations from operations or exercises, and the likely feedback among systems characteristics and concepts, this approach involves large uncertainties that are difficult to quantify. As Koopman stated, "Rightly employed, it [combat simulation] gives a useful indicator in evaluations; it can *never* be relied on to predict the future."[103] JWARS was expensive, yet could not accomplish the vision of those who conceived and advocated for it.

Analytic Agenda / Support to Strategic Analysis. Given the expense and challenges of JWARS, in 2002 Secretary of Defense Donald H. Rumsfeld created an Analytic Agenda (now called Support to Strategic Analysis—SSA) to transform DoD's analysis system supporting strategic and programmatic decision making. The Analytic Agenda was a set of activities designed to do the following:

- Articulate, through scenarios, the secretary's guidance to the department about the missions, environments, and threats for which the future force should be prepared.
- Apply joint concepts to future missions depicted in planning scenarios.
- Produce standardized, accessible, transparent data and common assumptions for department-wide use in analysis.
- Design and conduct major joint analyses to support decisions on force structure, investments, and capability trade-offs.[104]

This effort did result in scenarios for analysis approved by DoD leadership, and it created conferences at which the services met to agree on common datasets they would use in their analyses. Each service was assured of having one of its preferred scenarios included. The services also used their preferred "all-purpose" campaign simulations for their capability-development processes, incorporating data beyond that in the common datasets as needed. However, few of these data came from detailed analyses of operations and exercises. These efforts have had little impact on cross-service force structure investments or capability trade-offs.

The details of studies done using these simulations are classified and proprietary, limiting opportunities for review of their objectivity and rigor. OSD, the

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Joint Staff, and the services should take care not to create a similar, highly structured set of expensive, complex, proprietary war games.

No defense problem is specified well enough that an optimum can be calculated without employing subjective judgment to establish values. The large campaign simulations used for SSA result in large sets of feasible courses of action. Expecting large combat/campaign simulations or war games to resolve conflicting preferences among institutional forces within the military-industrial-congressional enterprise that drive the defense program and budget is illogical.[105] Improvements to JWARS or the SSA are incapable of providing the precise predictions for resolving complicated and complex defense issues that those who misunderstand scientific rigor expect. "As one goes up the scale of complexity, the personal qualities of the analyst shift from scientific to artistic and his[/her] model from precise to abstract. That is why asking me which model to buy is asking the wrong question. Instead, ask me which analysts and modelers to hire."[106]

Capabilities-Based Planning

DoD's acquisition system, which consumes the vast majority of the Pentagon's attention and analytical effort, focuses on major defense acquisition programs—platforms and systems that involve the commitment of billions of dollars.[107] Under Secretary Rumsfeld, DoD attempted to introduce capabilities-based planning as a means of putting the development of individual weapons systems in context. Capabilities-based planning has received rough treatment in recent reviews for being tied to the revolution in military affairs and force transformation, focusing on concepts such as net-centric warfare rather than on strategy to defeat the strategies and forces of identified potential adversaries. These critiques largely miss the mark.[108]

The usual driver for acquisition is that an aircraft, vehicle, or vessel is reaching the point where it is expensive to maintain or upgrade with new technology, and a military service proposes to replace that platform with a new one incorporating the latest generation of technology. A 1992 study of the cost growth of DoD Major Force Program categories since Secretary McNamara instituted them in 1962 demonstrated that DoD needs 7 percent growth in its budget to maintain its force structure if it continues attempting to replace each platform with the latest generation on a one-for-one basis.[109] Using the rule of 72, this means that a 4 percent growth in defense budgets results in halving the force roughly each quarter of a century.[110]

Following the 2006 Quadrennial Defense Review, DoD made an effort to institute "strategic and tactical" acquisition reform.[111] A major part of the reform involved pilot Evaluation of Alternatives on topics such as integrated air and missile defense as a basis for resource allocation, rather than conducting an Analysis

of Alternatives for each major defense acquisition program. The effort demonstrated promise, but failed when key leaders departed. Also, weapons program managers wanted to know what the study would show before providing their data for analysis, despite direction from higher authorities.

If DoD is to overcome its accelerating mismatch between limited budgets and growing challenges, it requires a new analysis paradigm and a culture focused more on national security than on protecting parochial service and program priorities by withholding knowledge and data.

Asking Essential Questions and Selecting Appropriate Methods

Adoption of a new analysis paradigm will involve some time before the paradigm becomes institutional practice within DoD, and will incur transition costs. DoD should ensure that initial efforts focus on substantive issues. In the 1950s and '60s, federally funded research centers led the way in understanding the implications of nuclear weapons for warfare and deterrence. RAND employed Bernard Brodie, Herman Kahn, Thomas C. Schelling, Albert J. Wohlstetter, and Roberta M. Wohlstetter, among many other highly talented intellects, to explore fundamental questions of war in the nuclear age, strategy and games, and many other topics. Now, federally funded research and analysis centers have become principally an extension of Pentagon staff studies. Funding for independent research on fundamental questions has been eliminated in favor of studying the issue du jour, which eliminates many fundamental distinctions between federally funded research centers and for-profit defense contractors. In addition to making better use of its Office of Net Assessment, which under the leadership of the recently retired Andrew W. Marshall (who came to OSD from RAND in the 1970s) had a long history of searching for the right questions, DoD should return to the former model and mission for federally funded research centers, having them help DoD's leadership understand the questions they should be asking and the issues they should analyze.

DoD should realize that the principal value of good analysis is in eliminating infeasible or unsuitable courses of action, and that no analyses can provide point solutions to complicated problems. Prevailing concepts and political power among those involved will determine the final trade-offs in defense policy and plans within the space of feasible and suitable solutions. Centralized processes that give too much power to one institution, such as OSD or the Joint Staff, are likely to generate more mistakes than a messier analytical competition among concepts, methods, and proposed solutions. The Secretaries of Defense must earn their pay.

That said, different subjects call for different analytical approaches. In turning to war gaming, DoD should avoid the law of the instrument.[112] To improve

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rigor, the Military Operations Research Society should assist DoD in developing guidelines for analysts to align analytical techniques with the fundamental characteristics of subjects under study.

The most appropriate action from pseudoexperimentation, whether war gaming or combat/computer simulation, is exploring the validity of the findings using other techniques. Analysis campaigns involve using a variety of techniques to address important issues. Cycles of research emphasize the interaction among these techniques as progress in one investigation informs others and is in turn informed by them.

Learning from RSAS and decades of experience in defense analysis, Davis recommends analysis campaigns. "The analysis campaign should provide for breadth with a mix of models, human gaming, historical analysis, trend analysis, and collaboration with experienced operators," and should consider multiple objectives. The approach is to conduct first-cut analyses to narrow the world under consideration, then to conduct detailed analyses. "Campaign models, for example—when used with large negotiated databases for only some standard case—are poor decision aids but are excellent for integration, for understanding the many facets of a successful large operation, and for building analyst expertise that is valuable in answering specific questions quickly, often with simpler models."[113] As an example of first-cut analysis considering multiple objectives, Hughes recommends examining alternative futures.

> For example, in determining the best naval forces to influence China and our Asian allies, it is essential to remember that the same American ships and aircraft, many of which are built for 30 and even 40 years of combat life, must serve our interests whether the China-American international relationship at any given moment is one of cooperation, competition, crisis containment, or conflict at different levels of intensity. By testing our fleet's utility in each circumstance we can judge how and where risks are involved with different fleet compositions and deployment patterns. The OSD Office of Net Assessment found that looking at alternative futures by region or economic circumstance was powerful. One did not make predictions about which future was most likely to come to pass. Instead [one] looked for common forces, solutions, deployments and negotiating positions that were suited for every future.[114]

Scenario planning has proved an effective technique for resolving structural indeterminacy.[115] Davis provides a comprehensive matrix of instruments (techniques) assessed by important attributes to be considered in an analysis campaign.[116] The discussion below represents the author's appreciation of techniques essential to cycles of research.

War Gaming and Combat/Campaign Simulation. War gaming and combat/campaign simulation are complementary to each other. Both provide insight to

participants on factors governing the contingency under study and issues and data needing further study. War games are particularly valuable for helping those employing DoD's large, computer-based campaign models to understand CONOPS and the flow of campaigns.[117]

Fleet/Field Operations Analysis. Games and combat simulation should tie directly to field/fleet exercises experimenting with new concepts, using prototype systems designed to address capability enhancements, and carefully collecting data to inform important areas of ignorance and assumptions used in plans, games, and campaign simulation.

The approach and attack manual served as a basis for data collection to advance U.S. submarine force capabilities rapidly, as did the coordination-in-direct-support (CIDS) fleet exercise guide for operational data on fleet communications. The analysis based on these data demonstrated that a CIDS concept for using submarines as an outer screen for aircraft carriers was infeasible. The fleet communications data, collected in ten fleet exercises over a two-year period in the late 1970s, provided the basis for the Warfare Environment Simulator, a simulation sponsored by Naval Electronics System Command (now the Space and Naval Warfare Systems Command) focused on command and control. Unfortunately, the Warfare Environment Simulator morphed into the Naval Warfare Simulation System, losing its focus on using fleet data and on command and control, instead becoming a large-scale campaign simulation.[118]

NWC war games served as the basis for developing new operational concepts to be explored at sea, both before World War II and during the 1980s and '90s. Fleet exercises in the 1920s and '30s turned concepts for amphibious and carrier air warfare and underway replenishment of naval task forces into key capabilities for the World War II effort. Fleet exercises in the 1980s translated operational concepts developed by the CNO SSGs (at the College) into capabilities to execute the 1980s Maritime Strategy.[119] Similarly, in the 1990s, the Navy Warfare Development Command (then collocated at the College) pursued fleet experimentation through a program called Sea Trial. However, the Navy did not sustain that effort. A debate exists over whether dedicated units are required to conduct such experimentation. The submarine force since 1949, the Navy Tactical Development and Evaluation Program in the 1970s, and U.S. Pacific Command around 2000 have made experimentation a matter of routine during fleet and joint exercises. Data collected from routine rather than structured exercises better represents what would occur in unstructured combat and operations.

As part of war-gaming initiatives, OSD, the Joint Staff, and the services should reinvigorate field/fleet experimentation and embed operations analysts in deployed battalions and carrier strike groups and on higher-echelon staffs to collect

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data on operations and exercises. For large programs and issues, exercise and operations analysis guides using conceptual processes would provide consistent datasets for analysis and use in pseudoexperimentation. Those educated in engineering and the hard sciences are likely to perform in the field as well as or better than those educated in operations research curricula emphasizing mathematical programming (optimization) and stochastic processes.[120]

Cyber warfare should receive particular attention, given current challenges in creating operational models. Beyond Red teams, white hats should experiment in the field with what it would take to turn unmanned systems into kamikazes attacking their host forces, for example, before making large investment decisions.

Intelligence Collection. War games also should be tied to intelligence collection and analysis. While military intelligence naturally tends to focus on possible adversary technical capabilities (e.g., range and accuracy of weapons), war games require Red teams that understand adversary planning, training, ethos, and operational concepts. Similarly, war games also suggest adversary courses of action that would create difficulty for the Blue team. Therefore, war-game findings should play into intelligence requirements to determine whether adversaries have identified and are preparing to execute such courses of action.

Campaign Analysis. Rather than using war games or large campaign models that require significant amounts of time to set up, rapid, focused analyses on the eve of war have demonstrated value in anticipating important outcomes. Shortly before each war began, Captain/Professor Wayne Hughes gave Naval Postgraduate School (NPS) students seventy-two hours to analyze the Falklands War between the United Kingdom and Argentina, the wars in Afghanistan, and the wars in Iraq. These analyses all provided results that would have been valuable to the commanders involved.[121] The key is selecting appropriate measures for quantification. Selecting appropriate analytical measures begins with developing an appreciation for the principal factors governing outcomes, and often is not done well.[122]

What useful results reasonably can be expected from war gaming and rapid campaign analysis, since accurate results cannot be expected? At NPS, Hughes teaches the students in his joint campaign analysis course that these war-gaming and campaign analyses provide the following:

- patterns of activity, both tactical and operational; the reward of new tactics to accompany new technology
- a focusing by decision makers and their staffs on the important things—those most likely to influence the outcome and achieve "victory," or whatever the intended outcome is

- synthesized information about almost anything: the traffic, the places of concealment, the beaches, the mountain passes to block, the critical roads, or the vital bridges to protect or destroy; and, perhaps most important because it is calculable, the time to arrive on scene and the logistical support necessary to sustain operations
- advice to the decision maker that is quantitative, objective, informed, specific—and incomplete
- unexpected side benefits; for example, in designing a warship one might discover that it is not a good idea to put too many eggs in one basket if the ship can be lost while performing a dangerous task[123]

Observe that predicting outcomes, or even winners by some criterion, does not appear on the list. Hughes is a great proponent of campaign analysis and its value—if one does not claim too much predictive power from it. Decisions have to be made amid uncertainty, and informed decisions are better than those based on individual experience and personal predilections alone.[124]

Simple versus Large Combat Models. Good analysis derives from understanding those few essential features of the subject under study that govern an outcome.[125] Although using models to understand essential features is valuable, attempting to predict outcomes by adding ever more detail without considering the implications for additional uncertainty is antithetical to analysis. Campaign analyses and manual war games employing simple, focused combat models and rules that are understood and subject to question by all participants can expose the factors that govern success—i.e., those on which commanders and capability developers should focus.

Barring a more exact method for quantifying the uncertainty of a combat simulation, the analyst should estimate the typical error involved in the variables used in the models, multiply that times the square root of the number of variables, and present and report the result as the range of uncertainty in the quantitative findings. Although simulations are of great value in providing insights to analysts, analysts should be appropriately humble in recommending program or policy changes solely on the basis of the outcomes of their models.

Complexity Sciences. Advances in complexity sciences raise questions regarding current combat models and present new opportunities for defense analyses. The combat models used in war gaming and campaign simulations were developed before more recent improvements in understanding chaos and complexity. Chaos involves sensitivity to initial conditions on a space of measure zero. In a space of measure zero, no matter how precise an interval, area, or n-dimensional volume around an initial state, there exist points that will result in far different future

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states of the system. A pendulum hung amid three magnets—such as Clausewitz described in explaining the pulls of government (reason), the population (primordial violence), and the military (chance) in war—is such a chaotic system. Classical physics and statistics, as discussed above, presume that describing the initial state allows prediction of future states, at least with probabilities. The foundations for statistics on spaces of measure zero are not well understood. Mathematics based on continuity does not apply in chaotic and in many complex systems.

Complexity involves power laws. Power laws have a mean, but unlike Poisson or Gaussian distributions, their standard distribution is infinity.[126] The law of large numbers does not apply to power laws. Power laws apply to phenomena such as earthquakes—and to much of human behavior that involves bursts of activity.[127] Historically, a small number of pilots and submarine commanders account for the most kills. Is this a power law? If so, how do combat models account for the distribution of talent among pilots and commanders? More broadly, how many events treated statistically in combat/campaign simulation involve chaotic and complex phenomena that make Monte Carlo processes and Markov assumptions inappropriate?

Warfare is renowned for extended periods of boredom followed by bursts of intense activity during battle. The outcome of battles is determined by tens to 10^7 motivated agents performing individual functions that are more difficult to represent than molecules in a liquid or gas. Agent-based models involve agents executing rules based on the local information they have. These models are known for demonstrating emergent behavior, such as the collapse of a line of troops when adjacent soldiers retreat.[128]

Fundamental features of warfare suggest chaos and complexity sciences may be more fruitful for understanding underlying phenomena than current models.[129]

History, Cognitive and Social Sciences, and Artificial Intelligence. The cycle of research for war gaming and combat/campaign simulation also extends to studying history and developments in social science, including experimental gaming on human behavior (such as in behavioral economics) and cognitive science studying developments in understanding the brain, etc., to explore human reasoning and dynamics.

AI has had recent success in defeating human champions in games such as chess and Go, and increasingly is embedded in computers and weapons. Having people who understand AI on a team conducting analysis campaigns will add considerable value to the effort.

Reviewing Previous Results. A final area of emphasis in a cycle of research is reviewing previous results.

> Clearly war gaming and campaign simulations are a blend of an objective, scientific approach and the artistry of human designers and participants. What can be done to evaluate how well individual studies, or a series of mutually reinforcing games, simulations, results, and conclusions have aided decision makers? One thing that is rarely done is to review "old" studies and evaluate their strengths and weaknesses after the projected future scenario year has passed. It is too much to ask, perhaps, for an evaluation of the study results and conclusion and it is exceedingly difficult to evaluate any study's impact on decisions it was to have enlightened.[130]

An objective examination of the scenario, the Red and Blue forces available, and the Red and Blue force combat capabilities after the fact can consider how well the study anticipated reality.[131] Independent review of key features of the analysis will contribute to objectivity and rigor and help to identify analytical techniques appropriate to the subject matter.

The extent to which pseudoexperiments, whether war games or combat/campaign simulations, are scientific depends wholly on the character of their execution. "Electronic computers, game-theoretic models, and statistical formulas are but instruments after all; it is not *they* that produce scientific results but the investigator who uses them."[132] Neither type of simulation is inherently more scientific than the other. The principal difference is that combat/campaign simulation is analytical—reducing the problem to constituent pieces—while war gaming emphasizes synthesis—ensuring all relevant factors are considered, including how they work together.

War gaming and large-scale computer-based combat/campaign simulation differ little in their inability to predict quantitative outcomes. The scientific value of the pseudoexperiment lies in the objectivity, rigor, and usefulness of the theory the pseudoexperiment represents. This includes the motivations, tastes and beliefs, and expertise of all the participants, including the client.

War gaming has a record of anticipating factors that largely govern outcomes, thus preventing surprise. Because DoD has used combat/campaign simulation for quantitative prediction, its performance at comparing quantitative results of combat models with actual combat has been less accurate and less reliable than that of war gaming that explored the processes and nonquantitative features that would affect a campaign most. Whereas those commanding and conducting operations rarely have the motivation and skills to become deeply involved in combat/campaign modeling, they can make the time and do have the skills to participate in war gaming. Repeated war gaming can provide firsthand experiences

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to limit surprise and facilitate recognitive decision making that allows rapid adaptation to emerging situations.

Using governing factors uncovered through war gaming, detailed computer models, campaign analyses, or other techniques to create simple models of the phenomena requires much more analytical skill than adding detailed models of additional processes to existing computer models. Simpler models provide greater understanding with appropriate precision than complicated computer models with large numbers of variables that give an appearance of precision but whose range of uncertainty is difficult to estimate and grows with the uncertainty of each parameter added and the square root of the number of variables.

Returning to the roots of operations research—observing, modeling operations, and collecting data in the field—is an essential aspect of a cycle of research. Work in the field yields data and knowledge that increase understanding of which concepts actually work and which do not, and provides essential data for use in computer and war-gaming simulation.

Although the discussion of questions and possibilities raised by developments in complexity sciences is incomplete, it suggests a need to reexamine combat models and to extend analytical techniques to add the rigor of appropriate techniques to combat simulation.

The Pentagon needs to overhaul its analysis paradigm if it is to meet growing security challenges with limited budgets. Overhauling the Pentagon's analysis paradigm again will require interdisciplinary teams of scientists—from both hard and social sciences, and with an appreciation for the humanities—interacting in analysis campaigns and cycles of research. Client and contractor use and abuse of need-to-know security barriers and proprietary restrictions on studies present formidable obstacles to implementing scientific standards in DoD studies.

NOTES

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1. Extended discussions of war-gaming history are provided in Peter P. Perla, *The Art of Wargaming* (Annapolis, MD: Naval Institute Press, 1990), and John T. Hanley Jr., *On Wargaming: A Critique of Strategic Operational Gaming* (Ann Arbor, MI: Univ. Microfilms International, 1991). Martin L. van Creveld, *Training of Officers: From Military Professionalism to Irrelevance* (New York: Free Press, 1990), provides an excellent history of the development of professional military education, and John B. Hattendorf, B. Mitchell Simpson III, and John R. Wadleigh, *Sailors and Scholars: The Centennial History of the U.S. Naval War College* (Newport, RI: Naval War College Press, 1984), provides a comprehensive history of the U.S. Naval War College. Wayne P. Hughes Jr., ed., *Military Modeling for Decision Making,* 3rd ed. (Alexandria, VA: Military Operations Research Society, 1997), provides an extensive overview of military modeling.

2. Perla, *The Art of Wargaming,* chap. 4.
3. Hanley, *On Wargaming,* pp. 105–10.
4. In 1902, Lt. J. V. Chase wrote a paper at the Naval War College using these equations; the Navy did not declassify it until 1972. Wayne P. Hughes Jr., introduction to Bradley A. Fiske, *The Navy as a Fighting Machine,* ed. John B. Hattendorf (Annapolis, MD: Naval Institute Press, 1988).
5. They are now called federally funded research and development centers.
6. Hanley, *On Wargaming,* pp. 156–57.
7. Alain C. Enthoven and K. Wayne Smith, *How Much Is Enough? Shaping the Defense Program 1961–1969* (New York: Harper and Row, 1971).
8. Paul K. Davis, *Analysis to Inform Defense Planning despite Austerity* (Santa Monica, CA: RAND, 2014), pp. 6–7.
9. Ibid., p. 21.
10. Deputy Secretary of Defense to Secretaries of the Military Departments et al., memorandum, "Wargaming and Innovation," 9 February 2015, available at news.usni.org/.
11. In his *Analysis to Inform Defense Planning despite Austerity,* Davis has proposed analysis campaigns, and Peter Perla coined the phrase *cycle of research* to capture the need for a process for linking war gaming to fleet exercises and other forms of study and analysis.
12. Bernard O. Koopman, "A Study of the Logical Basis of Combat Simulation," *Operations Research* 18, no. 5 (September–October 1970), pp. 856–57.
13. Abraham Kaplan, *The Conduct of Inquiry: Methodology for Behavioral Science* (San Francisco, CA: Chandler, 1964), p. 5.
14. Ibid., pp. 27–28.
15. These descriptions employ critiques of war gaming and some of the tenets used in establishing the Systems Analysis Office. Davis, *Analysis to Inform Defense Planning despite Austerity,* pp. 6–7.
16. Kaplan, *The Conduct of Inquiry,* p. 35.
17. Olaf Helmer and Nicholas Rescher, "On the Epistemology of the Inexact Sciences," *Management Science* 6, no. 1 (1 October 1959), p. 27.
18. Kaplan, *The Conduct of Inquiry,* pp. 127–28.
19. Helmer and Rescher, "On the Epistemology of the Inexact Sciences," p. 25.
20. Ibid., pp. 38–52; Kaplan, *The Conduct of Inquiry,* p. 95.
21. Helmer and Rescher, "On the Epistemology of the Inexact Sciences," p. 29; Kaplan, *The Conduct of Inquiry,* p. 112.
22. Terms used by Helmer and Rescher in "On the Epistemology of the Inexact Sciences" and Kaplan in *The Conduct of Inquiry,* respectively.
23. Helmer and Rescher, "On the Epistemology of the Inexact Sciences," p. 29.
24. Ibid., p. 48. The concept of *experimentation* here is any exploration used to gain understanding of the subject under study. A large literature on experimental gaming addresses the use of gaming in more-formal experiments.
25. Leonard J. Savage, *The Foundations of Statistics,* 2nd ed. (New York: Dover, 1972), p. 9.
26. See Stafford Beer, *Decision and Control: The Meaning of Operational Research and Management Cybernetics* (London: Wiley, 1966), for an excellent discussion of this process.
27. Garry D. Brewer, *Scientific Gaming: The Development and Use of Free-Form Scenarios* (New Haven, CT: Yale School of Organization and Management, 1978).
28. Koopman, "A Study of the Logical Basis of Combat Simulation," pp. 855–56.
29. Helmer and Rescher, "On the Epistemology of the Inexact Sciences," p. 49.
30. "[E]pistemology is concerned with the role of evidence in the attainment of scientific laws and with the scientific procedures implied by that role." Ibid., p. 27.
31. Ibid., p. 43.
32. O. G. Haywood Jr., "Military Decision and Game Theory," *Journal of the Operations Research Society of America* 2, no. 4 (November 1954), pp. 365–85.
33. Koopman, "A Study of the Logical Basis of Combat Simulation," p. 857.
34. Barry D. Watts, "Doctrine, Technology, and War" (paper presented at the Air & Space Doctrinal Symposium, Maxwell Air Force Base, Montgomery, AL, 30 April 1996), available at www.airpower.au.af.mil/.

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35. Koopman, "A Study of the Logical Basis of Combat Simulation," p. 858.
36. Classic methods for calculating transition rates for arrays of states and the solution of stochastic equations are not trivial. Ibid., pp. 860–66. They also employ assumptions of continuity that may not be warranted.
37. Ibid., p. 860.
38. Ibid., p. 867.
39. The following is derived from ibid., pp. 871–72.
40. A unit may be an individual element, such as a soldier, ship, or aircraft, or aggregated elements such as formations of men and women, squadrons, or task forces.
41. Koopman, "A Study of the Logical Basis of Combat Simulation," pp. 871–72.
42. William Poundstone, *Labyrinths of Reason: Paradox, Puzzles and the Frailty of Knowledge* (New York: Random House, 1988), pp. 183–88, relates an analysis by Larry J. Stockmeyer and Albert R. Meyer about such a computer.
43. Monte Carlo simulations employ many runs, randomly selecting from the probability distributions coded into stochastic processes, to produce distributions of outcomes. See Hughes, *Military Modeling,* for a comprehensive set of military modeling techniques for different applications; and Koopman, "A Study of the Logical Basis of Combat Simulation," pp. 867–71, for Monte Carlo Lanchester analysis.
44. For examples from several giants in military operations research, see Glenn A. Kent, "On Analysis," *Air University Review* 18, no. 4 (May–June 1967), pp. 50–55; Koopman, "A Study of the Logical Basis of Combat Simulation," pp. 872–79; Bernard O. Koopman, *Search and Screening: General Principles with Historical Applications* (Elmsford, NY: Pergamon, 1980); Wayne P. Hughes Jr., "A Salvo Model of Warships in Missile Combat Used to Evaluate Their Staying Power," *Naval Research Logistics* 42, no. 2 (March 1995), pp. 267–89; Wayne P. Hughes Jr., *Fleet Tactics and Coastal Combat,* 2nd ed. (Annapolis, MD: Naval Institute Press, 1999); and Davis, *Analysis to Inform Defense Planning despite Austerity,* pp. 50–55, 147–53.
45. For a brief discussion of the evolution of computers in solving games of tic-tac-toe, chess, and Go, see "AlphaGo: Using Machine Learning to Master the Ancient Game of Go," 27 January 2016, *Official Google Blog,* googleblog.blogspot.com/.
46. See later discussion of RSAS.
47. Operations Research Society of America, "Guidelines for the Practice of Operations Research," *Operations Research* 19, no. 5 (September 1971), pp. 1123–1258.
48. Achieving a reasonable culminating point in a war game of a few days or a week requires a theory of where this point occurs and careful design of the move and adjudication structures. Robert C. Rubel [Capt., USN (Ret.)], e-mail to author, 31 March 2016.
49. Hanley, *On Wargaming,* pp. 228–72.
50. Davis, *Analysis to Inform Defense Planning despite Austerity,* p. 32.
51. Ibid., p. 66.
52. Wayne P. Hughes Jr., "Prediction" (address to the Military Application section of INFORMS, Phoenix, AZ, 14–17 October 2012).
53. Helmer and Rescher, "On the Epistemology of the Inexact Sciences," p. 49. Captain Rubel, a former director of the Naval War College War Gaming Department and dean of the Center for Naval Warfare Studies, noted that this is true only if the umpires do not overlook an omission of the players', which may occur if following the rules would require a reset of the game. Robert C. Rubel [Capt., USN (Ret.)], e-mail to author, 18 April 2016.
54. Robert Levine, Thomas Schelling, and William Jones, *Crisis Games 27 Years Later: Plus C'est Déjà Vu* (Santa Monica, CA: RAND, 1991), p. 27.
55. Thomas A. Brown, *Potential Applications of Manual Games* (Santa Monica, CA: RAND, 1984), p. 2.
56. Operations Research Society of America, "Guidelines for the Practice of Operations Research," p. 1144.
57. Comptroller General of the United States, *Advantages and Limitations of Computer Simulation in Decisionmaking* (Washington, DC: General Accounting Office, 1973).
58. Irving L. Janis and Leon Mann, *Decision Making: A Psychological Analysis of Conflict, Choice, and Commitment* (New York: Free Press, 1977), chap. 3.

59. Irving L. Janis, *Crucial Decisions: Leadership in Policymaking and Crisis Management* (New York: Free Press, 1989), chap. 7.
60. Beer, *Decision and Control,* chap. 2.
61. Daniel Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus, Giroux, 2011).
62. Philip E. Tetlock, *Expert Political Judgment: How Good Is It? How Can We Know?* (Princeton, NJ: Princeton Univ. Press, 2005), p. 20.
63. Jacob Marschak and Roy Radner, *Economic Theory of Teams* (New Haven, CT: Yale Univ. Press, 1972), provides a framework and analysis for team decision making based on tastes and beliefs.
64. Quoted in Stephen Downes-Martin, "Adjudication: The *Diabolus in Machina* of War Gaming," *Naval War College Review* 66, no. 3 (Summer 2013), p. 74.
65. Kaplan, *The Conduct of Inquiry,* p. 128.
66. Wayne P. Hughes Jr., e-mail to author, 1 March 2016. Also see Hughes, "Prediction," for a discussion of rapid analysis before actual combat.
67. Kaplan, *The Conduct of Inquiry,* p. 283.
68. Phillip M. Morse and George E. Kimball, *Methods of Operations Research* (New York: Wiley, 1951).
69. Comptroller General of the United States, *Advantages and Limitations of Computer Simulation in Decisionmaking.*
70. This publication has had different names over the years.
71. The author participated in the design, conduct, and reconstruction of LANTSUBASWEX 2-88 that discovered that an analyst had embedded a thumb rule (quasi law) into the Submarine Fleet Mission Program Library search calculations that provided results that were conservative by an order of magnitude.
72. For example, the coordination-in-direct-support and over-the-horizon targeting programs conducted by Naval Electronic Systems Command, PME-108, in the late 1970s.
73. Hughes, "Prediction."
74. Ibid.
75. Thomas Mahnken, "The Gulf War in Retrospect," *FP,* 20 January 2011, foreignpolicy.com/.
76. Michael A. Ottenberg, e-mail to author, 11 March 2016.
77. Koopman, "A Study of the Logical Basis of Combat Simulation," p. 880.
78. Model verification and validation is an arcane subject covered only lightly in this article.
79. Brown, *Potential Applications of Manual Games,* p. 3.
80. Koopman, "A Study of the Logical Basis of Combat Simulation," p. 867. Adam Elkus, "Strategic Theory and the Logic of Computational Modeling," *Infinity Journal* 5, no. 1 (2015), also emphasizes that the main value of such simulation derives from other-than-quantitative prediction, quoting Joshua M. Epstein, "Why Model?," *Journal of Artificial Societies and Social Simulation* 11, no. 4 (2008), p. 12, "[T]here are many other reasons to model other than to predict. Models can explain phenomena of interest, guide data collection, suggest useful analogies, cast light on core uncertainties, expose hidden assumptions, bound outcomes to plausible ranges, illuminate core aspects of interest, challenge conventional wisdom, and generally reveal what is simple to be complex," and Petter Holme and Fredrik Liljeros, "Mechanistic Models in Computational Social Science," *Frontiers in Physics,* 17 September 2015, journal.frontiersin.org/, "By constructing a computational artifact that renders a theory precise in its qualitative assumptions and performing experiments with it, researchers attain the opportunity to discover flaws and hidden assumptions that might not otherwise be clear from the verbal theory alone. This may be an interesting theoretical result in and of itself or a spur to further research. Likewise, building a computational artifact and then performing experiments with it may suggest interesting new hypotheses for future research. Even familiar situations may look very different when their core assumptions are altered and the results simulated."
81. Comptroller General of the United States, *Advantages and Limitations of Computer Simulation in Decisionmaking;* decades of observing operations research practice.
82. Kaplan, *The Conduct of Inquiry,* p. 284.
83. Herman Kahn and Irwin Mann, *War Gaming* (Santa Monica, CA: RAND, 1957), pp. 11–12.
84. Hanley, *On Wargaming,* chap. 4.
85. The author was program director of the CNO SSG from 1985 to 1998 and helped to

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conceive and orchestrate this game. At the time, U.S. policy was that Iran was the adversary and we were friendly to Iraq.

86. Richard D. Duke and Jac L. A. Guerts, *Policy Games for Strategic Management: Pathways to the Unknown* (West Lafayette, IN: Purdue Univ. Press, 2004), p. 23.

87. Levine, Schelling, and Jones, *Crisis Games 27 Years Later,* pp. 23–26.

88. Andrew Marshall, e-mail to author, 3 March 2016. I thank Mr. Marshall for encouraging me to highlight these points.

89. Rudolf Hofmann, *War Games* (Washington, DC: U.S. Army Dept., 1952), provides a comprehensive account of German army gaming before and during World War II.

90. Brown, *Potential Applications of Manual Games,* p. 7.

91. Paul Bracken, "Unintended Consequences of Strategic Gaming," *Simulation and Games* 8 (September 1977), pp. 283–318, discusses the unintended consequences of gaming, which also apply to campaign simulation.

92. Brown, *Potential Applications of Manual Games,* p. 4.

93. Levine, Schelling, and Jones, *Crisis Games 27 Years Later,* pp. 31–33. Also see Robert C. Rubel, "The Epistemology of War Gaming," *Naval War College Review* 59, no. 2 (Spring 2006), pp. 108–28, for his discussion of whispers in war games.

94. U.S. Defense Dept., *Joint Operational Planning,* JP 5-0 (Washington, DC: Joint Staff, 2006), p. III-31.

95. See Karol G. Ross et al., "The Recognition-Primed Decision Model," *Military Review* (July–August 2004), pp. 6–10, on recognition-primed decision making, and Levine, Schelling, and Jones, *Crisis Games 27 Years Later,* p. 27, for the Schelling quote.

96. Paul K. Davis and James A. Winnefeld, *The RAND Strategy Assessment Center: An Overview and Interim Conclusions about Utility and Development Options* (Santa Monica, CA: RAND, 1983), p. 15.

97. Ibid., p. vi.

98. "Our intention is that analysts and other substantive experts work directly with the software tools to build, test, use, and adjust the models." Paul K. Davis, Steven C. Bankes, and James P. Kahan, *A New Methodology for Modeling National Command Level Decision-making in War Games and Simulations* (Santa Monica, CA: RAND, 1986), p. 60.

99. Davis and Winnefeld, *The RAND Strategy Assessment Center,* p. vii.

100. Hanley, *On Wargaming,* pp. 421–53.

101. Davis, *Analysis to Inform Defense Planning despite Austerity,* p. 60.

102. George F. Stone III and Gregory A. McIntyre, "The Joint Warfare System (JWARS): A Modeling and Analysis System for the Defense Department" (presentation at the INFORMS Winter Simulation Conference, Arlington, VA, 2001), pp. 691–96.

103. Koopman, "A Study of the Logical Basis of Combat Simulation," p. 857.

104. The author participated on the senior committee proposing scenarios and overseeing the set of activities for a year during 2006–2007.

105. See Robert M. Gates, *Duty: Memoirs of a Secretary at War* (New York: Knopf, 2014), p. 117.

106. Wayne P. Hughes, "An Operations Analyst's View of the New Modeling Technologies" (paper presented at the Symposium on Command and Control and Control Research and Decision Aids, Monterey, CA, 22 June 1994), p. 3.

107. In 2014, the dollar thresholds for a major defense acquisition program were $480 million in research and development or $2.79 billion in constant 2014 dollars.

108. For a critique of capability-based planning, see Thomas E. Ricks, "The Pentagoner: The Long, Slow Death of Capability-Based Planning," *Foreign Policy,* 5 January 2015, foreignpolicy.com/. A detailed study is provided in John T. Hanley Jr. et al., *Improving Integration of Department of Defense Processes for Capability Development Planning* (Alexandria, VA: Institute for Defense Analyses, 2006).

109. Dov S. Zakheim and Jeffrey M. Ranney, "Matching Defense Strategies to Resources: Challenges for the Clinton Administration," *International Security* 18, no. 1 (Summer 1993), pp. 51–78. Zakheim and Ranney created a computer program that challenged players to create future force structures using historical DoD cost growth and budgets.

Using this program, the CNO SSG in 1992 told the CNO that the U.S. Navy of 2012 would be closer to 250 ships than the approximately 550 it had at the time.

110. Usually, the rule of 72 is employed to determine how long it will take to double an investment. One divides 72 by the rate of return. However, in a similar fashion, dividing 72 by the percentage difference between cost growth and budget growth gives the number of years until forces that can be funded are half of what they were.

111. The author served in OSD Acquisition, Technology, and Logistics as deputy for acquisition concepts during 2007–2008 to institute some of these reforms.

112. "I call it the *law of the instrument,* and it may be formulated as follows: Give a small boy a hammer, and he will find that everything he encounters needs pounding. It comes as no particular surprise to discover that a scientist formulates problems in a way which requires for their solution just those techniques in which he[/she] himself[/herself] is especially skilled." Kaplan, *The Conduct of Inquiry,* p. 28.

113. Davis, *Analysis to Inform Defense Planning despite Austerity,* p. 23.

114. Hughes e-mail, 1 March 2016.

115. Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (New York: Doubleday, 1991).

116. Davis, *Analysis to Inform Defense Planning despite Austerity,* p. 24.

117. For example, the U.S. Army's Center for Army Analysis developed a Wargame Analysis Model (C-WAM) to help its analysts understand the theater backdrop, engaged forces, and CONOPS of a new theater campaign before coding into their high-resolution campaign model, JICM. Working with combatant commands and their component commands over several years both enhanced C-WAM's representation of joint capabilities and resulted in the commands using C-WAM to game their operations plans. Briefing, Military Operations Research Society Wargaming Community of Practice, 20 April 2016. (This briefing is not available yet, but it should be within a year or so via the Navy war-gaming virtual community of practice.)

118. The author wrote portions of the CIDS fleet exercise analysis guide and designed, participated in, and analyzed individual exercises and analyses using the results from all exercises. He assisted in employing the data from these exercises in the Warfare Environment Simulator.

119. John T. Hanley Jr., "Creating the 1980s Maritime Strategy and Implications for Today," *Naval War College Review* 67, no. 2 (Spring 2014), pp. 11–29.

120. Mathematical programming covers linear, nonlinear, integer, and dynamic programming and similar optimization techniques.

121. Hughes, "Prediction."

122. James G. Roche and Barry D. Watts, "Choosing Analytic Measures," *Journal of Strategic Studies* 14, no. 2 (June 1991), pp. 165–209.

123. Although this list addresses military officers, analogous statements apply to strategy/policy games involving civilian authorities and academics intending to affect higher-level decision makers. Elizabeth Bartels, e-mail to author, 1 April 2016.

124. Hughes e-mail, 1 March 2016.

125. Glenn A. Kent, *Thinking about America's Defense: An Analytical Memoir* (Santa Monica, CA: RAND, 2008).

126. A large sequence of Poisson distributions produces a normal Gaussian distribution.

127. Albert-László Barabási, "The Origin of Bursts and Heavy Tails in Human Dynamics," *Nature* 435 (May 2005), pp. 207–11.

128. For example, see Andy Ilachinski, "An Artificial Approach to War" (briefing slides, Center for Naval Analyses, Tactical Analysis Team / Operations Evaluation Group), available at www2.dcs.hull.ac.uk/.

129. Edmund L. DuBois, Wayne P. Hughes Jr., and Lawrence J. Low, *A Concise Theory of Combat* (Monterey, CA: Naval Postgraduate School Institute for Joint Warfare Analysis, 1997), provides a concise theory of combat to provide a framework for analysis.

130. Hughes e-mail, 1 March 2016.

131. Ibid.

132. Kaplan, *The Conduct of Inquiry,* p. 29.

A HIMALAYAN CHALLENGE

India's Conventional Deterrent and the Role of Special Operations Forces along the Sino-Indian Border

Iskander Rehman

Ever since 1962, when soldiers from the People's Republic of China inflicted a humiliating defeat on Indian forces, India and China have maintained an uneasy coexistence along the world's longest disputed frontier.[1] While certain aspects of the Sino-Indian security dynamic have improved markedly, others have given rise to growing unease. On the positive side of the ledger, the two nations have succeeded in avoiding a direct, armed conflict since a bloody skirmish in 1967, and have developed a number of confidence-building measures to prevent isolated incidents from spiraling out of control. Similarly, neither country any longer actively sponsors proxies or foments insurgencies on the other's soil. Analysts also have pointed to the relative stability of the Sino-Indian nuclear dyad, which does not appear to present the same escalatory risks as the India-Pakistan strategic relationship.[2]

Other issues and developments, however, are cause for concern. While the Sino-Indian relationship may have become less overtly conflictual, the military rivalry between the two rising Asian powers has taken on different aspects and has spread to new theaters. In addition to their long-standing border dispute, there is now a maritime component to the Sino-Indian rivalry.[3] Meanwhile, enduring sources of tension—such as China's military support of Pakistan and India's harboring of the Tibetan government in exile—continue to act as spoilers. Despite nineteen rounds of negotiations at the time of this writing, India and China have yet to define clearly the extent of many portions of their border—still officially designated as

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the Line of Actual Control (LAC)—let alone resolve the issue. Finally, certain ongoing trends in Chinese strategic behavior—whether in China's near seas or along the Sino-Indian border—have generated grave concern in New Delhi, whose vocal strategic community regularly points to a perceived recrudescence in Chinese border incursions.

Following one particularly tense standoff in 2013, the Indian government confirmed the creation of a long-discussed new Mountain Strike Corps, with the professed goal of reinforcing India's conventional deterrent along the Sino-Indian border. This massive accretion in manpower was presented as part of a larger, more-sustained Indian effort to address a perceived growing military imbalance with China. A core component of this effort has been to reinforce India's basing and transport infrastructure in a singularly austere operating environment. These developments have been commented on widely, both in India and abroad. Yet there has been a surprising lack of granular analysis of the Sino-Indian military dynamic, whether in terms of the two states' respective orders of battle, competitive advantages and disadvantages, or theater strategies.

Drawing on field trips to the Himalayan border states of Sikkim, Himachal Pradesh, and Jammu and Kashmir as well as close to thirty interviews with intelligence officials and Indian Army (IA) and special forces officers, both serving and retired, this article aims to give a clearer picture of the security situation along the Sino-Indian border. In particular, it questions whether the Indian military's current operational concepts are sufficiently tailored to the nature of the terrain and the evolving Chinese challenge. It suggests a more proactive approach to territorial defense, one that places a greater emphasis on the integration of forward-deployed, highly mobile teams of Indian special operations forces (SOFs) coupled with advanced intelligence, surveillance, and reconnaissance (ISR) and precision-strike capabilities, and complemented by an extensive network of tribal scouts and militias.

To develop this argument, this article proceeds in three substantive parts. The first briefly summarizes the current military "state of play" along the border, outlining both countries' respective orders of battle, modernization plans, and operational concepts. It argues that, while possibilities for greater escalation always exist, in the near- to medium-term future any Sino-Indian territorial conflict is likely to be relatively limited in scope and short in duration, rather than a protracted, large-scale, force-on-force campaign.[4] Such a conflict also would differ in a number of key characteristics from the war of 1962, most notably in that it would take place under a nuclear shadow and with the likely involvement of air, space, and cyber assets.

The second section conducts a survey of the literature on special operations and mountain warfare, and reflects on the role that Indian SOFs could play in

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the event of a limited Sino-Indian border war. Their potential function as a force multiplier is examined along three axes, or spectra, of conflict: their ability to counter acts of creeping coercion, or "gray-zone aggression"; their aptitude to perform vital enabling functions in mutually denied or deeply contested areas; and their capacity to wage special warfare campaigns across the Plateau of Tibet. Throughout, the article draws attention to the distinct geographic characteristics of the putative battle space; the high elevations, harsh temperatures, and rugged topography of many critical subregions along the border would have a defining impact on any combat operations.

The third and final section evaluates whether India has developed the requisite capabilities to implement such a nimble, proactive strategy. It examines this question through a tripartite lens, focusing on the operational, institutional, and political-strategic barriers to implementing such a strategic shift. The research findings are summarized in the conclusion.

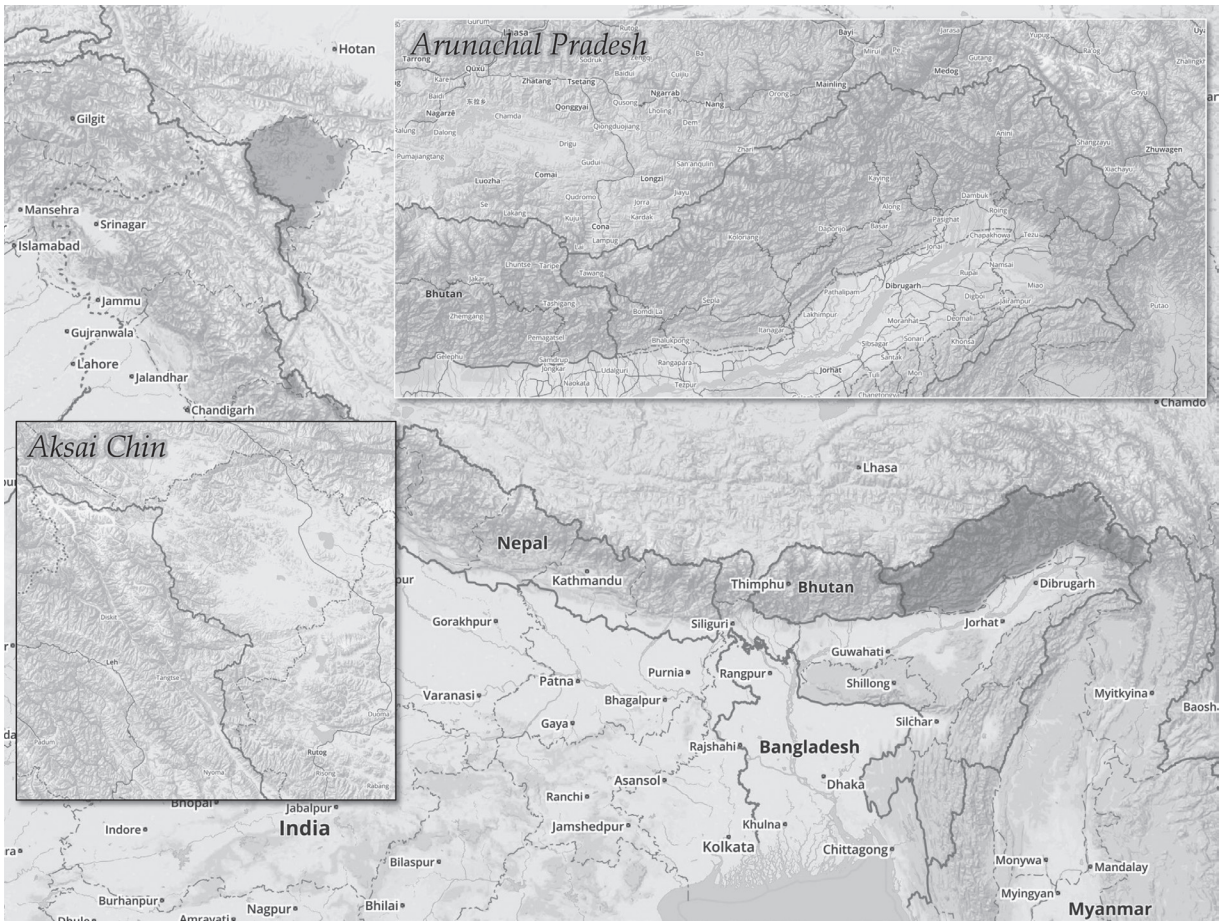
THE SINO-INDIAN MILITARY DYNAMIC ALONG THE LAC: THE CURRENT STATE OF PLAY

Certain misperceptions endure regarding the military balance along the Sino-Indian border. The most common is that China's localized military strength along the LAC far outweighs India's.[5] In reality, India possesses a clear advantage in sheer number of troops. With regard to airpower, New Delhi also holds something of an edge over its trans-Himalayan rival, even though it may be eroding rapidly—in large part owing to the continued hemorrhaging of India's fighter fleet and the growing density and sophistication of China's integrated air defense system (IADS) in the Tibetan Autonomous Region (TAR).[6] The vulnerability of India's air-basing infrastructure to artillery and missile strikes is, as we shall see, another concern. When it comes to mobile and lightweight artillery—perhaps one of the most critical factors, given the nature of the terrain—China holds the upper hand, in large part because of India's unending procurement woes in this domain.[7]

However, a simple bean-counting approach to the Sino-Indian military balance, based on various correlations of forces, rapidly reveals its limits. Indeed, analysts long have pointed to the manifold difficulties inherent in measuring military power and effectiveness. A nation's "conversion capability," or its capacity to convert resources into a balanced, well-trained, and technologically proficient force, is a key metric when gauging military power.[8] Another is its ability to tailor its strategies and force structure effectively to the nature of the threat it faces.[9]

When examining the continental dimensions of the Sino-Indian military rivalry, four factors are important to keep in mind.

MAP 1
THE SINO-INDIAN BORDER



Source: Author's construction, based on Google Maps.

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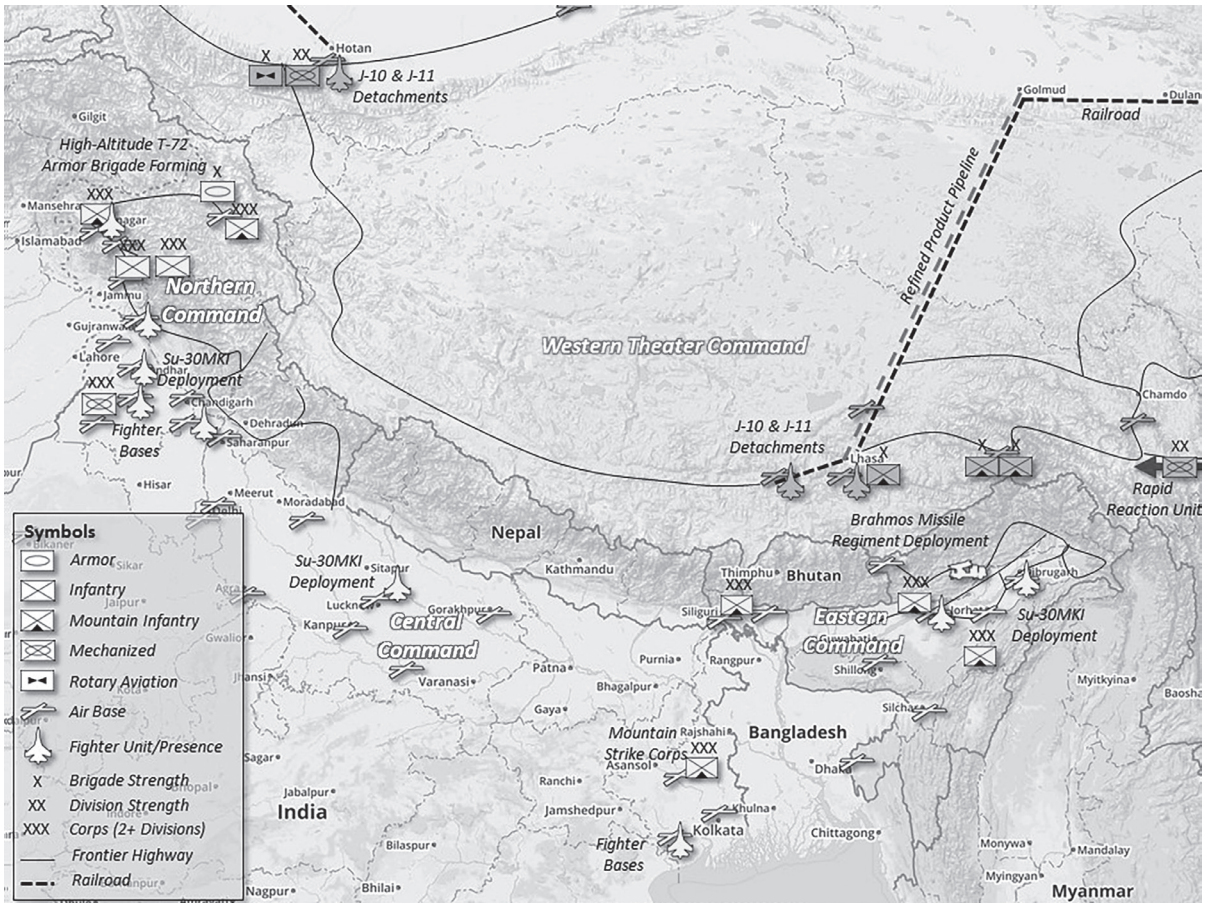
The first is the difference between the countries' territorial defense postures. Whereas India maintains a large (and growing) body of troops relatively close to the border, China's military presence in the TAR is more limited. In accordance with its doctrine on frontier defense, China stations most of its conventional forces in its interior, to be surged in times of crisis.[10] This posture has been facilitated by the impressive development of China's highway and high-speed railway networks, particularly the extension of the Qinghai–Tibet railway.[11] These logistical feats have not been lost on Indian planners, who estimate that Beijing could dispatch several divisions to the LAC within a few days.[12]

The second defining factor is the nature of the climate and terrain. Topographically, different portions of the LAC vary substantially. Areas along the Indian side are not amenable to mechanized warfare, except certain parts of Ladakh and northern Sikkim. Owing to the high elevations of the Plateau of Tibet, Chinese ground forces benefit from some commanding advantages—they overlook many Indian forward positions, rendering surveillance and artillery operations easier to execute—and are better acclimatized physiologically to high-altitude warfare.[13] On the other hand, the altitudes of the TAR make high-tempo air campaigns more difficult: at very high altitudes jet engines take longer to ignite owing to lower air density, and fighter aircraft are constrained in terms of their overall payload capacity. The weather also can have an inordinate impact on the planning and conduct of military operations: in mountainous environments, meteorological conditions are highly unpredictable and can shift drastically within a few hours.[14] Extreme cold, altitude, and weather affect almost every element of military equipment, ranging from artillery cannon to helicopter rotors.[15] Even precision-guided aerial munitions can undergo significant performance variations at very high altitudes.[16] During the harsh winters, certain mountain passes can be inaccessible temporarily, while other regions, such as Aksai Chin, paradoxically can be rendered more passable for heavy vehicles by the presence of a thicker layer of frost and ice. In Arunachal Pradesh, some of the world's heaviest quantities of rainfall regularly cause landslides, disrupting motorized traffic and troop movements.

The third major factor is the infrastructure disparity along the LAC. Whereas Chinese troops can gain rapid access to most areas along the LAC, Indian troops often have to trek several hours, if not days, to attain certain areas.[17] The People's Liberation Army (PLA) also benefits from a much more robust, multilayered communications architecture, having laid fiber-optic cabling and installed numerous small-aperture terminal satellite stations.[18]

Finally, the two nations have erected very different command structures along the border. Whereas in India the responsibility for the defense of the LAC is divided among several regional army and air force commands, in February 2016

MAP 2
SINO-INDIAN BORDER DEPLOYMENTS
(DOES NOT INCLUDE PARAMILITARY UNITS, PAP, OR INFRASTRUCTURE STILL UNDER CONSTRUCTION)



Source: Units located via IHS Jane's database, August 2016.

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China announced a major military rezoning that folded the former Chengdu and Lanzhou Military Regions into one unified western theater command.[19] This will have an impact on China's military effectiveness in the event of conflict, noted one Indian defense analyst, allowing for greater unity of effort and a "more rationalized marshalling of military resources."[20]

CHINA'S REVITALIZED WAR-ZONE STRATEGY AND THE EVOLUTION OF INDIA'S TERRITORIAL DEFENSE

China's Revitalized War-Zone Strategy

Chinese war planning traditionally has placed a heavy emphasis on preemptive military action as a means of seizing the initiative and throwing an adversary off balance. Considered under the overarching rubric of active defense, PLA operations in the Korean War of the early 1950s, the Sino-Indian War of 1962, and the Sino-Vietnamese War of 1979 all have been qualified by Chinese analysts as "self-defensive counterattacks," even though in each case it was Beijing that launched general hostilities.[21] For Chinese thinkers, there is no clear conceptual firewall separating defensive grand strategies from offensive military tactics. To the contrary, preemptive military action is framed as an integral part of the Chinese concept of escalation management, or *war control*.[22] Beijing's military planning with regard to the Sino-Indian border is a reflection of this tradition, and of its broader thinking on "war-zone campaigns" and "winning informationized local wars."

With the dissolution of the Soviet Union at the end of the Cold War, the PLA began to redefine some of its core strategies and concepts. The war-zone campaign doctrine, formulated in the 1990s, placed a new emphasis on jointness, transtheater mobility, and the rapid massing of strength on a particular front.[23] Writings called for the concentration of "elite forces and sharp arms" and stressed the importance of "gaining initiative from striking first" and "fighting a quick battle to force a quick resolution." When it came to conflicts along China's terrestrial borders, it was argued that a growth in the effectiveness of transregional support operations—principally via enhanced rail mobility—would allow the PLA to surge units stationed deep within China's interior rapidly. These forces would be shielded by interlocking "mobility corridors" generated by early strikes on an adversary's standoff platforms or the movement of mobile surface-to-air missile (SAM) batteries.[24] China's concept of informationized local wars, which complements in many ways the war-zone campaign doctrine, attaches inordinate importance to operations in the cyber and space domains and to prevailing in the electromagnetic spectrum.[25]

Many of these key tenets permeate contemporary Chinese military thinking with regard to future operations along the LAC. Thus, in the event of a conflict with India, conventional forces would be surged from the Chinese interior, with

the vast majority being deployed via rail, and another portion being flown in via heavy airlifter, and potentially also via government-requisitioned civilian aircraft.[26] As Larry Wortzel has noted, the Chinese fully seem to expect that air, cyber, and electronic operations will be part of any Sino-Indian border contingency.[27] A key role of the PLA Air Force (PLAAF), along with the PLA Rocket Force (PLARF), would be to conduct standoff strikes to interdict, disrupt, and delay the arrival of Indian forces coming from the lowlands. As one Chinese military analyst notes, "Along the Sino-Indian borders, where the IA enjoys . . . manpower superiority vis-à-vis the PLA, the PLAAF will launch 'shielding bombardment' campaigns in a defensive land war to rebuff the enemy's second-tier infantry and logistical reinforcement. If India's supporting units are delayed in getting to the battlefield, PLA reinforcements from the rear can arrive at the front line to consolidate the defense line and launch a counterattack."[28]

PLA SOF units no doubt would be central to China's concept of "key counterattacks." According to the PLA's *The Science of Campaigns,* one of the key roles of Chinese special operations units would be "to assault enemy vital targets, paralyze enemy operational systems, reduce enemy operational capabilities, and interfere, delay, or disrupt enemy operational activities to create favorable conditions for main force units."[29] One recently retired Indian SOF general drew attention to this aspect of Chinese thinking on special operations, noting, "If a divisional size attack is launched, say, in Tawang, then the Chinese could employ SOFs to cut off all routes for buildup of reserves, attack specific sensors, and also raid artillery and logistic locations. The deep induction of SOFs for providing early warnings and information on the movement of Indian reserves could also be tasked."[30]

China's Western Military Region possesses its own SOF brigade (formerly attached to the Chengdu Military Region) and both the Xinjiang and TAR Military Districts have large, dedicated SOF units, as well as elite, rapid-reaction units of People's Armed Police (PAP).[31]

India also has been following, with a certain degree of trepidation, the rapid development of China's airborne assault capabilities, in the form of the PLAAF's 15th Airborne Corps. Consisting of three divisions numbering over 35,000 troops, with a light artillery and mechanized component, the 15th Airborne Corps is headquartered in Xiaogan, from which it is expected to reach any part of China within ten hours.[32] The Central Military Commission has prioritized its modernization, and its capabilities recently were bolstered by the introduction of the Y-20 heavy airlifter.[33] The 15th Airborne Corps is considered "key to the War Zone Campaign Concept" and would be used "for the kind of disruptive deep strikes that the War Zone Campaign calls for."[34] Indian military planners have monitored closely the growing number of large-scale airborne exercises the PLA

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has conducted in the TAR over the past few years, with one retired air marshal making the following observation: "We are aware of China's increasing focus on airborne assault operational capability, involving integrated forces. . . . A future [limited] war could see the Chinese depending heavily on their airpower for air defense and air support. Offensive operations would be SOF- and air assault forces–intensive, unlike the simple infantry operations of 1962 vintage."[35]

India's concerns over certain aspects of the PLA's war-zone campaign doctrine and evolving force structure have been amplified by recent developments in China's strategic behavior, most notably along the Sino-Indian border but also in the South and East China Seas. Since the eastern Ladakh border standoff in 2013, there have been a number of similarly fraught confrontations.[36] One such incident in 2014 reportedly led to the deployment of close to one thousand troops by each side.[37] Territorial incursions have continued ever since, with notable tensions flaring in September 2015 and, most recently, in March 2016.[38]

The Evolution of India's Attitude toward Territorial Defense

India's responses to China's intensified military coercion have been twofold. First, the country has decided to augment its force structure significantly, with new battalions of scouts; via the stationing of additional air, missile, and surveillance assets; and by raising a new Mountain Strike Corps. Second, it has sought to remedy one of its key defensive shortcomings: the paucity of rail and road infrastructure in certain key border regions.

The latter represents an important shift away from the so-called scorched-earth strategy that had held sway since 1962. For many decades Indian military planners deliberately eschewed the development of border infrastructure, as they feared it would facilitate Chinese ingress deep into the Indian plains and lowlands.[39] According to one informed journalistic account of the Indian military's thinking vis-à-vis the Sino-Indian border, it was only in the middle of the first decade of this century that the IA began to see the pitfalls of this approach more clearly.[40] The lack of solid infrastructure along the Indian side of the LAC had rendered large tracts of contested land acutely vulnerable to Chinese probing and creeping forms of encroachment. Trudging through treacherous terrain on foot or via mule train, Indian patrols often discovered Chinese preparation of positions or infrastructure development only weeks after it had occurred. In the depth of winter, when snow rendered some footpaths impassable, Indian forces tacitly conceded certain areas, only to reinvest them in the spring. In the event of a standoff, China could surge reinforcements more rapidly, with Indian troops perhaps taking hours, if not days, to arrive at their destination. In short, while an absence of infrastructure conceivably could help delay a large-scale invasion, it had proved remarkably inadequate at deterring Chinese military coercion and territorial encroachment.[41]

It also had become gradually more apparent that a short-duration, limited, border conflict is far more likely than a protracted, large-scale, force-on-force campaign, not only because of the nature of current Chinese operational planning, but because both nations would be conducting military operations under a nuclear overhang. As one much-discussed Indian report noted in 2012, "Though both countries have a doctrine of 'no first use,' the nuclear factor can be expected to impose caution on political decision makers on both sides. The stakes at issue will again determine the degree of risk in political calculations. Generally, the nuclear factor can be expected to limit the scale of conflict and impact the scope of feasible political objectives."[42]

Finally, the longer the conflict lasts, the more likely it will attract third-party intervention in the form of diplomatic or military assistance or both. According to declassified Central Intelligence Agency (CIA) reports, this was one of the main reasons China planned for a short, limited war in 1962.[43]

Responding to a limited-war contingency requires operational agility and the ability to respond rapidly and effectively to a crisis.[44] This reinforces the need for a tighter web of infrastructure that can enable Indian forces to react promptly to any "tremor felt along any one of its strands."[45]

Over the past few years, India has launched a bevy of large-scale border infrastructure projects, albeit with chequered results. While some progress has been made in certain areas, most of India's road and rail construction projects have fallen victim to considerable delays. As of May 2016, only twenty-one of sixty-one border road projects designated strategic had been completed.[46] Similarly, while the Indian government sanctioned the construction of twenty-eight strategic railway lines along India's borders in 2010, six years later none have been finalized.[47]

The accretion of India's conventional force structure along the LAC and the attendant development in infrastructure provide two material indicators of the shift in India's defense strategy toward China. The most significant change, however, has occurred in the intellectual domain, as Indian defense planners have adopted a much more vigorous, tactically offensive approach to territorial defense. The creation of the Mountain Strike Corps, note Indian commentators, was part of a larger movement toward deterrence by punishment and away from what has been perceived to be an overreliance on deterrence by denial in the past.[48] Indeed, for many decades India's two-front planning construct called for India simply to hold along the border with China while its forces engaged in more-offensive operations against Pakistan to the west.[49]

This approach progressively has been replaced with what has been described to this author variously as a form of "offensive defense," a "quid pro quo strategy," and a "cross-border riposte strategy." Following Clausewitz's well-known dictum that "a swift and vigorous assumption of the offensive" is often the most "brilliant

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point in the defensive," Indian military planners have adapted their concepts of operation to the natures of both the opponent and the topography.[50] As one army colonel candidly noted, mountainous terrain "can favor the first mover," adding,

> Once the Chinese seize a position, it may be very difficult to dislodge them. Rather than expend much blood and treasure attempting to storm impregnable positions, we should pursue a strategy of horizontal escalation and capture territory elsewhere. If you cannot counter symmetrically, you can effectively counter by shifting the locus of the battlefield. The political compulsions of territorial defense make things very difficult for us in the Army. Our elected government will not tolerate us losing even one centimeter of territory. This cannot be achieved without us seizing territorial chips for bargaining purposes elsewhere. We have to think of conflict termination.[51]

Another IA officer concurred, observing, "Raising the strike corps was part of a move to create a more offensive defense. If India's sovereignty is weakened, we should have the ability to mount a riposte. If the PLA strikes at Tawang, we can provide a mechanized Indian response via Ladakh. In the past we had a dissuasive posture, solely focused on static defense. Deterrence is now being rebalanced."[52]

Both Ladakh and northern Sikkim are considered good locations for mounting such a mechanized riposte, not only because they provide some of the few staging areas along the Indian side of the LAC conducive to mechanized warfare, but because they overlook main axes of approach (the plateau of Aksai Chin and the Sora Funnel) and logistical lifelines, such as the China Western Highway.[53] In the event of conflict, India's mechanized forces would sweep down from these mountain plains to conduct pincer movements behind advancing Chinese formations, with the hope of breaking troop concentration.[54]

India's mechanized counteroffensive would form only one component of a wider theater strategy, however. In addition to these movements, Indian air and missile power would be brought to bear on transport and communication nodes deep within the TAR, with the goal of delaying or preventing the arrival of PLA reinforcements.[55]

INCORPORATING SOFS INTO INDIA'S CURRENT APPROACH TO AREA DENIAL

Despite this shift toward a more offensive form of area denial, India's current approach to conventional deterrence along the LAC appears to suffer from certain limitations. Indeed, while New Delhi's overarching military strategy has evolved—most notably by more vigorously stressing the need for cross-border strikes—the force structure changes it preconizes are remarkably similar to those pursued in the wake of the 1962 war: a massive accretion in conventional land power.[56]

New Delhi also continues to rely on geographically dispersed conventional units or on poorly equipped paramilitary forces, the latter in the form of the Indo-Tibetan Border Police (ITBP), as India's first line of defense in many of the forward areas most vulnerable to Chinese aggression.[57] The rugged nature of the topography, along with the continued paucity of infrastructure, means that even though India forward-deploys a large number of conventional screening forces along some of the most obvious axes of approach (the five main river valleys in Arunachal Pradesh, for instance), these troops are relatively static and could be outflanked by small detachments engaging in rapid lateral movements.[58]

Meanwhile, a large portion of the IA's mechanized units still will be stationed in the lowlands, with the expectation that they would be rushed to higher altitudes in the event of conflict. Not only would this prove logistically challenging owing to the enduring deficits in India's road and rail infrastructure; it also would prove physically taxing.[59] In contrast to the first wave of PLA troops flowing from the heights of the Plateau of Tibet, Indian troops deployed from interior garrisons would be surged into combat before having been acclimatized properly.[60] Medical studies have shown that a physically fit soldier requires about two weeks to adapt progressively to a new altitude, and three weeks to conditions of extreme cold.[61] In the absence of proper acclimatization, soldiers operating at extreme altitudes can suffer from acute mountain sickness, severe sleep disorders, high-altitude pulmonary edema, and cerebral edema.[62]

Second, such a manpower-centered approach to deterrence already has proved to be prohibitively costly. In April 2015, Defence Minister Manohar Parrikar announced that the planned Mountain Strike Corps would be halved to approximately 35,000 troops for financial reasons, and that the formation budget for the corps would be frozen at U.S.$6.1 billion, significantly less than the originally sanctioned U.S.$13.8 billion.[63] Scandal already had erupted a year earlier when it was revealed that the IA had been compelled to dip into precious weapon and ammunition reserves to equip its newly raised forces properly.[64] While the Indian defense minister appears to have reversed his prior decision, renewing assurances that the Mountain Strike Corps would be resourced properly, India's efforts to add thousands more boots on the ground inevitably will prove onerous.[65] Indeed, India's expansion of its ground forces has been accompanied by a rise in personnel costs, a trend that is slated to increase exponentially over time.[66]

Finally, the natural compartmentalization of much of the terrain—which often does not allow large units to maneuver effectively—disincentivizes the massing of force, especially when moving uphill.[67] As India's conventional forces wind their way up narrow, mountain roads to higher elevations or are funneled through mountain valleys, they could find themselves targeted by Chinese artillery barrages, missile strikes, and "shielding bombardment campaigns." They might

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suffer disproportionate casualties when targeted by Chinese forces positioned in height and depth or find their main axes of approach to certain remote areas suddenly cut off.[68]

In short, India's intense reliance on large, centralized, conventional forces—a substantial portion of which are stationed at lower altitudes—would not be the most operationally judicious approach in the event of a short, fast-moving, limited war launched from high elevations along the LAC.

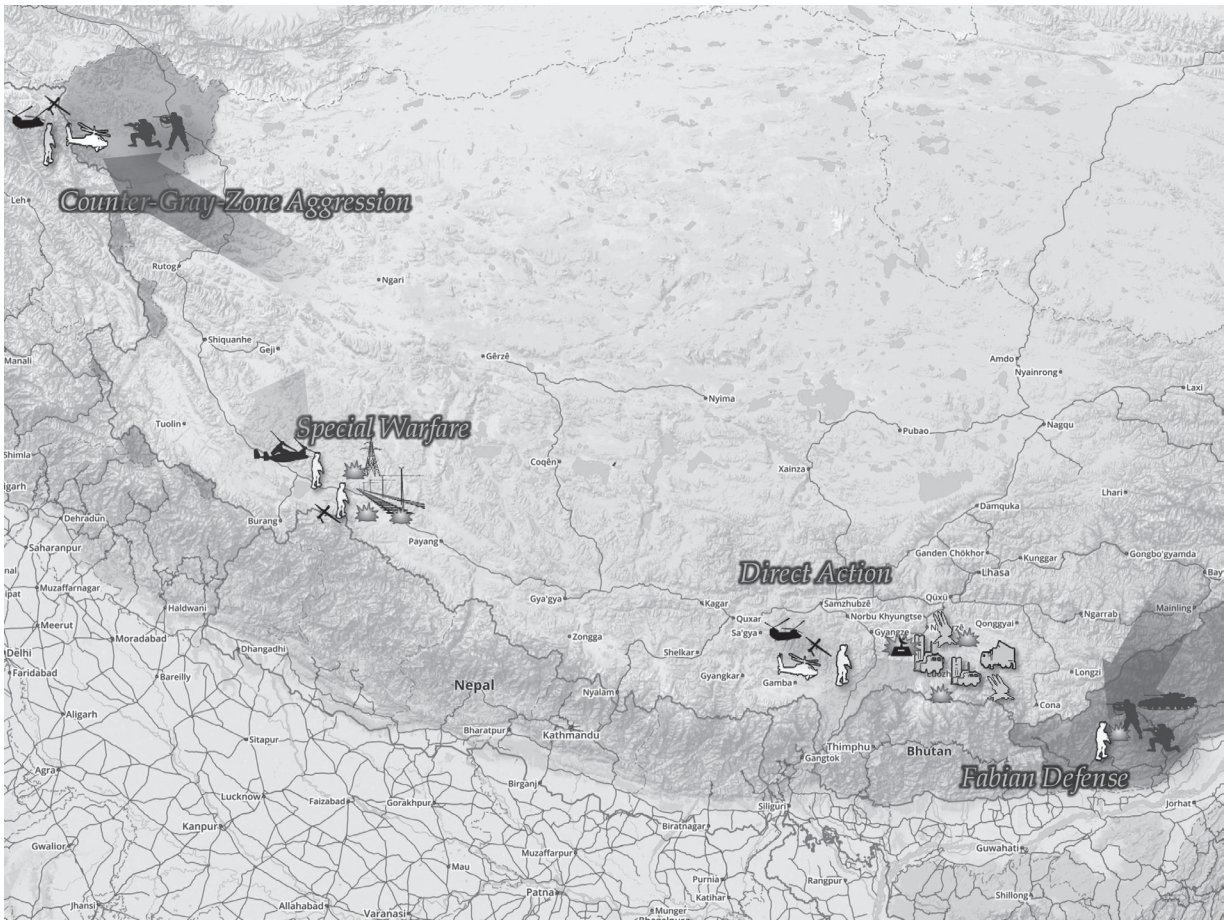
One French study on mountain warfare notes that for conventional forces to assail higher-altitude positions successfully, they must rely on a "different yet complementary force," that is, a force that is "decentralized, highly trained, and optimized for heliborne assault and the neutralization of enemy positions located at higher vantage points."[69] The next section of this article makes an argument for providing the IA with a similarly "different yet complementary force"—one that is forward deployed, distributed, and able to respond both rapidly and effectively to various contingencies. The candidate force—a mixture of SOFs and locally raised scouting battalions—would be geared toward rapid reaction and proactive defense.

The argument is *not* that large-scale conventional forces have no role to play in the event of a Sino-Indian border contingency, or that India should rely exclusively on special operations for conventional deterrence along the border. Many of the missions at the heart of India's operational concepts—such as the seizure of limited tracts of territory—are suited to mountain infantry, not SOFs.[70] Rather, the emphasis is on developing a better complementarity between these elements rather than on clearly dissociating them. Indeed, it has been demonstrated repeatedly that modern militaries are at their most effective when they succeed in integrating conventional and special operations within a common, clearly defined, strategic framework.[71]

PROACTIVE DEFENSE AND THE ROLE OF SPECIAL OPERATIONS FORCES

This section evaluates the role of India's SOFs within the framework of a more proactive territorial defense strategy. India possesses a large number and variety of elite units, some of which fall under the Home Affairs Ministry, such as the National Security Guard (NSG), which focuses almost exclusively on counterterrorism (CT) operations, and the Special Protection Group, a VIP-protection unit. To add to the confusion, some units occasionally qualified as SOFs in India, such as the IA Ghatak platoons and the Sagar Prahari Bal—the latter a unit formed following the 2008 Mumbai attacks to provide better coastal security—are not so much special operators as specialized forces.

MAP 3
EXPLORING THE ROLES OF INDIAN SOFS ALONG THE SINO-INDIAN BORDER



Source: Author's graphical construction superimposed on Google Maps.

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The primary focus of this discussion is the SOF units most likely to play a role in the event of a Sino-Indian border conflict: the SOF-qualified elements of the IA's Para Commando battalions and, to a lesser extent, the relatively newly formed Garud unit of the Indian Air Force (IAF). At the time of this writing, the IA possesses eight battalions of special operators (Para SFs), with plans for future expansion, as well as five battalions (a brigade) of airborne paras, which are more akin to airborne assault units.[72] Each battalion nominally is pegged at approximately seven hundred men, but many units reportedly are undermanned, underequipped, and suffering from a 30 percent officer shortfall. The Garud, which was formed in 2003, currently comprises about one thousand troops, and their numbers will double in the aftermath of the attacks on Pathankot Air Base in early 2016.[73] The IAF has struggled to define the role of the Garud adequately, beyond base protection. (While the Indian Navy's SOF component, the Marine Commando Force [MARCOS], has been stationed in small numbers at certain high-altitude lakes in Jammu and Kashmir, its role would be minimal at best, and therefore MARCOS will not be addressed further.)

Another unit, the fabled Special Frontier Force (SFF), will be discussed in addition to the Para SFs and the Garud.[74] Formed in late 1962, following the Sino-Indian War, the SFF is part of India's external intelligence agency, the Research and Analysis Wing (RAW), and answers directly to the Cabinet Secretariat.[75] Modeled on the Kennedy-era Green Berets, the unit is rumored to contain about ten thousand soldiers, trained to conduct operations behind enemy lines and engage in special warfare.[76] There is some debate over whether this secretive force has preserved its elite status as well as its original mandate.

The roles of these units will be examined along three axes: their utility in countering gray-zone aggression, their aptitude for engaging in direct action behind enemy lines, and their ability to conduct special warfare in the TAR.[77]

COUNTERING GRAY-ZONE AGGRESSION

Over the past few years, numerous observers have drawn attention to the challenge that acts of creeping coercion pose to the international order. These concerns have been compounded by revisionist powers' shared predilection for so-called gray-zone strategies, a combination of "salami-slicing" tactics, information warfare, and military coercion.[78]

Certain aspects of gray-zone campaigns, such as the use of proxies, long have been familiar to Indian security managers, who have had to contend with such modes of Pakistani covert action since independence.[79] China's historic use of infrastructure development as a means of cementing—literally—its claim over contested territory is also well known in New Delhi. After all, many past episodes of border tension have occurred following Indian forces' belated discovery of

Chinese road and basing development in remote border areas. Despite India's familiarity with such forms of great-power competition, its strategic community's literature on the challenges that gray-zone aggression poses is surprisingly sparse. Moreover, when Indian strategic thinkers reflect on such issues, they tend to do so with Pakistan in mind rather than China. Yet as demonstrated in the first section of this article, the threat of gray-zone aggression should not be perceived as exclusive to Indo-Pakistani security dynamics.

Within U.S. strategic circles, it is the special operations community that perhaps has thought the longest and hardest about how to counter such forms of territorial encroachment effectively. As one recent official document notes, democracies can face certain disadvantages when confronting authoritarian rivals whose decision-making and civil-military structures can facilitate "unity of effort in the gray zone."[80]

For the same reasons that SOFs can prove immensely attractive to democracies when prosecuting CT operations overseas—their tactical agility, deniability, and restricted oversight—they are emerging as the tools of choice in responding to certain features of authoritarian aggression.[81] For example, in the event of Chinese operatives landing on the Senkaku Islands (claimed by both China and Japan), disguised as fishermen, Japanese military planners view "advance parties" of heliborne special forces as forming one of their first lines of defense.[82] Similarly, central and eastern European states envision rapid-reaction SOF units as providing some of the most effective counters to any future Russian attempt to replicate a Crimean "little green men" strategy on NATO soil.[83]

SOFs provide democratic policy makers with the capacity to respond rapidly, effectively, and in a tailored manner to such acts of infiltration, subversion, or sabotage.[84] In India's case, a wide variety of scenarios were mentioned in the course of private conversations with the author, such as Chinese clandestine operatives or SOFs entering Arunachal Pradesh or Sikkim disguised as Tibetan refugees, nomadic herdsmen, or economic migrants from India's troubled northeastern territories.[85] Indian military officers also expressed concern over their past inability to detect Chinese infrastructure development in a timely fashion and mentioned the possibility of Chinese engineers discreetly constructing small landing grounds, hidden ammunition depots, and SAM sites during the offseason when Indian soldiers no longer can gain access to certain areas close to Chinese positions, owing to snow and the paucity of infrastructure on the Indian side of the LAC.[86]

To respond with alacrity to such scenarios, Indian SOFs would need, first and foremost, to be able to detect them. India's advances in space-based surveillance, along with the planned introduction of a large number of surveillance platforms—in the form of high-altitude unmanned aerial vehicles (UAVs) and

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aerostats—promise to help in this regard, but the difficult nature of the terrain imposes limitations.[87] India has been contemplating erecting Israeli-type security systems along certain portions of its border with Pakistan, complete with night-observation cameras, long-range detection radars, motion sensors, and thermal imaging.[88] However, the deep valleys and craggy peaks that prevail across much of the LAC—not to mention the prohibitive expense—preclude such ambitious technological solutions.[89] Radio, radar, and even satellite communications systems have difficulty operating around terrain folds, and the very fact that the Sino-Indian border has not been delineated officially means that China would view any large-scale Indian fencing effort as a severe provocation.[90]

As a result, human intelligence (HUMINT) would prove absolutely critical in detecting Chinese gray-zone operations, whether the latter were in the form of cross-border infiltrations, illicit infrastructure development, or attempts at sabotage and subversion. For decades, Indian intelligence services have depended on the knowledge gleaned from nomadic herders, who frequently wander between Indian- and Chinese-controlled territory along the LAC.[91] Religious pilgrims and resident tribal populations provide other valuable sources of information. India should seek to sharpen its HUMINT capabilities further along the LAC, by recognizing that the key to preserving long-term control lies in the degree of influence it wields over the complex patchwork of border peoples. For example, in Arunachal Pradesh alone there are more than twenty-six major tribes and one hundred subtribes.[92] India should focus on training more of its intelligence officers and SOFs in the languages and dialects of the many peoples along the border and on fast-tracking the central government's much-delayed Border Area Development Program (BADP), with a particular focus on the regions most likely to be the targets of future Chinese incursions, i.e., Arunachal Pradesh and Ladakh.[93] A less heavy-handed policing approach in certain areas also might prove constructive in terms of winning hearts and minds and might foster better information sharing between local communities and Indian authorities.[94]

Finally, the addition of more tribal and local forces—in the vein of the Ladakh Snow Tigers or the recently raised scout battalions from Sikkim and Arunachal—would buttress considerably India's conventional deterrent in its border regions.[95] Not only does this constitute a low-cost approach to frontier policing; it also provides Indian security managers with a year-round, forward-deployed, "trip wire" force whose members are physiologically acclimatized to high altitudes and mountain warfare and have an innate knowledge of the terrain and local conditions.[96] Because of their familial ties with local villagers and herdsmen, these scouts are better positioned to recognize signs of cross-border infiltration. Small teams of Indian special forces—in the form of joint terminal attack controllers (JTACs) or communications experts—could be attached to each battalion, much

in the way the United States embedded small teams of SOFs among its Northern Alliance partners during Operation ENDURING FREEDOM.[97] This would provide lightly armed tribal and ethnic battalions with the ability to call on airpower or follow-on conventional forces in the event of an encounter with a more formidable foe. Equipping select teams of Sikkim and Arunachal Scouts with antitank guided missiles, light mortars, and shoulder-mounted rocket launchers, in the vein of the Ghatak platoons that act as the spearheads of conventional IA units, also could prove valuable.[98] The goal should be to provide the IA not only with lightly armed reconnaissance units but also with hybridized structures that can help mount a Fabian defense of their respective home states in the event of a larger-scale Chinese incursion, by delaying, harassing, and attriting PLA forces.[99]

DIRECT ACTION AND ENABLING OPERATIONS

India, albeit somewhat more belatedly than China, has begun to attach more importance to airborne assault operations, especially their utility for targeting Chinese transport and communications infrastructure in the TAR in the event of conflict.[100] There is also a growing realization among some military thinkers that Indian SOFs could be called on to play a critical role behind enemy lines, conducting sabotage, reconnaissance, and direct-action operations. While one serving IA special forces colonel cautiously stated that "Indian SOFs would be used for direct action operations primarily on Indian soil, with the occasional cross border deployment in a limited manner," another IA special forces brigadier was less circumspect, observing that "India's dissuasive posture being based in part on the threat of horizontal escalation, SOF operations behind Chinese lines will necessarily be part of the mix."[101] IA doctrine, for its part, defines special forces as "specially selected troops who are trained, equipped, and organized to operate in hostile territory, isolated from the main combat forces. They may operate independently or in conjunction with other forces at the operational level. They are versatile, have a deep reach, and can make precision strikes at targets of critical importance."[102]

It is this last function—the ability to strike at rear-based targets—that seems to hold the most appeal for Indian military planners. There is a recognition that the combat environment straddling the Sino-Indian border may morph progressively into something of a no-man's-land for large clusters of ground forces and high-signature platforms, owing to the growing ubiquity of extended-range, precision-guided munitions. The PLA's increased focus on transtheater mobility and the ability to deploy SAMs, truck-mounted UAVs, and land-attack cruise missile batteries rapidly along its side of the LAC has engendered particular anxiety in New Delhi.[103] Indian advanced landing grounds and air bases are increasingly vulnerable to missile and artillery bombardment.[104] Furthermore, the

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government has yet to finalize the construction of hardened shelters for the IAF's squadrons of Su-30MKI aircraft.[105] While Indian fighter pilots have begun to train using sections of road and highway as dispersal runways, other passive defenses could be implemented, such as investing in large numbers of subterranean shelters with large stockpiles of munitions, lubricants, and petroleum.[106] Absent such efforts, Indian airpower near the border effectively may be crippled in the first phases of conflict, or could suffer from virtual attrition—devoting the bulk of sorties to defensive counterair missions or to suppressing enemy air defenses, rather than conducting precision strikes against enemy air bases and ground targets.[107] This role, note some Indian military officials, may need to be entrusted to small demolition teams of SOFs, which could carve "holes" in China's reconnaissance strike complex and provide terminal guidance for standoff missile strikes conducted from outside the range of China's IADS networks. In some ways, this resembles Soviet thinking on the deployment of Spetsnaz SOFs behind NATO lines for sabotage and demolition missions against mobile missile batteries.[108]

This "penetrating role" is in line with the conceptualization by some U.S. analysts of SOFs as low-signature entry forces within heavily denied or contested environments.[109] IAF doctrine specifies that the "destruction and degradation of enemy air assets" constitute one of the core functions of its dedicated SOF unit, the Garud.[110] One retired IA brigadier confided the following:

> In the conceptualized role of the mountain strike corps, the future Air Assault Division and Special Operations Forces will operate in tandem as part of India's area denial strategy. What is implied is, SOFs will be inserted up to and beyond an operational depth to disrupt the build-up of PLA forces, isolate and invest critical vulnerable points and areas. These isolated vulnerable points will then be attacked via air assaults through heliborne and airborne forces. It is important to keep in mind that the Tibetan plateau is a plane with little undulations, which allows for the application of both air assault forces as well as air assault mechanized forces.[111]

The challenge, however, would be to succeed in inserting SOF guidance and demolition teams in the absence of dedicated, stealthy airlifters.[112] Advances in air-defense systems and long-range surface-to-surface fires have raised new questions about how to conduct airborne operations without incurring large-scale, potentially catastrophic losses.[113] Large, high-signature transport aircraft, such as India's C-17 Globemasters or C-130J Hercules, would be vulnerable to Chinese radar-guided SAMs—providing the latter had not been suppressed prior to the air assault. More-discreet modes of airborne insertion, e.g., via low-flying heliborne strike forces, still could be put at risk by lower-altitude air-defense systems and antiaircraft guns.[114] Indian troops most likely would need to establish drop zones at a distance from the densest thickets of Chinese low-altitude systems and rely on airborne light armored vehicles (LAVs) to gain greater mobility and

firepower and compensate for the distances separating their lodgments from their target points.[115] The U.S. Army has been developing a new family of LAVs designed for this particular role and Indian SOF officers expressed interest in acquiring several such vehicles, with future airborne assault operations in mind.[116]

Once successfully inserted, Indian SOF teams may need to operate "blind" within an environment characterized by the denial of command, control, communications, computers, and ISR (i.e., C4ISR) capabilities, particularly if India's fragile space-based communications architecture has been degraded or disabled preemptively. Mindful of this, the IA has released an updated request for information (RFI) for mini battlefield UAVs, which senior officers have indicated would enable two-man IA SOF teams to conduct over-the-hill surveillance behind enemy lines.[117] The introduction of longer-range, high-altitude UAVs, when combined with a more-robust satellite and airborne communications network, also could improve IA ability to locate and direct fire at enemy targets situated at greater distances as well as to preserve communications among dispersed units.[118]

Finally, if a Chinese offensive indeed proves to be air assault–intensive, small teams of Indian SOFs equipped with shoulder-mounted SAMs could prove invaluable. Given the rough, mountainous terrain, limited avenues of approach, and growing ability of China to target larger formations of conventional forces, SOFs could provide a key comparative advantage in this more defensive role.[119]

WAGING SPECIAL WARFARE IN THE TAR

The Tibetan issue always has been at the heart of Sino-Indian tensions.[120] For New Delhi, the PLA's absorption of the mountain territory in 1951 signified the loss of a historic buffer zone, and the progressive hardening of Beijing's Tibet policies has caused both anger and dismay. For China, India's harboring of the Dalai Lama and the Tibetan government in exile following the 1959 Tibetan uprising amounted to an almost unforgivable affront. Throughout the late 1950s and up to the 1962 border war, Chinese intelligence remained absolutely convinced that India was attempting to foment unrest across the Plateau of Tibet.[121]

Following India's defeat, Prime Minister Jawaharlal Nehru made the fateful decision—long encouraged by certain of his intelligence czars—to aid and abet insurgency movements within Tibet and to arm India's sizable Tibetan refugee community.[122] A large paramilitary unit, the ITBP, was raised and entrusted with patrolling forward areas along the LAC.

In addition, a much more secretive force was established: the SFF. Composed of thousands of ethnic Tibetans, many of whom had been resistance fighters in the TAR or part of the Dalai Lama's bodyguard, the SFF was an elite unit of paratroopers trained in mountain warfare, sabotage, and demolition. Commanded by IA officers on special assignment, the unit is "managed" by RAW and reports

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directly to the Prime Minister's Office via the Directorate General of Security in the Cabinet Secretariat. The CIA played an important role in shaping the SFF's development in its early years, providing training and instruction in guerrilla warfare tactics.[123] Doctrinally, the unit is inspired heavily by Kennedy-era U.S. Army Special Forces, with the Green Berets' intellectual predilection for special warfare and operations deep behind enemy lines.[124] In fact, this was the SFF's original mandate. Some claim that Nehru even went so far as to frame the SFF as the potential vanguard of a future liberation of Tibet from Chinese rule.[125] Since its creation, the SFF has played an active role in India's regional conflicts, fighting behind enemy lines in Bangladesh alongside Indian-sponsored militias—the Mukti Bahini—in the war of 1971, detonating bridges, and suffering, according to some accounts, dozens of casualties.[126] Unconfirmed reports also have indicated that the SFF played a role in the Indian military assault against the Golden Temple, Operation BLUESTAR, in 1984 and in the Kargil War of 1999.[127]

The current state of the SFF is difficult to ascertain. The unit continues to exist and is based in the hill town of Chakrata, in the state of Uttarakhand. Details pertaining to its force structure, equipment, and operational mandate in the event of a Sino-Indian confrontation are considered extraordinarily sensitive. Even retired IA special forces officers were distinctly uncomfortable when questioned on the matter. Some claimed complete ignorance, stating that the SFF's operations and training regimen were strictly compartmentalized, with little to no interaction with regular military SOFs. This is clearly not the case, as Para SFs are seconded to SFF units frequently. When queried on its alleged elite status, one former IA general dismissed the SFF as little more than a "rag tag force, poorly equipped and no longer commando-trained."[128] A smattering of press reports has drawn attention to troubling shortages in certain essential pieces of equipment, such as parachutes.[129] There is also uncertainty surrounding the force's dedicated air-transport assets, now that the Aviation Research Center, RAW's private air wing and border-surveillance unit, has been dissolved and split between the IAF and the National Technical Research Organization, a signals-intelligence agency created in 2004.[130] Overall, however, other interviewees' assessments were at odds with those of the general. Many expressed a grudging admiration for the toughness of those "Tibetan boys," as well as that of the Gurkhas and hill tribesmen who have swollen the SFF's ranks over the years.

The main question, however, relates to the contemporary role of what some have referred to as India's "secret Tibetan army." Ever since the late 1970s and the tentative beginnings of Sino-Indian rapprochement, a tacit quid pro quo arrangement has been observed. China agreed to end its support for insurgent groups in India's troubled northeast, while India subscribed to a one-China policy and officially abandoned its clandestine efforts across the Tibetan border.[131] However, the

reality is somewhat more complex. Although China no longer directly supports militancy in places such as Nagaland, Mizoram, and Assam, Chinese middlemen have been known to funnel in weaponry via countries in Southeast Asia.[132] Meanwhile, other countries, such as Pakistan, continue to play an active role in the area, raising questions over whether China chooses to maintain close ties with certain of these groups via a third party.[133] When it comes to India and Tibet, there is a similar sense that New Delhi could revert to older policies if it found itself compelled.[134]

For this reason—for purposes of what might best be described as a form of unconventional deterrence—it would appear that the SFF has remained true to its special warfare roots. One former planner within India's Integrated Defence Staff commented that, in his opinion, "in light of current circumstances, I see no reason to dilute the operational mandate."[135] A recently retired Para SF lieutenant general responded in a more oblique fashion, saying that "envisioning what role the Tibetan boys would play does not require much imagination."[136] Serving officers either refused to respond or simply suggested that there had been "no change in their tasking."[137]

One might question, however, whether the SFF would be able to prosecute such a campaign successfully in today's environment. First, such an effort most probably would be far more isolated than if it had occurred during the early to mid-1960s, when the SFF was established. During that period, both Nepal and the United States played an active role, alongside India, in supporting Tibetan militancy. In fact, for many years it was the ancient kingdom of Mustang, in Nepal, that served as the true epicenter and safe haven for Tibetan combatants.[138] By the end of that decade, however, China had succeeded in convincing Nepal to betray the Tibetan cause, while the United States had sacrificed its anticommunist freedom fighters on the altar of Nixonian rapprochement with China.[139] In the event of another conflict, India essentially would find itself conducting the bulk of its covert campaigns alone. Depending on the circumstances, one could envision the United States discreetly providing a modicum of intelligence support, but not much more. Even if SFF task forces are inserted successfully, it might prove extremely challenging to sustain them, given the contested nature of the aerial environment over Tibet. Investment in systems such as the U.S.-developed Joint Precision Airdrop System, which can be dropped from a height of 25,000 feet, might alleviate this challenge.[140]

Another key difference lies in the extent of China's surveillance and control over Tibet, which is far greater today than it was in 1962. Since the 2008 disturbances, in particular, Beijing has improved vastly its internal security apparatus in the TAR. New, highly sophisticated frontier-monitoring systems, incorporating electro-optical devices, radars, unmanned aircraft, and tools for imagery

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analysis, have been put in place. Tibetan communities in India have registered a sharp drop in the number of incoming refugees—many who seek to depart are apprehended or shot while attempting to cross the border.[141] China recently enacted a draconian new counterterror law that further curtails Tibetans' freedom of movement and expression, and Chinese intelligence officers have deeply penetrated Tibetan monasteries and refugee networks.[142] Surveillance of neighborhoods has been amplified via the establishment of an intricate "grid system" and facilitated by the forced sedentarization of historically nomadic populations.[143] PAP forces, often formed from recently decommissioned PLA troops, have grown ever more numerous in Tibet and increasingly militarized, incorporating heliborne rapid-reaction units and equipped with armored vehicles.[144] Their presence, in addition to the PLA element already stationed in the TAR, could present a formidable challenge to Indian special warfare efforts. Moreover, it remains unclear whether the majority of the younger generation of Tibetans living on the Indian side of the border would be as willing to take up arms alongside their brethren as some have claimed.[145] Finally, as we shall see in greater depth in a later section, India's political leaders might be reticent to deploy the SFF in such a role, either because they viewed such a step as too escalatory or because it would lead to protraction, thus impeding war termination.

THE CHALLENGES TO IMPLEMENTING A STRATEGY OF PROACTIVE DEFENSE

Technical and Operational Hurdles

The first and most immediate set of hurdles resides in the technical and operational domain. Numerous observers, both within and outside India's special operations community, have drawn attention to chronic shortfalls in essential equipment, such as parachutes, night vision devices, communications devices, laser designators, and high-altitude clothing.[146] U.S. SOFs, having observed their Indian counterparts during training exercises, noticed that in many cases Indian paratroopers preferred to discard their expensive Israeli-designed Tavor rifles—which are ill suited for Himalayan conditions and occasionally jam—in favor of the more reliable AK-47.[147]

Another common complaint was that the SOFs had expanded too rapidly in size and in an ad hoc manner, without the benefit of careful, deliberate planning.[148] As a result, noted one colonel, in numerous cases during the raising of Para SF battalions existing equipment sourced from regular infantry regiments was distributed among the new units, resulting in their soldiers having to make do with inferior equipment.[149] In some cases, observers pointed to seemingly prosaic concerns as having genuine security implications. One example is the continued absence of aluminum, belt-attachable water bottles. Indian Para SF

personnel often are compelled to carry large, heavy, plastic bottles of potable water in their rucksacks. When removed, these reflect very far out into the sunshine and off the snow—running the risk of revealing hidden positions.[150]

Another issue concerns officer manpower, especially declining retention rates. Most Para SF units suffer from an estimated officer shortfall of 25–30 percent.[151] As one brigadier general stationed at IA headquarters noted, a growing number of Indian SOF officers are leaving the service to pursue more-lucrative careers in the private sector, where they often specialize in VIP protection.[152] It is important to note, in passing, that this problem is not specific to India; the United States faces a similar challenge.[153] The net result, however, is that India's SOFs are increasingly "bottom heavy," with a large number of fresh, new recruits but too few experienced officers and noncommissioned officers.

This overly rapid expansion also has exposed certain deficiencies in India's SOF training infrastructure. SOF officers warned in 2010 that it would take "many years" for the IA's Special Forces Training School (SFTS)—located in Nahan, 300 km to the north of Delhi—to catch up with the expanded force's new requirements.[154] Foreign observers note that the SFTS still lacks key facilities, such as vertical wind tunnels, next-generation simulators, and sufficient firing ranges.[155]

Questions also were raised about the nature of certain aspects of the selection and training processes, which often are delegated to each individual battalion, and how to ensure consistent standards. Indian SOF officers, however, were of the view that this more-decentralized system had its advantages, as it allowed units to be highly specialized in certain niche competencies and to have "excellent area and terrain specialization."[156]

Organizational and Doctrinal Challenges

Perhaps the greatest set of challenges lies in the organizational domain. Absent a restructuring of India's special operations capability around a Joint Special Operations Command (JSOC), many of the more chronic problems affecting training, procurement, and information sharing most likely will endure.[157] Indian strategic commentators long have called for the creation of a JSOC, via which India's community of special operators could be provided with "fully fused" informational support from the nation's notoriously factionalized intelligence agencies.[158] While the formation of India's Defence Intelligence Agency in 2002, following the recommendations of the Kargil Review Committee, has led to better integration among the services' respective intelligence wings, reportedly there is still much scope for improvement.[159] This would necessitate the permanent deputation of civilian intelligence officers drawn from all the relevant agencies, including the Intelligence Bureau, which, while theoretically domestically oriented, plays an important role along certain tracts of the Sino-Indian border. Optimizing

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the functionality of India's (future) JSOC also would require providing it with its own budget, requirements-validation process, and streamlined acquisition procedures. This would enable it to fast-track much-needed items, such as night vision devices and parachutes, bypassing the traditionally cumbersome procurement process of the Indian Ministry of Defence (MOD).

The existence of a JSOC also would bring about greater strategic and doctrinal clarity, along with more institutionalized joint training. For the time being, India's Para SFs have no organic air wing, and the IA air arm as yet does not possess its own ground-attack capability. After years of bitter wrangling among services, the MOD arbitrated in favor of the IAF retaining control, for the time being, over newly acquired heliborne platforms critical for special operations and airborne assault, such as the Apaches and Chinooks purchased from the United States.[160] While this is projected to change in the near future, the process points to the persistent dysfunctionality of interservice relations, which could affect the effectiveness and reactivity of Indian SOFs in the event of a crisis. With each service striving to create its own SOF unit, there also has been a certain amount of duplication in terms of core competencies and a relative absence of profound reflection on what some of these newly formed units could bring in terms of added value—this despite the existence since 2008 of a (classified) Indian *Joint Doctrine for Special Operations*.[161] The IAF's Garud, for example, has yet truly to evolve beyond its primary objective of protecting air bases and installations, a task that could be relegated to a force already designed for such a purpose: the paramilitary Central Industrial Security Force. There is a broad consensus within India's SOF community that where the Garud truly needs to focus its efforts is on developing a core of highly trained JTACs and forward-deployed air combat–control teams.[162] Another core objective would be to specialize in the emergency extraction of downed IAF pilots or groups of SFFs or Para SFs isolated behind enemy lines.[163] Yet, according to most interviewees, until now not much progress has been made on these fronts.

When Prime Minister Narendra Modi came into office in May 2014, there was hope in a few quarters that some long-advocated defense reforms, such as the creation of a chief of defense staff, an aerospace command, a cyber command, and a JSOC, finally would materialize. As time has gone by, hopes of sudden and major reform under this government—whether in the realm of economy or defense—have begun to dwindle. This does not mean, however, that there is no movement.[164] The current defense minister, Manohar Parrikar, reportedly has sought inspiration from both past U.S. defense reforms and Israel's ongoing efforts to fashion a "Depth Corps Force" that would operate in symbiosis with a new Israeli JSOC.[165] During a visit to U.S. Pacific Command in early December 2015, Parrikar allegedly also sought details on the conduct of U.S. Air Force

special operations, with the goal of applying these insights to the future development of the Garud.[166]

Some Indian interviewees noted, rather pessimistically, that major organizational reform might occur only in the wake of some form of catastrophe. This was the case, for example, for the United States, which created its Special Operations Command in the wake of the humiliating debacle of 1980's Operation Eagle Claw.[167]

Special Operations and the Question of Political Sponsorship

In his detailed, empirical study of the efficacy of past special operations, Colin Gray points to the fundamental importance of "permissive domestic conditions, and a tolerant political and strategic culture."[168] Owing to the unorthodox nature of SOF tactics and the politically sensitive missions with which SOFs are often entrusted, their use implies a certain risk tolerance on the part of political decision makers.

In 2015, the Indian government signed off on a much-publicized, and relatively successful, Para SF raid into Myanmar. That operation, however, was undertaken against lightly armed insurgents and with the acquiescence of the Myanmar government.[169] Most recently, IA SOFs allegedly carried out punitive strikes against "terror launchpads" in Pakistan-occupied Kashmir, in response to a bloody terrorist attack on Indian soil.[170] At the time of this writing, the specifics of the operation remain shrouded in uncertainty and subject to heated speculation, particularly in the Indian and Pakistani press.[171] According to some of this author's more-reliable sources, the operation was conducted by two units of Para SFs (from the 4th and 9th Battalions), operating under cover of artillery fire. Heliborne operations were limited to the drop-off and pickup points, from which the SOFs proceeded on foot. Ghatak platoons drawn from regular army units provided rear-area security, helping to ensure the safe extraction of the Para SFs once their direct-action mission was completed.[172] If this account is accurate—and it may prove impossible to verify completely—it would not be the first time India (or Pakistan) has deployed SOFs for shallow thrusts across the Indo-Pakistani Line of Control.[173] It is important to stress, however, the inherent differences from employing SOFs in some of the China-related contingencies discussed in this paper. Deploying Indian SOF teams for more-prolonged missions, deeper into contested territory, and against a far more capable adversary would require a much greater willingness to embrace risk, friction, and uncertainty.[174]

On a broader level, successful covert action hinges on a clear intellectual understanding of the strategic value of special operations rather than a fixation on short-term tactical gains.[175] A previous section demonstrated that Indian security managers have yet to develop a truly joint vision for special operations. Within

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the Indian media, for their part, commentary on SOF-related issues all too often is confined narrowly to CT-related issues. A common refrain among Indian Para SF officers is that India's political leaders and public view special forces as "little more than glorified infantry," and through a narrow tactical lens rather than strategically.[176] What such statements imply is that SOFs frequently are reduced to functioning as heavily armed substitutes for standard units, or are viewed as shock troops—ancillary forces whose role is to support a wider war effort. While there is certainly a danger in overly fetishizing special operations and in neglecting to integrate SOFs properly with conventional forces, there also are costs to failing to appreciate the uniqueness of SOF attributes.[177] As one U.S. study from the 1990s eloquently articulated, "A military structured for linear, attritional warfare gains little leverage from SOF operations. It correspondingly sees little value in SOFs and would prefer that SOF assets be distributed broadly to the force as a whole. By contrast, a force structured for thrusting along fault lines will use SOF units to gain leverage by initiating the breach and by generating chaos in the enemy's rear."[178]

A common criticism levied at the IA is precisely that it is structured for "linear, attritional warfare," not for "thrusting along fault lines."[179] Well-known South Asianists have described India's military strategy as one of restraint and as suffering from an absence of strategic initiative.[180] While there may be some truth to these characterizations, they are also far too sweeping.

Indeed, India's very unique model of civil-military dysfunction, somewhat paradoxically, has provided the armed services with a lot of leeway in the pursuit of operational planning.[181] As evidenced in the section detailing India's strategy of "offensive area denial" vis-à-vis its trans-Himalayan neighbor, the IA concept of operations for a LAC-related contingency is far from passive or reactive. To the contrary, it places a strong emphasis on regaining the initiative rapidly, on conducting surgical strikes deep within the Chinese interior, and on horizontal escalation across multiple sections of the border.

The question, however, is whether India's political leadership would be willing to sign off on these plans. Even though India's current government seems intent on signaling that it is less reticent to use force and risk escalation, much would depend on the circumstances of the conflict and the exact nature of Chinese aggression. A number of important questions remain open. Would India's politicians be willing to accede to IA requests to extend the army's operational ambit far beyond the LAC? Would airpower be employed for standoff strikes across the border, or would it remain confined to the Indian side, as during the Kargil War?[182] If some of the priority targets are communication and transportation nodes within the TAR and the PLAAF and PLARF have not yet entered the fray,

would India consider it more judicious to employ ground-based, deniable SOFs rather than initiating a cycle of vertical escalation via targeted missile strikes and the use of air-launched ordnance?

Perhaps most importantly, would India's political leadership draw on its Tibet "trump card" and exercise the special warfare option? New Delhi may be leery to do so, for several reasons. First, it may fear a Chinese counterescalation in India's northeast, with all the attendant implications for India's long-term stability and its ability to secure the narrow Siliguri corridor that connects its northeastern states to the Indian subcontinent.[183] Second, such a move could encounter hostility from the current Tibetan government in exile, which officially has renounced violence and historically has perceived Tibetan guerrilla movements as competing power structures within a heavily factionalized refugee community.[184] Furthermore, within some segments of Indian society, sentiments toward the Tibetan community occasionally have verged on the hostile, and support for greater Tibetan autonomy has not been uniformly robust.[185] While the Modi government has been more overtly supportive of the Tibetan cause than its predecessor, this may not always be the case. Indian security managers may be unwilling to stoke the flames of militancy for fear of inadvertently redirecting Tibetan nationalism and thereby spawning yet another form of separatist movement on their own soil.

From a purely operational standpoint, an unconventional warfare campaign would no doubt yield precious tactical dividends, by increasing Chinese rear-area anxiety and compelling the PLA to tie down large numbers of troops in surveillance and garrison duties. If India's goal in the event of conflict, however, is to conclude hostilities rapidly on favorable terms, such a move could prove counterproductive, as it inevitably would lead to protraction, along with widespread suffering among the Tibetan people, thus impeding war termination. In effect, the wisest posture might be to maintain such a capability as a form of deterrent and as part of a broader competitive strategy, and to resort to special warfare only in the event of significant escalation on the part of China.[186]

The LAC constitutes the longest disputed land border in the world. For close to six decades, the lack of resolution has served as a vivid reminder of the tensions that linger at the heart of the Sino-Indian relationship. For New Delhi, the preservation of local superiority along the Himalayan belt is of paramount importance and continues to inform its defense planning and force-structure plans.

This article has summarized the various correlations of military force along the Sino-Indian border and has charted the changes in New Delhi's operational concepts and attitudes toward territorial defense. While Indian planners have moved toward adopting a more-offensive form of area denial, they continue to

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rely, for the most part, on conventional forces that could be overcome or circumvented in the event of a fast-moving, localized, and limited border confrontation launched from higher elevations. Taking into account the rugged nature of the terrain and the continued paucity of infrastructure, a case has been made here for a more reactive, distributed, and mobile force structure and for greater reliance on special forces, working in tandem with locally raised battalions of scouts.

Despite the existence of a large number of SOFs, along with plans for further expansion, India has yet to articulate their role clearly and continues to view such units as ancillaries to conventional troops rather than as potential force multipliers. While warning against an overreliance on special operators, this article has laid out the operational benefits to be accrued from their tailored employment in a number of potential Sino-Indian contingencies, ranging across a broad spectrum of conflict.

Before India is able to envisage such ambitiously minded concepts of operations, however, steps will need to be taken and reforms will need to be enacted. These extend well beyond issues of equipment, training, and procurement; defense management, political vision, and doctrinal definition will need to be addressed. The long-discussed creation of a triservice JSOC would constitute an important step forward. Perhaps most importantly, India's security managers will need to embrace an operational philosophy that places a greater emphasis on rapidly regaining the initiative and on high-end asymmetric warfare. In short, their mode of thinking may need to become more Chinese.

NOTES

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1. Some analysts have referred to this relationship as one of "cold peace." Jeff M. Smith, *Cold Peace: China-India Rivalry in the Twenty-First Century* (Lanham, MD: Lexington Books, 2013). On the history of Sino-Indian relations, see John W. Garver, *Protracted Contest: Sino-Indian Rivalry in the Twentieth Century* (Seattle: Univ. of Washington Press, 2002). See also Srinath Raghavan, *War and Peace in Modern India: A Strategic History of the Nehru Years* (New Delhi: Permanent Black, 2010), pp. 227–308.
2. Gaurav Kampani, *China-India Nuclear Rivalry in the "Second Nuclear Age"* (Oslo: Norwegian Institute for Defence Studies, 2014), available at brage.bibsys.no/; Manjeet S. Pardesi, "China's Nuclear Forces and Their Significance to India," *Nonproliferation Review* 21, nos. 3–4 (2014), pp. 337–55.
3. C. Raja Mohan, *Samudra Manthan: Sino-Indian Rivalry in the Indo-Pacific* (Washington, DC: Carnegie Endowment for International Peace, 2012).

4. For an overview of various Sino-Indian conflict scenarios, see Daniel S. Markey, *Armed Confrontation between China and India,* Contingency Planning Memorandum 27 (New York: Council on Foreign Relations, 2015), available at www.cfr.org/.
5. Subhash Kapila, *China-India Military Confrontation: Strategic Reality Check,* Paper 5806 (New Delhi: South Asia Analysis Group, 2014), available at www.southasiaanalysis.org/.
6. See Ashley J. Tellis, *Troubles, They Come in Battalions: The Manifold Travails of the Indian Air Force* (Washington, DC: Carnegie Endowment for International Peace, 2016), available at carnegieendowment.org/. See also Rahul Bedi, "IAF's Depleting Assets Preclude Two-Front War Option," *IHS Jane's Defence Weekly,* 17 March 2016.
7. See "Trials and Tribulations: Recounting India's Artillery Woes," *IHS Jane's International Defence Review,* 13 June 2013. Whereas China possesses more than 2,170 self-propelled howitzers, India only has about 715 antiquated mountain guns and self-propelled howitzers left in its inventory. The quantitative gap is even more stark with regard to multiple-launch rocket systems (MLRSs). India only fields around two hundred MLRSs, whereas China possesses around 1,700. Author's calculations from data compiled in "India—Army," *IHS Jane's World Armies,* updated 5 May 2016, and "China—Army," *IHS Jane's World Armies,* updated 9 February 2016, janes.ihs.com/.
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9. A. W. Marshall, *Problems of Estimating Military Power* (Santa Monica, CA: RAND, 1966).
10. M. Taylor Fravel, "Securing Borders: China's Doctrine and Force Structure for Frontier Defense," *Journal of Strategic Studies* 30, nos. 4–5 (August–October 2007), pp. 705–37.
11. Ben Blanchard, "China to Build Second Rail Line into Tibet," Reuters, 4 March 2016, available at www.reuters.com/.
12. Sarah McDowall et al., "Himalayan Discord: China and India's Border Predicament," *IHS Jane's Intelligence Review,* 29 January 2013.
13. On artillery use for reverse-slope defense, see I. M. Datz, *Military Operations under Special Conditions of Terrain and Weather* (New Delhi: Lancer, 2004), pp. 500–505.
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15. Marcus P. Acosta, *High Altitude Warfare: The Kargil Conflict and the Future* (Monterey, CA: Naval Postgraduate School, 2003), available at calhoun.nps.edu/. See also Lester W. Grau and Hernán Vázquez [Lt. Col.], *Ground Combat at High Altitude* (Fort Leavenworth, KS: Foreign Military Studies Office, 2009).
16. Anil R. Pustam, "Mountain Air Support Demands Special Equipment and Training," U.S. Naval Institute *Proceedings* 126/9/1,171 (September 2000), p. 71.
17. Sudha Ramachandran, "India's Worrying Border Infrastructure Deficit," *Diplomat,* 19 June 2014, available at thediplomat.com/.
18. *National Seminar on China: Focus on Tibet,* Seminar Report (New Delhi: Centre for Land Warfare Studies, 2015), available at www.claws.in/.
19. "China's Military Regrouped into Five PLA Theater Commands," Xinhua, 1 February 2016, available at news.xinhuanet.com/.
20. Ajai Shukla, interview by author, 13 May 2016. On the impact of China's military reforms, see Phillip C. Saunders and Joel Wuthnow, *China's Goldwater-Nichols? Assessing PLA Organizational Reforms* (Washington, DC: National Defense Univ. Press, 2016), available at inss.ndu.edu/.
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"self-defensive counterattack," see Andrew Scobell, *China's Use of Military Force: Beyond the Great Wall and the Long March* (New York: Cambridge Univ. Press, 2003), pp. 30–32, and Mark Burles and Abram N. Shulsky, *Patterns in China's Use of Force: Evidence from History and Doctrinal Writings* (Santa Monica, CA: RAND, 2000), available at www.rand.org/.

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23. On China's war-zone strategy, see Nan Li, "The PLA's Evolving Campaign Doctrine and Strategies," chap. 8 in *The People's Liberation Army in the Information Age,* ed. James C. Mulvenon and Richard H. Yang (Santa Monica, CA: RAND, 1999).
24. Ibid.
25. Dennis J. Blasko, "'Technology Determines Tactics': The Relationship between Technology and Doctrine in Chinese Military Thinking," *Journal of Strategic Studies* 34, no. 3 (2011), pp. 355–81; M. Taylor Fravel, "China's New Military Strategy: 'Winning Informationized Local Wars,'" Jamestown Foundation *China Brief* 15, no. 13 (2 July 2015), available at jamestown.org/.
26. On the PLA's intensified focus on joint training and rapid mobilization, see *Developments in China's Military Force Projection and Expeditionary Capabilities: Hearing Before the U.S.-China Economic and Security Review Commission,* 114th Cong. (21 January 2016) (testimony of Mark R. Cozad, "PLA Joint Training and Implications for Future Expeditionary Capabilities"). On the reorientation of the Chinese army from theater defense to transregional mobility, see Dennis J. Blasko, "The PLA: Mission, Equipment, and Contingent War Plans of China's Land-Based Forces," in *The Routledge Handbook of Chinese Security,* ed. Lowell Dittmer and Maochun Yu (New York: Routledge, 2016), pp. 257–60.
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33. Richard D. Fisher Jr., "China's Y-20 May Enter Service in 2016," *IHS Jane's Defence Weekly,* 1 March 2016.
34. "China: Procurement 2015," *IHS Jane's,* 23 November 2015, janes.ihs.com/.
35. Matheswaran [Air Marshal, IAF (Ret.)], to author, 11 June 2015, privately held.
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37. Niharika Mandhana, "China's President Talks Trade in India as Troops Face Off at Border," *Wall Street Journal,* 18 September 2014, available at www.wsj.com/.
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39. Garver, *Protracted Contest,* pp. 98–99; Arun Sahgal, "China's Military Modernization: Responses from India," in *Strategic Asia 2012–13: China's Military Challenge,* ed. Ashley J. Tellis and Travis Tanner (Seattle, WA: National Bureau of Asian Research, 2012), p. 285.

40. Shishir Gupta, *The Himalayan Faceoff: Chinese Assertion and the Indian Riposte* (New Delhi: Hachette India, 2014), chap. 7.
41. As Klaus Knorr has noted, attackers who succeed in leveraging the effects of strategic surprise do not require superior forces to prevail. Klaus E. Knorr, "Lessons for Statecraft," in *Strategic Military Surprise: Incentives and Opportunities,* ed. Klaus E. Knorr and Patrick M. Morgan (New Brunswick, NJ: Transaction Books, 1983), pp. 252–53.
42. Sunil Khilnani et al., *Nonalignment 2.0: A Foreign and Strategic Policy for India in the Twenty-First Century* (New Delhi: Centre for Policy Research, 2012), p. 40.
43. Chinese leaders were surprised by the sharpness of India's turn to the United States and United Kingdom for assistance during the conflict. Central Intelligence Agency, *The Sino-Indian Border Dispute, Section 3: 1961–62* (Washington, DC: 1964), pp. 62–64.
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45. Recently retired Indian intelligence official, interview by author, 11 December 2015.
46. Sushant Singh, "Border Roads Organisation: Tight Funds, Uphill Goals in a Tough Terrain," *Indian Express,* 18 May 2016, available at indianexpress.com/.
47. Sushant Singh, "Borders without Railways: The Missing Strategic Link," *Indian Express,* 18 May 2016, available at indianexpress.com/.
48. On the distinction between deterrence by denial and deterrence by punishment, see Glenn H. Snyder, *Deterrence by Denial and Punishment* (Princeton, NJ: Woodrow Wilson School of Public and International Affairs, 1959).
49. A. K. Lal [Maj. Gen., IA (Ret.)], *Transformation of the Indian Armed Forces 2025: Enhancing India's Defence* (New Delhi: VIJ Books, 2012), pp. 119–22; Vinod Anand, "Review of the Indian Army Doctrine: Dealing with Two Fronts," *CLAWS Journal* (Summer 2010), pp. 257–64.
50. Hans Rothfels, "Clausewitz," in *Makers of Modern Strategy: Machiavelli to Hitler,* ed. Edward Mead Earle, Gordon A. Craig, and Felix Gilbert (London: Oxford Univ. Press, 1941), p. 111.
51. Anil Raman [Col., IA], interview by author, 17 June 2015.
52. Vivek Chadha [Col., IA], interview by author, 15 June 2015.
53. In the event of hostilities, however, Indian officials may be unwilling to "reactivate" the Sikkim front, as it is one of the zones along the border whose boundaries have been clearly delimited. The author is grateful to Srinath Raghavan for this point.
54. Ajai Shukla, "In a First, India Tank Brigades to Defend China Border," *Business Standard,* 17 September 2012, available at www.business-standard.com/. There are considerable challenges, however, innate to tank operations at high altitudes. Indian armored troops stationed in Ladakh thus have had to procure additional additives and lubricants to prevent their tank fuel from freezing overnight. See Rahul Bedi, "India Deploys 100 T-72 Tanks along Disputed Border with China," *IHS Jane's Defence Weekly,* 26 July 2015.
55. Sahgal, "China's Military Modernization," p. 293; Mandip Singh, *Critical Assessment of China's Vulnerabilities in Tibet,* IDSA Occasional Paper 30 (New Delhi: Institute for Defence Studies and Analyses, 2013), available at www.idsa.in/.
56. The Indian Army nearly doubled in size in the decade following its defeat, going from 458,000 to 825,000 troops. Steven I. Wilkinson, *Army and Nation: The Military and Indian Democracy since Independence* (Cambridge, MA: Harvard Univ. Press, 2015), chap. 4. There is a vast body of literature on military organizations' resistance to change and innovation. For a seminal study, see Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell Univ. Press, 1991). For an overview of the literature, see Adam Grissom, "The Future of Military Innovation Studies," *Journal of Strategic Studies* 29, no. 5 (2006), pp. 905–34. For an Indian perspective, see Vivek Chadha, "An Assessment of Organisational Change in the Indian Army," *Journal of Defence Studies* 9, no. 4 (October–December 2015), pp. 21–48.
57. The ITBP, which has a total sanctioned strength of 89,430, currently mans 169 border

outposts all along the LAC. See Government of India, *Ministry of Home Affairs Annual Report 2015–2016* (New Delhi: 2016), p. 175. On the equipment and morale issues plaguing the ITBP, see Dilip Kumar Mekala, "Close to the Clouds: ITBP Jawans Endure Harsh Weather and Modest Facilities to Guard Our Borders in the Mountains," *Force* (August 2015).

58. Multiple Indian Army officers, interviews by author, various dates.

59. For example, it is estimated that a large conventional force departing from Ranchi, in Jharkhand, would take over twenty-seven hours to reach Tawang. Ibid. The Indian Parliament's Standing Committee on Defence noted, with regard to Tawang, "While our neighbouring countries can reach borders within two or three hours, our Army takes more than a day to reach there." Lok Sabha Secretariat, *Standing Committee on Defence (2015–2016): Fifteenth Report* (New Delhi: 2016), p. 24.

60. This would also be the case for PLA reinforcements surged via high-speed rail. However, and in contrast to India, China has built a number of oxygen-rich hyperbaric chambers to acclimatize its follow-on forces more rapidly. See Xinhua, "China Starts Sichuan-Tibet Grid Construction," *China Daily,* 19 March 2014, available at www.chinadaily.com.cn/.

61. Lester W. Grau [Lt. Col., USA (Ret.)] and Dr. William A. Jorgensen, "Medical Implications of High Altitude Combat," *U.S. Army Medical Department Journal* (April–June 2003), pp. 2–7.

62. Ibid.

63. Rajat Pandit, "Fund Crunch Hits Army's New Strike Corps," *Times of India,* 16 April 2015, available at timesofindia.indiatimes.com/.

64. Vijay Mohan, "Raising of Mountain Strike Corps Depletes Army's War Reserves," *Tribune,* 24 December 2014, available at www.tribuneindia.com/.

65. Sujan Dutta, "China Strike Force Back on Course," *Telegraph,* 14 January 2016, available at www.telegraphindia.com/.

66. Personnel costs increasingly have dominated the army's budget, rising from approximately 69 percent in 2013 to 72 percent in 2016. Author's calculations, derived from data compiled in *IHS Jane's Defence Budgets: India Defence Budget,* updated 21 January 2016, janes.ihs.com/. See also "Increases in Military Personnel Spending Elevate India to World's Fourth Largest Defense Spending," *IHS Jane's Aerospace, Defense and Security,* 30 March 2016.

67. See U.S. Army Dept., *Infantry Small-Unit Mountain Operations,* FM 3-97.6 (Washington, DC: Army Headquarters, 2000), chap. 4.

68. On the importance of considering the impact of decentralized operations when conducting mountain operations, see ibid., chap. 2.

69. Hervé de Courrèges, Pierre-Joseph Givre, and Nicolas Le Nen, *Guerre en Montagne: Renouveau Tactique* (Paris: Economica, 2006), pp. 24–27. See also Cyrille Becker [Col.], "Actualité des Principes de la Guerre en Montagne," in "Guerre en Montagne: Les Défis de la Verticalité," supplement, *Défense et Sécurité Internationale,* hors-série no. 46 (February–March 2016).

70. For an overview of the role of mountain infantry, see Jon D. Greer [Maj.], *Mountain Infantry—Is There a Need?* (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1988), available at www.dtic.mil/.

71. See Kevin Christie [Col.], "Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace" (paper, Joint Military Operations Department, Naval War College, Newport, RI, 2006), available at www.researchgate.net/, and Linda Robinson, *One Hundred Victories: Special Ops and the Future of American Warfare* (New York: PublicAffairs, 2013), pp. 261–69.

72. "India: Special Operation Forces," *IHS Jane's Amphibious and Special Forces,* 12 June 2015; *The Military Balance 2016* (London: International Institute for Strategic Studies, 2016), p. 250. India plans to add another two battalions of Para SFs by 2018. See Rajat Pandit, "Para-Special Forces Get Two New Battalions," *Times of India,* 17 August 2014, available at timesofindia.indiatimes.com/.

73. "10 More Garud Squadrons, Electric Fences to Be Put Up," *Business Standard,* 2 February 2016, available at www.business-standard.com/.

74. The SFF is also occasionally designated under the moniker Establishment 22, chosen as an homage to the 22nd Mountain Regiment, the

regiment of the SFF's first commander, Sujan Singh Uban, during World War II.

75. For a discussion of the formation of the SFF (with U.S. assistance) following India's defeat in 1962, see John Kenneth Knaus, *Orphans of the Cold War: America and the Tibetan Struggle for Survival* (New York: PublicAffairs, 1999), pp. 255–70; Carole McGranahan, *Arrested Histories: Tibet, the CIA and Memories of a Forgotten War* (Durham, NC: Duke Univ. Press, 2010), pp. 155–70; Kenneth Conboy and James Morrison, *The CIA's Secret War in Tibet* (Lawrence: Univ. Press of Kansas, 2002), pp. 184–90; and Gyalo Thondup's personal recollections in Gyalo Thondup and Anne F. Thurston, *The Noodle Maker of Kalimpong: The Untold Story of My Struggle for Tibet* (New York: PublicAffairs, 2015), pp. 223–29.

76. Special warfare can be defined as "special operations forces conducting combinations of unconventional warfare, foreign internal defense, and/or counter-insurgency through and with indigenous forces and personnel." See U.S. Army Dept., *Special Operations,* U.S. Army Doctrine Publication 3-05 (Washington, DC: U.S. Army Headquarters, 2012).

77. Direct action refers to "short-duration strikes and other small-scale offensive actions conducted as a special operation in hostile, denied, or diplomatically sensitive environments and which employ specialized military capabilities to seize, destroy, capture, exploit, recover, or damage designated targets." See U.S. Defense Dept., *Special Operations,* JP 3-05 (Washington, DC: Joint Chiefs of Staff, 2011).

78. Michael J. Mazarr, *Mastering the Gray Zone: Understanding a Changing Era of Conflict* (Carlisle, PA: U.S. Army War College Press, 2015), available at www.strategicstudiesinstitute.army.mil/.

79. C. Christine Fair, *Fighting to the End: The Pakistan Army's Way of War* (New York: Oxford Univ. Press, 2014), pp. 226–61.

80. Philip Kapusta, "The Gray Zone," *Special Warfare* 28, no. 4 (October–December 2015), p. 23.

81. Eliot A. Cohen, *Commandos and Politicians: Elite Military Units in Modern Democracies,* Harvard Studies in International Affairs (Cambridge, MA: Harvard Univ. Center for International Affairs, 1978); Michael Noonan, "The Seductiveness of Special Ops?," *War on the Rocks,* 3 March 2015, warontherocks.com/.

82. See Japanese Ground Self-Defense Force, *Roles: Ground Defense Force as in the National Defense Program Guidelines* (Tokyo: 2014), available at www.mod.go.jp/.

83. See "Largest Baltic Special Forces Exercise Flaming Sword 2015 Culminates in Combined Operation," *Baltic Times,* 4 June 2015, available at www.baltictimes.com/.

84. According to some reports, India contemplated deploying Para SF units during the 2014 standoff in Chumar, but only as a backup force to regular troops. See Rahul Singh, "India Was Prepared to Use Special Forces during Chumar Faceoff," *Hindustan Times,* 5 October 2015, available at www.hindustantimes.com/.

85. Recently retired Indian intelligence official interview. This would not be without precedent: Chinese forces reportedly infiltrated parts of Arunachal Pradesh disguised as Monpa herders during the 1962 war.

86. IA officers, interviews by author, December 2015.

87. Vijay Mohan, "IAF to Procure 8 Aerostat Radars," *Tribune,* 3 February 2016, available at www.tribuneindia.com/.

88. "Government Mulls Israel-Type Fencing along Pakistan Border," *Indian Express,* 24 January 2016, available at indianexpress.com/.

89. A recent pilot project to establish a camera-based surveillance network at high-altitude points near Pangong Lake in Ladakh failed, with the cameras succumbing to the harsh weather conditions. See Vijaita Singh, "Surveillance Camera Project Fails," *Hindu,* 23 October 2015, available at www.thehindu.com/.

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THE DEVELOPMENT OF VIETNAM'S SEA-DENIAL STRATEGY

Shang-su Wu

In the past two decades, Vietnam's military investment has manifested a strategic shift of national interest from land to the maritime sphere, especially since 2000. This evolution reflects the country's altered external environment and its economic transformation.

During the Cold War, Hanoi focused on land warfare. Despite the existence of a small navy since the 1960s, land warfare represented the main security issue for Vietnamese decision makers, whether it concerned the Vietnam War against the United States and its allies, military intervention in Cambodia, or border defense against China.

Subsequently the normalization of relations with neighboring countries, particularly China, as well as a pivot toward a more trade-oriented economy, altered Hanoi's strategic circumstances. Whereas all of Vietnam's land borders have been accepted mutually in a series of treaties, Vietnam's water territory is still vulnerable, especially in the face of China's rising maritime power, because the maritime boundaries are unsettled. This threat affects not only Vietnam's management of its maritime resources but also the security of sea lines of communication (SLOCs), a critical factor in international trade.[1] Given the large gap in naval and air military capabilities between Hanoi and Beijing, the former's projects in pursuit of military modernization reflect a clear strategic focus on sea denial.[2]

However, a series of questions concerning Vietnam's sea-denial capabilities present themselves, and those questions cannot be answered fully yet.

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Why did Hanoi adopt a sea-denial strategy? What are the characteristics of that strategy? How much does Vietnam's sea-denial strategy serve its national interests? This article examines Vietnam's geostrategic circumstances to understand better its choice of a sea-denial strategy. Hanoi's current achievements in building its sea-denial capability, as well as the characteristics and limitations of that capability, are reviewed. Finally, as the United States and its allies vis-à-vis China increase their military presence in the South China Sea, the article discusses the effects of Vietnam's sea-denial strategy and the country's relevant military capabilities on the geostrategic situation.

VIETNAM'S STRATEGIC ENVIRONMENT AND NATIONAL INTERESTS

In Vietnam's geostrategic environment, Beijing poses the greatest threat to Hanoi's maritime interests. Other countries are unable or unlikely to pose any significant challenge.

A number of regional states, e.g., the Philippines, Malaysia, Brunei, and Indonesia, claim particular territories in the South China Sea, but their limited naval capabilities do not pose a credible threat to Vietnam. Given geographic adjacency, Cambodia and Thailand might be thought to have the potential for conflict with Vietnam over maritime interests, but in fact these countries cooperate on maritime and military issues.[3] With regard to capability, no country in the region possesses a navy strong enough to threaten Vietnam's. As for the great powers, only China has territorial disputes with Vietnam.

Despite several cases of bilateral cooperation, such as during the Vietnam War, Chinese geopolitical pressure on Vietnam goes back more than a thousand years. In the past, the countries' shared land borders presented natural points of access for projecting force, as evidenced in the war between them of 1979.[4] Therefore, history forms an indispensable part of Vietnam's strategic culture, and resisting China's dominance remains important.[5] Since the normalization of bilateral relations in 1991, Hanoi pragmatically has hedged its bets in relations with Beijing in the economic and political areas. In parallel, the countries have concluded bilateral agreements on land borders, which tends to reduce the risk of territorial disputes, a common cause of warfare.

However, the theater for bilateral territorial disputes has moved to sea areas. Since 2009, various events have confirmed some serious security concerns, such as Beijing's nine-dash line; its assertive attitude toward its territorial claims, backed by its strengthening military capability; and a series of maritime territorial conflicts employing violent means—Beijing's so-called salami strategy.[6] Since Vietnam's 2007 launch of its strategy to develop its maritime industries for greater contribution to its economy, followed by the introduction of a range of related

legislation and policy, the conflicts with China on territorial waters have become even more pressing.[7]

Given the geostrategic conditions and the nature of maritime conflict in general, three levels of possible scenarios for a conflict between Vietnam and China suggest themselves: low-intensity conflicts, medium armed conflicts, and a blockade conducted by China. (Higher-level scenarios, such as attacking onshore targets and conducting land warfare, would not be purely maritime conflicts, and thus are not covered in this article.)

Low-intensity conflict mainly would involve coast guards or other paramilitary forces. Military units might be involved, but without applying most weapon systems.[8] The category of medium armed conflicts covers a wide spectrum of military engagements; protecting or restoring control of an island and exchanging fire are two prospective scenarios. Instituting a blockade is classified as a major act of war because of the magnitude of the sphere of battle affected. Whereas an armed conflict that occurred in water territory might not endanger major economic activities or populations, both Hanoi and Beijing nonetheless might view it as an intense territorial collision. A naval blockade, having a broader and greater impact, in particular economically, would be seen as escalation, because it would represent a greater application of strategic pressure, or even a challenge to survival—which Vietnam's political leaders could neither ignore nor downplay. Since a considerable portion of the Vietnamese economy is based in the north and China's adjacent Hainan Island makes the Gulf of Tonkin a semiclosed body of water, even blockading only northern Vietnam would have significant effects. Blockading the entire Vietnamese coastline may not be impossible for China's People's Liberation Army (PLA) Navy (PLAN), but an operation of that scale would be more challenging.

Low-Intensity Conflict

As the maritime collisions that have occurred in the South China Sea in recent years have demonstrated, both Hanoi and Beijing use their coast guards, maritime police forces, and other law-enforcement entities to attempt to establish the legitimacy of their claims over territories while avoiding military engagement. Notwithstanding this, they do carry out aggressive actions such as deliberate collisions and ramming, the shooting of flares, and water cannoning.[9] In such scenarios, the direct involvement of Vietnam's military capabilities, such as fighter-bombers or submarines, is unsuitable. This leaves Hanoi with surveillance systems as the only support available to its coast guard operations. However, attempts to maintain control of islands or direct attacks on vessels and aircraft might escalate into armed conflict.

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Vietnam's military deployments to a number of islands, particularly the Spratlys, are vulnerable to blockade, raid, and invasion owing to their isolation and limited firepower. According to satellite images, the Vietnamese posts in the South China Sea are too small to contain sophisticated weapon systems or related surveillance equipment.[10] Therefore, the Vietnamese troops at best may be armed with short-range surface-to-air missiles (SAMs), but likely only with light arms and antitank weapons.

As long as Chinese armed forces did not succeed in bringing about a fait accompli, i.e., accomplishing a takeover in one fell swoop, the Vietnam People's Army (VPA) Navy (VPAN) and the VPA Air Force (VPAAF) might focus profitably on denying Chinese access. Once an island was captured, Vietnam would experience considerable difficulty in retaking it by force, as doing so most likely would involve a joint operation. If Vietnamese forces were unable to retake such an island, they could isolate it by denying its SLOCs. However, this kind of siege tactic would take time to work, and the situation would turn into a war of attrition—which would be unfavorable for Vietnam. In a war of attrition, the small numbers of Vietnamese combat aircraft, surface vessels, and submarines likely could not sustain a blockade in the face of their superior Chinese counterparts. (A later portion of this article is given over to a comparison of the respective forces.)

Medium Conflict

Exchange of fire, either accidental or intentional, could occur in the South China Sea. Escalation is the key factor: no matter which side loses in the first round of combat, the subsequent response is critical. If one side sends in reinforcements, the other may do so as well. If an increasingly intense spiral of response develops, the situation may evolve into a war of attrition—again, a situation unfavorable to Vietnam.

However, unlike in the previous scenario (protecting or retaking an island, which involves concentration on a specific location), in an exchange-of-fire scenario Hanoi could apply guerrilla tactics by moving aircraft or vessels or both into other sea areas where Beijing has concerns. Although China's maritime forces are superior to Vietnam's, they cannot deploy everywhere. Thus, Hanoi could make use of any weaknesses in Beijing's military presence to launch attacks for tactical advantage.

Blockade

A Chinese blockade of Vietnam's SLOCs would constitute an intermediate scenario, representing an escalation above small-scale armed conflict but not yet reaching the level of an attack on the mainland.

Although it would not be easy for the PLAN's South Sea Fleet alone to achieve a full blockade of Vietnam's long coastlines, its submarines plus its surface combatants, supported by maritime patrol aircraft and satellites, have the potential to interfere with Vietnam's SLOCs from a distance. Given the ability to move reinforcements from its other fleets, the PLAN might be able to establish a near-total blockade.

Hanoi could negotiate land transport through Cambodia, via something like the famous Ho Chi Minh Trail, or use the ports in Rach Gia on the Gulf of Thailand to make sea-transportation connections via the water territories of Cambodia, Thailand, and Malaysia. However, since such alternative arrangements would involve foreign countries, their viability remains uncertain. In any case, the minor ports in Rach Gia would be insufficient to replace the existing major ones.[11]

VIETNAM'S SEA-DENIAL STRATEGY

In most scenarios—other than low-intensity conflicts that involve few or no military forces—the VPAN generally faces asymmetrical challenges from its Chinese counterpart. In such circumstances, a sea-denial strategy is appropriate, in contrast to sea control or a postmodern navy. Although sea denial is not mentioned in Vietnam's official publications, its practices demonstrate a preference for such an approach.

Sea Control

Sea control refers to fleets controlling a specific body of water at a certain time. This demands a broad formation of surface fleets incorporating comprehensive air/missile defense, antisubmarine warfare (ASW) and antiship capabilities, and additional assistance from aircraft and submarines. A navy exercising sea control intends to be able not only to expel hostile naval forces but to protect its country's maritime activities. However, implementation of a sea-control strategy is expensive, requiring the building of various vessels and aircraft, especially surface combatants equipped with excellent capabilities against air, surface, and underwater targets.[12]

In Southeast Asia, even Singapore, with its great financial capacity and its willingness to invest in defense, has only six *Formidable*-class frigates, which have some sea-control capability.[13] In the asymmetrical naval relationship between Vietnam and China, even if the former were able to muster defense expenditures similar to Singapore's, six to ten surface combatants would not rival any one of the latter's three major fleets, each of which has more than twenty major surface vessels.[14] Operationally, Hanoi's sea-control navy would be vulnerable to Beijing's sea-denial capabilities in the air, on the surface, and underwater. (The latter is also known as an antiaccess/area-denial [A2/AD] strategy.)

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Postmodern Navy

A postmodern naval strategy is aimed at threats from nonstate actors such as pirates, terrorists, and criminals rather than at other states' navies. Such a navy concentrates on sea control, expeditionary operations, keeping order at sea, stability, humanitarian assistance, and cooperative naval diplomacy.[15]

Note that sea control is listed above as a major goal. However, vessels developed to counter nonstate actors lacking sophisticated military technology—such as the U.S. Navy littoral combat ships, which provide flexibility, maneuverability, and speed at relatively low cost—bring only limited capability to a conventional naval battle.[16] Given the present incidence of low-intensity conflicts in the South China Sea, a postmodern navy might have a role to play, and its relatively cheap assets would be affordable. However, neglecting conventional naval combat capability likely would leave a postmodern navy, with its limited firepower, unable to support escalation. Following this naval strategy would leave Vietnam with limited options by which to respond to maritime challenges from China.

Sea Denial

Sea denial refers to the prevention or disturbance of an enemy's use of the sea, particularly in areas adjacent to the defender's coast. This strategy has been applied widely by states lacking sufficient capacity or capability to exercise sea control.

The concept of sea-denial strategy has experienced evolution and enrichment as a result of the development of modern defense technology. Owing to the invention of torpedoes, then of antiship cruise missiles (ASCMs), as well as the various platforms on which each of these can be deployed, the strike range of sea denial underwent a gradual expansion, from distances in the visible range to hundreds of nautical miles. The importance of surveillance and targeting increased accordingly. Thus, a variety of platforms (e.g., land-based reconnaissance and strike aircraft, over-the-horizon [OTH] radars, ocean-reconnaissance satellites, ASCMs) have been applied to the problem, gradually enabling a multidimensional and networked system for sea denial.[17]

This result mainly flowed from the Soviet navy's efforts during the Cold War.[18] With its similarly asymmetrically limited resources, Vietnam might find that a variety of sea-denial technologies would present an economical solution by which it could counter China in the maritime environment. The building of submarines, missile boats, maritime strike aircraft, ASCMs, moderate surveillance capability (the South China Sea is relatively small), and other sea denial–oriented technologies is in fact the approach Vietnam has taken in its recent military buildup. Furthermore, a sea-denial strategy usually is constrained to a specific space, which presents it as a less-offensive posture; this fits well with Hanoi's official principle of self-defense.[19]

Vietnam's sea-denial strategy would focus on Chinese surface vessels—the main platforms for most maritime activities—in the South China Sea. Chinese submarines and aircraft are also valuable targets, but the stealth of submarines and the mobility of aircraft make them less feasible targets than surface vessels, which are comparatively slow and detectable.[20] Furthermore, most maritime activities, such as mining and fishing, are conducted using surface platforms, rather than aerial or underwater ones.

A Vietnamese sea-denial strategy might be conceptualized and executed as follows:

- The relatively small size of the South China Sea would allow Vietnamese reconnaissance aircraft, as well as other reconnaissance facilities such as satellites, to locate targets for the command center and the strike forces.
- Then Vietnamese combat aircraft, equipped with airborne ASCMs, would constitute a major strike force capable of covering the greater part of the South China Sea.
- Despite their slow speed, submarines would be the best platforms for anti-ship missions owing to their stealth and lack of need for air cover.
- Small surface vessels, such as missile boats, are valuable in defending coastal areas, as they are easy to hide and wield the considerable firepower of ASCMs. However, their narrow range in detecting targets, especially beyond the horizon, and their low durability would restrict them in such a large theater.
- Although major surface vessels, such as frigates, have better surveillance capability because of their larger space for equipment and shipboard helicopters, which might enable them to make a greater contribution to sea denial, their vulnerability to a saturated attack by ASCMs and their high cost constrain their use for sea-denial operations.

In addition to the sea surface, airspace is essential to sea denial. If the VPAAF is able to establish air superiority, or at least to constrain its Chinese counterpart's activities, it would make a sea-denial strategy more effective.

VIETNAM'S DEVELOPMENT OF SEA-DENIAL CAPABILITY

So far, Hanoi's recent military procurements generally have reflected the sort of strategy laid out above. Vietnam practiced a sea-denial strategy previously, during the Indochina War. As far back as the early 1960s, it acquired a number of Soviet P-4 and P-6 torpedo boats, and later introduced Project 183 and Project 206 missile boats armed with P-15 ASCMs. However, as most battles in that war occurred on land, Hanoi paid more attention to denying American airpower using numerous Soviet SAMs, such as the S-75, S-125, and 2K-12, as well as a range

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of fighters, mainly MiG-21s. After unification in 1975, Moscow supplied a range of sea-denial weapon systems, such as Su-22 attacker aircraft equipped with airborne Kh-23, Kh-25, and Kh-28 air-to-surface missiles (ASMs), more missile boats, and S-35 coastal ASCMs, supported by better surveillance systems such as Be-12 flying boats and Ka-25/27 helicopters.[21]

However, following the political reforms of 1986, the rapprochement with China, Vietnam's withdrawal from its military interventions in neighboring countries, and the easing of international tensions overall at the close of the Cold War, Vietnam dramatically shifted application of its national resources toward economic development. This decreased military preparation, and therefore the country's sea-denial capability. In particular, the decrease in operational strike aircraft such as Su-22s significantly reduced Vietnam's sea-denial radius.[22]

After the Soviet Union collapsed, Hanoi lost financial and logistical support from that source. This led to a period of stagnation for the VPAN and the VPAAF, at the same time as their Chinese counterparts were increasing their modernization projects. After surviving the most difficult years in the early 1990s, Vietnam made minor efforts in the later 1990s to resume a slight buildup of its naval and aerial capabilities. It introduced two BPS-500 missile boats, four Project 1241 missile boats, and twelve Su-27SK fighters with Kh-35 ASCMs, all from Russia.[23] However, such small-scale projects constituted the VPAN and the VPAAF merely keeping up with progress in military technology rather than providing a strong response to the regional arms dynamic.

In the latter part of the first decade of the twenty-first century, Vietnam's improving financial capacity eventually allowed a large-scale military procurement. Since the end of the Cold War, Hanoi has maintained a gross domestic product (GDP) growth rate of more than 5 percent, except in 1999, and late in the following decade it increased its defense budget significantly, to an amount three times larger than it was in 1991.[24] For strategic and operational reasons, the increase in investment mainly went into maritime capability. However, the VPAN's Cold War legacy of Soviet vessels remains small and aging, and thus the service is incapable of properly protecting Vietnam's maritime activities within its water territory.[25] The recent increase in procurement reflects Vietnam's security concerns regarding China, especially the latter's increasingly tough approach to territorial disputes since 2007, as seen in a variety of bilateral conflicts at sea.[26] In this strategic environment, the VPAN and the VPAAF have been considered strategic priorities—despite the VPA's superiority in the Vietnamese military structure and its political influence—and their military procurement projects have been oriented toward denial.

The country's determination to improve maritime and aerial defense is evident.[27] The maritime buildups comprise ten additional Project 1241 missile

boats armed with Kh-35 ASCMs, thirty-six Su-30MKK fighter-bombers with Kh-29 and Kh-31 ASMs and KAB-500/1500 guided bombs, thirteen used Su-22M attackers from the Czech Republic and Ukraine, six Project 636 diesel-electric submarines (SSKs) equipped with fifty 3M-54 ASCMs, two Bastion-P coastal defense systems with forty P-800 supersonic ASCMs, four to six Gepard-3 frigates, two Dutch Sigma 9814-class corvettes, eight Project 10412 patrol vessels, and six Canadian DHC-6-400 and two Polish M-28B maritime patrol aircraft.[28] As fourth-generation fighters, the Su-30MKKs—with new avionics and an eight-ton payload for ground-attack munitions, especially for Kh-31 supersonic ASMs—form a considerable strike capability, in particular against surface vessels. Despite their old design, modernized Su-22 aircraft still can provide platforms for some ASMs, to supplement the Su-30s in sea-denial missions.[29] Hanoi also has shown an interest in purchasing non-Russian combat aircraft.[30] Russian Kh-35, 3M-54, and P-800 missiles also are used to deny adversary surface vessels beyond the horizon, with maritime patrol aircraft assisting in finding targets.[31] Vietnam's procurement of two S-300PMU-1 SAM systems (maximum range: 150 km) and its procurement in the near future of S-400 SAMs (maximum range: 400 km) may provide the capability to deny Chinese aerial activity in some offshore areas.[32] In contrast to other Association of Southeast Asian Nations countries, Vietnam's efforts in military modernization are outstanding. And they are concentrated fully on the maritime field—the VPA has received no major project.[33] The predominance of Russian equipment probably reflects the legacy of the Soviet sea-denial strategy that somewhat fit Vietnam's needs, as well as the tight bilateral relations.[34] However, the Russian dominance in Hanoi's arsenal may present operational and logistical obstacles for several non-Russian systems.

Sufficient training is an indispensable factor in the efficient use of military assets, and Hanoi is making improvements in this area. For decades, limited budgets constrained training of VPAN and VPAAF forces, but the new projects are bringing in additional capacity. Weapon systems from foreign suppliers come with the provision of training in operation, maintenance, and repair, as well as simulation facilities. In addition, joint exercises with foreign countries can strengthen training.[35] Internally, the personnel interchange program between the VPAN and the VPAAF that began in 2009 also may strengthen their ability to conduct joint operations.[36] However, the VPAN is still rather inexperienced in operating and maintaining sophisticated naval weapon systems and operations, especially those for submarines.[37]

Despite its lack of mention in official Vietnamese materials, such as the defense white paper, Vietnam's enhancement of its naval and aviation assets may represent Hanoi's intention to prepare for multilevel conflicts. As the economic

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importance of maritime resources grows, the naval and aviation buildups indicate some concern about control of the Vietnamese exclusive economic zone (EEZ). The patrol vessels, corvettes, frigates, maritime patrol aircraft, and fighters are designated to protect the EEZ in an armed conflict up to a medium level. In other words, Vietnam's military buildups suggest that Hanoi is concerned about more than just sea denial. In the case of larger-scope warfare scenarios involving China's massed forces, the VPAN and the VPAAF likely would be ineffective at protecting aerial and maritime activities, or even simply providing escorts, so they would concentrate on denial operations. The Vietnamese missile boats, SSKs, coastal ASCMs, and SAMs are intended specifically to deny particular aerial and maritime targets.

However, in contrast to their earlier capabilities, the VPAN and the VPAAF now can extend their denial power by using longer-range arms with greater destructive capability. For example, the maximum range of the 3M-54 ASCMs is at least 220 km, a figure that could be multiplied depending on the mobility of their submarine platforms. The supersonic P-800 ASCMs with 300 km range are less likely to be intercepted than the older subsonic ASCMs.[38] The S-300PMU-1 SAMs have the potential to cover a range of airspace over some coastal waters, while the Su-30MK2's wide combat radius and beyond-vision-range capability can extend the range of engagement.[39]

Moreover, the longer-range weapon systems not only enable Hanoi to deny hostile aerial and maritime activities beyond its EEZ but also present opportunities to strike certain Chinese military facilities. A prime candidate would be Yulin on Hainan Island, the home base of the PLAN's South Sea Fleet—a major facility less than 300 km from Vietnam's coastline.[40] Hanoi's R-17 and 3M-54 missiles could reach the Chinese naval base, and the act of striking its vessels and facilities could be seen as part of a sea-denial strategy.[41] However, as previously discussed, attacking onshore targets almost certainly would be classified as escalation, and Vietnam would face even greater retaliation from China. Furthermore, the shortness of the distance between the Vietnamese coastline and Hainan Island would be convenient in turn for the PLAN and other Chinese military units to launch retaliatory attacks, thus leaving Vietnamese facilities vulnerable. Therefore, while such threats may help in deterrence, they may be disadvantageous to carry out.

THE CAPABILITY GAP

Despite considerable investment, several factors constrain Vietnam's current capability to achieve fully its strategic goal—denial of China's maritime activities in the South China Sea.

First, Vietnam's surveillance capability may be insufficient, or at least weak. Long-range weapon systems rely on targeting; the platforms themselves, whether

vessels or aircraft, may have limited detection capability. Vietnamese surveillance currently relies on the country's VNREDSat-1 natural resource satellite, which uses French technology, and several aerial platforms such as the VPAN M-28, DHC-6 maritime patrol aircraft, and Vietnamese Coast Guard C-212 maritime patrol aircraft. Strike aircraft such as the Su-22, -27, and -30 add limited detection capability.[42] Hanoi's current remote-sensing cooperative effort with New Delhi may contribute to surveillance as well.[43] Land-based radars, signal-collection facilities, and surface vessels also may be important for Vietnam, although little information is available on Hanoi's planning in this regard. A central and networked command system could be established, as long as the VPAN takes significant lessons from the Soviet sea-denial strategy.[44]

Given the above, Vietnam may be able to observe the whole South China Sea area. However, several questions arise regarding this surveillance arrangement, relating to integration and survivability.

Integrating and sharing the collected intelligence among various aerial platforms, the command chain, and strike units would not be easy. Owing to its earth-observation function and foreign management, the VNREDSat-1 might not provide real-time information. A similar situation might occur regarding the Vietnam-India space cooperative venture.[45] Because Vietnam's existing aerial-surveillance platforms come from various sources, such as Russia and Israel, their integration would present another challenge.[46]

With regard to survivability, Vietnamese propeller-driven maritime patrol aircraft lacking VPAAF escort would be vulnerable in the air to Chinese fighters; and even when escorts were available, VPAAF fighters would be outnumbered by their Chinese counterparts. In the Guangzhou Military Region alone, the PLAN Air Force and the PLA Air Force (PLAAF) deploy four times as many fourth-generation fighters as the VPAAF, not to mention potential reinforcements from other areas in China (see table 1).[47] The recent formation of the Chinese Southern Theater Command, which has broader coverage than the Guangzhou Military Region, may allow its commander to concentrate even more assets.[48] China's air superiority also includes better intelligence and command, accommodated by its airborne warning and control system (AWACS) aircraft and longer-range air-refueling aircraft.[49] In addition, in the near future PLAN fighters based on aircraft carrier(s) or on forward bases on some of the Spratly Islands may present a further feasible option.[50] This would mean that the VPAAF's surveillance capability could be decreased significantly, if not neutralized, during wartime. Ground facilities in Vietnam also may be exposed to Chinese strikes, particularly from ASMs.[51] The Vietnamese Suhkoi Flanker aircraft, with their high mobility and air-to-air combat ability, may be more likely to survive, but they likely would be occupied with various other missions, such as aerial combat, rather than with

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TABLE 1
COMPARISON OF AIRPOWER BETWEEN VIETNAM AND CHINA

Fighter Generation	Vietnam	Guangzhou Military Region, China (combined PLAAF and PLANAF units)
3rd	MiG-21Bis/UM: 33; Su-22M/UM: 28	J-7s: 3 regiments and 1 brigade, about 120; J-8s: 1 regiment, about 24
4th	Su-27SK/UBK: 11; Su-30MK2: 36 (29 delivered)	J-11/B (Su-27): 4 regiments, about 96; J-10: 2 regiments and 1 brigade, about 72; Su-30MKK: 1 regiment, about 24

Note: PLANAF = PLA Naval Air Force

Source: IISS, *The Military Balance 2016,* pp. 244–45, 248, 298; van Creveld, *The Age of Airpower,* pp. 198–204.

detecting maritime targets. Without aerial intelligence from fixed-wing aircraft, the VPAN would be dependent on its Ka-27 helicopters and sonars alone to detect targets beyond the horizon. But those helicopters easily could fall prey to attack by China's fighters, and the availability and quality of information from sonar are sometimes unstable owing to fluctuations in maritime conditions.

In short, the VPAN and other forces may not be able to provide sufficient information on targets beyond the horizon.

Second, the majority of Vietnamese weapon systems share the same Russian origins as their Chinese counterparts. For example, both Hanoi and Beijing purchase the Su-30MK2 and Project 636 SSKs, although the former's submarines may be more advanced than the latter's.[52] Thus, the general technological characteristics and even the details of Vietnam's supposed "trump cards" may be transparent to China already. The Vietnamese crews may learn different doctrines and tactics as a result of training in India; however, the Chinese operators of those Russian aircraft and submarines have had more time than their Vietnamese counterparts—owing to earlier procurement and perhaps to reverse engineering—to master similar weapon systems.[53] Besides the fighters and submarines, the VPAAF's Kh-31P antiradar missile is valuable in destroying enemy radars, AWACS, and other surveillance systems, or threatening to shut them off, but it would not be as formidable against the PLAN or the PLAAF, again owing to China's earlier procurement advantage.[54] Although Hanoi has begun to purchase non-Russian arms unavailable to Beijing, such as the Dutch Sigma corvettes, it will be difficult for it to change the Russian-dominant nature of its military in the near future.

Finally, quantitative inferiority would constrain the durability and credibility of Vietnam's A2/AD strategy, and Vietnam's limited logistical facilities and training may not help the situation. As most modern sea-denial platforms, such as submarines and fighter-bombers, require intensive maintenance as well as excellent training to retain their operability, even Hanoi's increased investment

TABLE 2
COMPARISON OF NAVAL POWER BETWEEN VIETNAM AND CHINA'S SOUTH SEA FLEET

Type of Vessel	Vietnam	South Sea Fleet, China
Surface combatants	Frigates: 2 (total of 8 involved in current deals)	Destroyers: 7; frigates: 20
Submarines	SSKs: 6	SSNs: 2; SSKs: 16

Note: SSN = nuclear attack submarine

Source: IISS, *The Military Balance 2016,* pp. 248, 298.

to date may not be sufficient.[55] Although Russia is assisting Vietnam with missile manufacture and shipbuilding, Vietnam remains restricted by its limited defense industry and its resultant dependence on foreign supply for some critical parts, such as engines. Most VPAN and VPAAF weapon systems, especially non-Russian ones, also would face supply issues during conflict.[56] Apart from the above-mentioned quantitative gap in the number of combat aircraft, the numbers of Vietnamese major surface vessels and submarines are much lower than those of the PLAN's South Sea Fleet (see table 2).[57] Despite the sometimes advantageous asymmetrical nature of Hanoi's sea-denial strategy, Beijing's sheer numerical superiority may allow it to absorb losses Hanoi would inflict during warfare, and eventually to coerce the latter toward the former's strategic goals.

Vietnam might achieve a tactical or operational victory in the initial phase of a conflict. However, owing to integration issues, dependence on Russian arms, and quantitative inferiority, it is doubtful that Vietnam could sustain that victory in the face of China's superior military capability.

In cases of protecting or restoring control of an island and exchanges of fire, Beijing easily could reinforce its Guangzhou Military Region from other regions with more vessels and aircraft to prolong the war, and even to transform it into a war of attrition. A positive outcome for Vietnam would be a decisive victory that caused China to withdraw because of serious damage to either its military capability or its international reputation. With regard to achieving this strategic goal, the VPAN's Project 636 SSKs, with their stealth characteristics and long-range ASCMs, would be most likely to survive and might succeed in launching several waves of attacks on the surface vessels of the PLAN's South Sea Fleet. The Sukhoi aircraft and surface vessels also could contribute their respective ASCMs to sea-denial strikes. Since major surface vessels are a significant—and expensive—component of China's sea power, the sinking of a number of frigates and destroyers, or even an aircraft carrier, might force Chinese decision makers to cease fire. However, the South Sea Fleet's sixteen SSKs plus two nuclear attack submarines might constrain or even neutralize the Vietnamese SSKs' tactical advantages, as submarines often make effective ASW platforms.[58] By the same

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token, Vietnamese aircraft and vessels may bear considerable losses in the face of dominant Chinese countermeasures, especially if the latter can attack the former's bases ashore.

In a blockade scenario, the VPAN—limited in ASW capacity, frigates, helicopters, and aircraft—would be unlikely to neutralize or expel the PLAN's numerous submarines or to be able to escort merchant vessels through the SLOCs to a safe area. VPAN and VPAAF ASCMs could keep the PLAN's surface vessels at some distance from the Vietnamese coastline, but Vietnam might fail to deal effectively with a blockade established at a greater distance, owing to its inadequate surveillance capability and the limited ranges of its surface vessels and strike aircraft. The VPAN's small flotilla of Project 636 SSKs would pose a considerable threat against major Chinese surface ships, but their number may be too small to create a real impediment to China's access to SLOCs, given their limited long-term durability, the narrow margin for loss, and the risk of attacking vessels from other countries. In other words, Beijing would be likely to press Hanoi through blockade, and the latter's countermeasures might not be enough to neutralize the former's operation.

In summation, the VPAN and the VPAAF, using an asymmetrical approach and employing their denial capabilities, may not achieve their strategic goals in all wartime scenarios by fully neutralizing their Chinese counterparts' superiority. With Hanoi's cautious attitude on defense expenditure—allocating roughly 2.5 percent of GDP to the defense budget—it will take a few years to complete its recent procurements, making future projects rather unlikely, or at least likely to be of smaller scale.[59]

It can be deduced from the scenarios outlined that Vietnam faces limited chances of overall military success, but nonetheless has strengthened its deterrence against China. Given the inherently asymmetrical nature of bilateral relations between Hanoi and Beijing, the former's deterrence helps its "hedging engagement" with the latter by adding considerably to the costs of using force.[60] Compared with a decade ago, the cost to China of conducting armed conflict against Vietnam has become higher, and the outcomes have become less certain. Before the VPAN and the VPAAF acquired additional assets, Hanoi only had a declining number of aging Su-22M attacker aircraft to react to any contingency on the islands it has occupied or the water territories it claims. Although the gap between the military capabilities of the two sides remains wide, Hanoi now has expanded its options compared with previous periods. This means the PLAN and the PLAAF now need to deploy more units in any operation against Vietnam if they are to maintain superiority. This both increases the preparation time and effort needed, thus reducing the possibility of a surprise attack, and potentially paints China with the more aggressive image on the international stage.

Tactically, this may make Beijing less likely to use its military units to provoke small-scale conflicts, especially in cases that involve an unnecessary risk of loss or defeat.

Since China is involved in other territorial conflicts, such as those relating to Taiwan and the Senkaku Islands, concerns over any one of them may prevent Beijing from concentrating enough force to achieve absolute superiority over Hanoi. Without sufficient Chinese superiority, Vietnam's sea-denial strategy would prove especially effective, or at least influential, within the broader regional geostrategic picture, as opposed to the purely bilateral relationship. In this way, Vietnam's military investment may contribute to stabilizing or ameliorating the changing maritime balance of power currently being driven by China's increasing naval might.

Hanoi's sea-denial strategy had its foundation in the Cold War era. The current version can be interpreted as a moderate form of military modernization and a reasonable, asymmetrical response to Beijing's superior military power.

Vietnam's beefed-up denial capability may mean that China would not perceive it to be the "easiest prey" in the South China Sea; in terms of pure military capability, the VPAN and the VPAAF are indeed much stronger than their Philippine counterparts. However, Manila can rely on extended deterrence by strengthening its alliance mechanisms with the United States, such as the Enhanced Defense Cooperation Agreement (EDCA), and with other countries, such as Japan. As the Philippines and Vietnam are two frontline states facing China's expanding sea power, once the Philippines achieves better deterrence, or even if Chinese decision makers simply perceive this to be the case, Vietnam may suffer heavier strategic pressure because of its nonallied international stance.[61] In this context, Hanoi's pursuit of a sea-denial strategy helps to ensure that, overall, it is not weaker than Manila when facing Beijing.

Vietnam's denial capability serves as a diplomatic bargaining chip. During peacetime, Hanoi's military investment demonstrates its commitment to security and serves as a form of defense diplomacy. Commitment to defense is a sign of shouldering responsibility rather than free riding, a matter of importance to countries considering forming alliances, other cooperative security efforts, or both with Vietnam. Defense diplomacy (e.g., joint exercises and friendly visits) represents an effective means by which the VPAN and VPAAF can strengthen relations with their foreign counterparts.[62]

If Vietnam had no substantial defense capability, an external third power would face relatively high costs of intervention, especially in the case of a direct confrontation with China; those costs might be so high that the power would refrain from taking any substantial action. Since Hanoi is developing the

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capability to take its own steps to resist Beijing's military initiative during an initial period, a third party—which most likely would be Washington—would have more options, including providing arms or putting military pressure on Beijing's other fronts, such as in the East China Sea. Additionally, if China succeeded in presenting the world with a fait accompli it would render subsequent external intervention less meaningful, but Vietnam's resistance might prevent this. However, despite improving Vietnamese-U.S. military ties, as demonstrated by some partnering and cooperation, U.S. intervention may remain uncertain owing to the lack of a formal alliance like that with the Philippines. In this context, Vietnam's sea-denial capability would be a critical factor for decision makers in the United States.[63] Such a strategy would provide Hanoi with some breathing space to wait for changes to occur on a domestic or international level, as influenced by third parties.

The similarity between the Russian-originated weapon systems that Vietnam and China both use, Vietnam's quantitative inferiority, and its limited surveillance capability make it unlikely that Vietnam's denial-oriented military strategy will be able to counter fully the might even of China's Guangzhou Military Region alone. Thus—unless the VPAN and the VPAAF develop some new tactics that would constitute a significant surprise to their Chinese counterparts—Hanoi's present military assets likely are insufficient to achieve the asymmetrical effects at which its sea-denial strategy aims. Strengthening that deterrence at least would ameliorate Vietnam's situation in the geostrategic landscape, including in its bilateral relations with China.

When considering the development of Vietnam's sea-denial strategy, three points are worth further discussion: the country's alliance or defense diplomacy, further procurement, and political leadership.

Despite an official emphasis on nonalliance, Hanoi is not bound by any treaty to remain neutral, leaving it free to change its diplomatic policy. In a fashion similar to the Philippines' use of the EDCA to strengthen its deterrence against China, Vietnam also can set up some type of security arrangement with a third-party power, whether it be an alliance in name or not. There might be some future breakthrough in Vietnamese-U.S. relations, although Vietnam's long relationship with Russia in defense and economic matters may affect such a process.[64] Once any alliance is formed, the role of Vietnam's sea-denial strategy may be adjusted accordingly. Even at a level below an alliance, joint exercises and other forms of military cooperation also may affect Hanoi's sea-denial strategy, in addition to increasing Beijing's uncertainty about its strategic calculation regarding Hanoi.

As for further procurement, the means by which Vietnam deals with the weak points in its sea-denial capability will be crucial. Adding surveillance systems, whether OTH radar, maritime patrol aircraft, or maritime satellites,

would improve targeting and the organization of attack and command, thereby strengthening the overall efficiency of sea-denial operations. A more integrated chain of command would enhance sea-denial capability immediately. Regarding means used for strikes, ASCMs and aerial platforms would be preferable because of their high mobility and lower costs of procurement and training compared with submarines. If financial capacity is limited, land-based ASCMs present an economical solution.

Finally, it is possible that the new Vietnamese leadership, given its pro-China record, may adjust the pace and content of military modernization to stabilize bilateral relations.[65] Such a development would require time to manifest itself, because Hanoi's present arms contracts have not been filled yet, and the situation will not become clearer until Vietnam launches a new wave of military procurement —or does not. As deterrence is an indispensable part of Vietnam's current China policy, investment in defense is not likely to be dropped entirely from the country's list of priorities; but if Vietnam achieves relatively stable relations with China, it may pay greater attention to economic or other issues, and the pace of building a sea-denial strategy for Vietnam might slow down.

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REVIEW ESSAY

WHAT IS VICTORY?

John B. Hattendorf

The Verdict of Battle: The Law of Victory and the Making of Modern War, by James Q. Whitman. Cambridge, MA: Harvard Univ. Press, 2012. 336 pages. $19.95 (paperback; e-book $29.95).
Understanding Victory: Naval Operations from Trafalgar to the Falklands, by Geoffrey Till. Santa Barbara, CA: Praeger, 2014. 248 pages. $60 (e-book $60).

How does one measure victory in combat operations? Is there a difference between victory ashore and victory at sea? These are certainly two fundamental questions about the nature and character of war that are worthy of careful reflection, but too often they become lost among vague assumptions. The two scholars who have taken up the challenge in these two volumes represent different academic disciplines and each looks at the subject through quite a different lens. While each volume makes a substantial contribution to the literature by itself, when read together they provide an even more interesting and provocative basis for the readers of this journal to think about victory, both in the past and in the future.

Dr. John B. Hattendorf is the Ernest J. King Professor Emeritus of Maritime History at the Naval War College. He joined the Navy in 1964 and served in uniform at the Naval War College in 1972–73 before returning as a civilian faculty member in 1977. He retired from the civilian faculty in September 2016. He is the author, coauthor, editor, or coeditor of more than forty books on British and American maritime history and naval warfare.

James Q. Whitman is Ford Foundation Professor of Comparative and Foreign Law at the Yale Law School. His book focuses mainly on the great land wars of the eighteenth century in Europe and in European colonies around the globe, and does not include naval warfare. In contrast, Geoffrey Till is professor emeritus of maritime studies at King's College London, and a distinguished naval

historian and historian of modern strategic thought. His book is a set of four case studies from naval history that focus on single-warship operations in the context of four major naval events: the battle of Trafalgar in 1805, the battle of Jutland in 1916, the battle of Malaya in 1941, and the Falklands campaign in 1982.

It is useful to start with Whitman's book. Harvard University Press provocatively describes his volume as "an iconoclastic tour de force." Whitman shows that the concept of victory in battle has changed dramatically over time. He introduces his topic by quoting the description of the aftermath of the 1859 battle of Solferino written by Henri Dunant, the founder of the Red Cross and recipient of the first Nobel Peace Prize: "Anyone crossing the vast theatre of the previous day's fighting could see at every step, in the midst of chaotic disorder, despair unspeakable and misery of every kind" (p. 2).

Whitman then goes on to show that this mid-nineteenth-century pacifist's view of the pointless slaughter and misery of battle contrasts sharply with the view more widely held in history: that death in battle was a profoundly meaningful sacrifice in the process of larger contexts and struggles. Such efforts included maintaining principles of religion or law and order, redrawing borders, preserving hereditary legal rights, overthrowing regimes, or maintaining national or imperial survival. Whitman reminds his readers that in the past many writers described a pitched battle as a type of trial or legal proceeding—a lawful way to settle disagreements. In ancient times, battles could be fought separately from society—a farmer could be tending his fields peacefully while a battle took place nearby. In European medieval history, the result of a battle was seen as the judgment of God. Battle was viewed as a kind of legal ordeal staged to summon God to judge cases that humans were incapable of deciding on their own. This, Whitman points out, now seems utterly bizarre, when in the modern world we have come to view legal proceedings as a means to avoid violence. By the eighteenth century, the medieval view had developed into a concept of contractual settlement: solving international differences through the chance outcome that battle involved. Under this interpretation, a pitched battle was a way of limiting violence in war and preventing warfare from spilling over into the broader aspects of society. Although pitched battles involved the savage slaughter of hundreds or thousands of young men, limiting conflict to such crucibles of violence protected societies from worse forms of unlimited warfare. In this way, pitched battles avoided the attacks on general society involved in the indiscriminate violence of systematic pillaging, scorched-earth campaigns, carpet bombing, terrorist attacks, guerrilla warfare, and the like. The concept of the pitched battle, Whitman argues, was a more effective means of civilizing warfare than what is available to

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us today, when lawyers argue about *jus ad bellum* and *jus in bello*. While these modern concepts are intended to humanize warfare, they strictly forbid limiting war by consensual battle, providing for the use of war only in cases of self-defense and extreme necessity.

Whitman deals with his subject in six chapters.

- In "Why Battles Matter," he establishes that eighteenth-century pitched battles were a meaningful and lawful means of establishing rights and settling disputes. This concept broke down in the mid-nineteenth century in the American Civil War and the Franco-Prussian War, when its eighteenth-century legal meaning became lost.
- In "Accepting the Wager of Battle," he argues that the eighteenth-century concept had nothing to do with Clausewitzian concepts of battle or with the culture of dueling, but rather with the minds of eighteenth-century kings—a battle could gain or lose a kingdom.
- In "Laying Just Claim to the Profits of War," Whitman shows that warfare in the eighteenth century, as in earlier times, was about dividing up claims to territory in the tradition of the ancient just war theorists and insisting that a legal pretext be given for war. What was different in the eighteenth century was that only kings retained the practical power to go to war to settle their differences.
- In "The Monarchical Monopolization of Military Violence," Whitman explains that often in history wars have been waged to assert or deny legitimacy to political powers. Agreeing with Max Weber, Whitman writes that "the sovereign is one who can succeed in claiming the right to exercise unrestrained violence" (p. 171).
- In "Were There Really Rules?," Whitman agrees that the eighteenth century was an era of exceptionally restrained warfare, although it saw actions such as the unusually bloody battle of Malplaquet in 1709 during the War of the Spanish Succession; the clash produced some 32,000 casualties. Although the Duke of Marlborough and his allies lost nearly twice as many men as the French, contemporaries judged the former the victors because they retained possession and full control of the battlefield, which their enemies ceded.

  In making his point, Whitman points out that the analogy of wars to games, while an attractive one, is highly misleading. Games have rules that must be obeyed; war does not. In looking at the eighteenth century, Whitman concludes that the practice of limited warfare in that era showed that victory in warfare succeeded in shaping the conduct of war and its results in a way

that the simple implementation of force did not. The law of victory is seen in battles such as Chotusitz in 1742 and Yorktown in 1781, making warfare more controlled and decisive than what came before or after.

- In Whitman's final chapter, "The Death of Pitched Battle," leading up to his conclusion, he discusses the rise of the "great battle" theory and the way in which it eclipsed the earlier idea that God, fortune, or chance ruled human events. In the romantic era of the early nineteenth century, chance became a factor that a genius could control, rather than being the basis for a legal doctrine of war. In this context, the idea of battles as grandiose pivotal events in world history gained traction, eclipsing the concept at work during the eighteenth century.

There is much to learn from understanding the changed conceptions of victory in warfare. Today it is not victories in battle that are seen as world-changing events; instead, change is created by broader underlying structural forces, such as economics. Pitched battles do not often occur in the modern world; but as a result, Whitman notes, it has become hard to bring our wars to an accepted conclusion. The modern victors tend to make claims to limitless rights. Reflecting on the issues of our time, Whitman concludes: "We need a law of victory that can help us cut deals and end wars without insisting that every victory must end in a great triumph for the historic cause of democracy" (p. 260). At the same time, he cautions: "Wars enter their most dangerous territory when they aim to remake the world, and the same is true of lawyers" (p. 262).

Geoffrey Till takes a completely different approach to understanding naval victory. His objective is to analyze what has changed and what has not changed in the successful conduct of naval warfare over the past two hundred years. In examining his four chosen naval battles or campaigns, he concentrates on the role of a particular ship in each campaign, purposefully selecting a ship that does not come to mind immediately when one recalls the battle. In doing so, he is well aware that a superficial glance at his book might lead an observer to conclude that his focus on battle and little-known individual ships might be considered passé or even perversely antiquarian.

For that reason, he takes time to explain that his approach is a multilayered one that presents his subject in a manner that provides an unusual, but highly effective, light on the changing character of naval warfare. In doing this, Till points out factors that are very useful for modern naval planners to consider regarding what generally has worked and what has not worked out over time and in differing technological circumstances. To make his point, he systematically applies

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a set of eleven perspectives to use in evaluating each of the cases: (1) strategic design, (2) technological advantage, (3) command and leadership, (4) organizational efficiency, (5) training, (6) intelligence, (7) concept of operations, (8) battle awareness, (9) maneuverability, (10) firepower, and (11) resilience.

Using these criteria, Till produces a set of superb, detailed analyses of the actions. The four studies vary in length from thirty-four to fifty pages and are based on careful examination of the detailed literature on each topic. Each study stands alone as a separate battle analysis. "On the face of it, these four ship battles were very different because of their unique circumstances, their very different technologies, and their disparate geographic and chronological settings. But they did have things in common, most obviously, in that they *mattered*. . . . [They] conveyed important messages and had important consequences. These battles had decisive effects, for good or ill" (p. 189).

In a most interesting section of his conclusions, the author reveals that the book had its origins in the late-1990s era of "transformation" and the concept of the revolution in military affairs that went along with it. He reminds readers that the most vocal proponents of that concept often gave the impression that nothing in the past held any relevance for the future; however, their own statement in *Joint Vision 2020* suggested that there was much more to transformation and to the ability to prevail in combat than mere technological advantage. Till agrees that naval operations are much more complicated than a matter of mere technological advantage, and this explains the long gestation period for this book.

With the thought in mind that naval operations are so highly complex, Till modestly hesitates to make any simple generalization about the factors that led to naval victory in the four cases at hand; he leaves it up to his readers to reach their own conclusions. But he does offer great insight.

While each battle encounter is unique in its own way, two general factors must be kept in mind. Technological advantage is important, but faulty strategic design clearly can shift the balance and lead to operational and tactical defeat. At the level of operational enablers, technological advantage also plays a role, but at this level it can also be undercut by faulty command and leadership capacity; while styles in leadership may differ, clarity in aim and in relative responsibility is essential. There is also a critical need to strike a balance between centralized direction and delegated control. In this, modern communications need to ensure that subordinates in the thick of a fight can make their needs known to their superiors. Furthermore, military success is dependent on effective organization and efficient supply, which, in turn, are reflections of national economic strength, industrial capacity, and military support systems. Effective training for combat operations is always a critical factor, but the historical examples studied here lead

one to wonder why training levels can vary so much, even within a fleet. A reader may well conclude that this turns on both leadership and the opportunities that are made available at the individual ship and unit level.

Till points out that a "commander's concept of operations translates strategic enablers into battle deliverables. To be effective, the concept needs to be consistent with, and supportive of, national aims; realistic in terms of means available . . . and effectively implementable by the commander's subordinates" (p. 194). Battle awareness, he points out, is simply the tactical expression of strategic and operational intelligence, but intelligence is the key element in achieving surprise, whether it be tactical, operational, or strategic. Thus, an effective concept of operations is an essential precondition to success in naval warfare.

In his final analysis, Till concludes that, among his eleven perspectives, no single one is paramount in importance; all contribute to and are affected by the others in varying degrees that depend on the situation.

These books by James Whitman and Geoffrey Till look at different issues in their examination of the meaning of victory and military success, but both are very fine examples of the varying ways in which the study of history can bring enormous insight and understanding to the changing nature and character of war while also being a corrective to an overreliance on new technology. Both provide us with a balanced understanding based on a deeper perspective on what has changed and what has not changed in warfare. As Till eloquently concludes his volume, "To be useful, history needs to be accurate, objective, dispassionate, and scientific in its pursuit of truth, rather than merely a past invented to provide cohesiveness and purpose to its inheritors" (p. 199). This reviewer wholeheartedly agrees.

BOOK REVIEWS

WHY? AND OTHER THIRTY-FIVE-YEAR QUESTIONS

Pussycats: Why the Rest Keeps Beating the West and What Can Be Done about It, by Martin van Creveld. Mevasseret Zion, Isr.: DLVC Enterprises, 2016. 249 pages. $11.95.

Martin van Creveld is one of the foremost—and most controversial—contemporary students of warfare. He has authored over two dozen books exploring various facets of strategy, the future of warfare, and military operations and organization, including such works as *The Rise and Decline of the State, The Transformation of War, Technology and War, Command in War, Supplying War,* and *The Training of Officers*.

In this book, van Creveld notes that, despite their overwhelming superiority in virtually every facet of military power, Western militaries since 1953 deployed abroad to fight non-Westerners almost always have been defeated and forced to withdraw. He poses the question, "How did the world's best and most ferocious soldiers, who for centuries fought and defeated anybody and everybody until they dominated the entire world, turn into pussycats?" Van Creveld suggests five broad categories of causes that individually and collectively over time have eroded greatly the basis for *effective* Western military superiority:

- Subduing the young
- Defanging the troops
- Feminizing the forces
- Constructing post-traumatic stress disorder (PTSD)
- Delegitimizing war

The first refers to the ever-growing restrictions most Western countries have placed on young people, ostensibly on grounds of their safety and welfare. The author declares that "the move to impose more and more restrictions on young people is a manifestation, if not to say disease, typical of modern life in general and Western life in particular." The entry into adulthood becomes ever more extended, reinforced by phenomena such as "helicopter parenting," "safe spaces" and "trigger warnings" on campus, and strict limits on work that minors are permitted to do. This is complemented by an excessive emphasis on unearned "self-esteem," a strong desire to avoid "traumatizing" the young by criticizing or reprimanding them, a de-emphasis on assuming individual responsibility, and the devaluation of competition for fear of hurting those who do not perform as well as others. The cumulative effect, van Creveld argues, is to infantilize the young, undercut the

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motivation to excel, and steadily reduce individual and societal willingness to take risks—thus, "scant wonder that a great many young people no longer know how to cope with anything." Yet this is the pool from which Western militaries must draw their troops.

Van Creveld asserts that many factors have contributed to "defanging the troops." He notes the vast increase since Vietnam in the proportion of senior officers in the U.S. military. This rank inflation has resulted in ever more decisions being pushed to higher levels, with a seriously negative impact on the speed of decision making and a mounting risk aversion at all levels. Another problem is the spread of civilian attitudes into and imposition of civilian norms on the military. War is a deadly business, yet Western, especially U.S., military forces have been hobbled by "exquisite" rules of engagement that often impede mission accomplishment at excessive risk to friendly forces. One side cannot play by "Marquess of Queensberry rules" alone. At the same time, there is a growing trend of senior officers "treating their troops as if they were rowdies and/or babies unable to look after themselves, and/or 'pussycats.'" The recurrent bouts of drastic liberty restrictions on U.S. forces in Japan are a prime example. The author writes that "in today's politically correct world it is no longer enough to kill those who would kill you"; the enemy must not be disrespected, let alone humiliated after his defeat—no battlefield souvenirs taken. Male aggressiveness, historically quintessential to battlefield success, is now a problem for leadership to deal with, particularly with regard to matters such as pornography and allegedly rampant sexual misconduct in the military, which have nothing to do with combat effectiveness. The proliferation of military lawyers on staffs means that commanders or squad leaders now must keep potential legal ramifications constantly in mind, on top of all the other battlefield imperatives.

But even worse, posits van Creveld, is the "de-Militarized Military." While it is undeniable that "war is the most terrible of all activities we humans engage in," there always has been a sense of satisfaction, even enjoyment, in it. But "in the prevailing attitude of political correctness [to proclaim that] invites attack." For example, when Marine general Jim Mattis noted that shooting some people who merited it was "a hell of a lot of fun," he was roundly condemned and "counseled" to shut up. Similarly, the notions of "hero" and "heroism" that traditionally underpinned a military's fighting spirit and its "culture of war" have been devalued systematically in Western societies as they pertain to combat, whereas they once were associated closely with pride. But the author warns that "any attempt to tamper with [the culture of war], even if laudable in terms of a progressive country's instincts, is dangerous and should only be undertaken with the greatest caution. What has been demolished can never be restored." Thus, he concludes, "scant wonder that . . . the willingness to serve has been declining for decades."

Van Creveld's third category, "feminizing the forces," is no doubt the most controversial. He starts by stating flatly that "currently Western countries are embarked on a social experiment that has no precedent in history." He further asserts that "whatever feminists may claim and the statute books may say, women and men are only equal in

certain respects but not in others. Hence the attempt to treat them as if they were was bound to cause as many problems as it solved." There are two principal physical differences between the two sexes, namely, physical strength/endurance and pregnancy/motherhood. The author goes into some detail on how these impact individual and unit performance.

More importantly, van Creveld notes that the sustained, intensive effort to create a "unisex" military has had serious second-order consequences. Measures such as putting men and women through separate courses with different physical performance requirements and "gender norming" are inherently suspect from a combat-effectiveness perspective. The problem is that fair treatment implies equality, meaning that unit members essentially must be interchangeable, because "cohesion, the ability to stick together and stay together even when—particularly when—things go disastrously wrong, is the most important quality any military formation must have." Writes van Creveld, "since men and women are *not* identical, treating them as if they were is unfair. But treating them as if they were not is also unfair, though in a different way."

The contribution to a climate of intellectual dishonesty within the U.S. military is a more serious second-order effect. Van Creveld suggests that female service members actually receive preferential treatment, including higher promotion rates and more lenient treatment during disciplinary proceedings, and in connection with pregnancy. What is more dishonest is that "service personnel are prohibited from saying that such privileges exist," or, for that matter, from writing or commenting in any way that might suggest there are problems or challenges associated with full integration of women into all military fields. "The accusation of being 'hostile to women' will follow almost automatically," and being branded as such "can easily bring about the end of one's career." One other form of dishonesty concerns charges of sexual harassment; as one female U.S. pilot told the author, "sexual harassment is what I decide to report to my superiors." Whether that is an accurate reflection of reality or not, it is widely perceived that way among many men in the U.S. military. As a result, van Creveld notes that "to avoid trouble, men, military men more than most, are expected to believe—or at least conceal their disbelief in—two contradictory things. The first is that military women can serve and fight just as well as men can and that they therefore deserve the kind of equality they and their supporters are demanding. The second is that, being equal, they do not enjoy privileges of any kind." These contradictory ideas are "precisely the kind of thing that George Orwell in *1984* called 'double-think.'"

The author concludes this discussion with one final point. "Feminizing the forces and having women take an active part in war and combat threatens to take away one of the most important reasons, sometimes even *the* most important reason, why many men enlist and fight: namely, to prove their masculinity to themselves and to others." The "end of masculinity" as a desideratum for a military force is bound to undermine its "culture of war."

With regard to "constructing PTSD," historically there is little record of it as a widespread phenomenon. Van Creveld suggests that this was in part because war from ancient times had been

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associated with notions of *aretē* (excellence) and *virtus* (prowess), and more recently with "honor" and "pride," all of which helped to forestall or suppress it. But over the last century, "what changed was the way [war] was perceived and understood. From a revelatory experience akin to a religious one, it was turned into a thoroughly rotten business [that] was without either virtue or honor or knowledge of any sort, merely a process whereby obtuse generals sent millions to be slaughtered. . . . As a result, almost anybody who spent enough time fighting was bound to suffer psychological damage." Or so it was claimed.

Western militaries in the world wars came to accept notions of "shell shock" and "combat fatigue." What is notable, however, is that U.S. forces suffered proportionately ten times the rate of such psychiatric casualties as did the German Wehrmacht, which was accepted generally as having displayed far greater cohesion and fighting power than its Western counterparts throughout the second war. Interestingly, postwar East Germany saw far lower rates of such conditions than West Germany, although both were treating the same ex-soldiers. This suggests that "there can be no doubt that social factors—politics, culture, organization, leadership, what have you—do much to determine the way PTSD is treated. The same seems to apply to its frequency and, perhaps, even to its very existence."

Psychiatric cases spiked in Vietnam and PTSD claims remain at high levels. Various causes are postulated: concussion; "the sheer terror of modern war"; guilt feelings from surviving while comrades died; guilt feelings from killing others, especially in close combat. But as van Creveld demonstrates, many of those factors were always present in war, yet did not manifest themselves in large-scale PTSD. In more-recent conflicts, van Creveld notes that there was a far lower incidence of PTSD among North Vietnamese than among U.S. veterans, suggesting that "victory is the best cure for the soul." Nor is defeat linked to widespread PTSD, as evidenced by the German experience in two world wars or, more recently, that of Serbs after the Yugoslav wars—a Serbian attaché informed the author that "PTSD is not a hot topic" in Serbia.

So why is the PTSD rate in the United States so high today? "Is it really war that is generating PTSD? Or is it present-day society's idée fixe that war is bad both in itself and for the soul of those who participate in it, so that over enough time anybody who does so *must* break down," in which case there is no disgrace involved? Van Creveld suggests that the cure may be driving the disease; there may be perverse incentives to overdiagnose PTSD, with the fear of liability at the societal level driving the process. There are large numbers of claims and claimants, and medical specialists, mental health workers, and lawyers all have strong incentives to keep the process going at full speed. Van Creveld poses the difficult question: "Is it conceivable that the compensations and pensions are providing at least some soldiers with an incentive to invent or exaggerate symptoms and retain them for as long as they can?" He concludes by quoting a speech by General Mattis: "I would just say there is one misperception of our veterans and that is they are somehow damaged goods. I don't buy it. If we tell our veterans enough that this

is what is wrong with them they may actually start believing it. While victimhood in America is exalted I don't think our veterans should join those ranks."

Van Creveld then segues to his fifth category, "delegitimizing war," by noting that "to wage war two things are indispensable: armed force and legitimacy." He briefly reviews various notions of legitimacy, including war as civic duty in ancient times, defense of the sovereign power of the state, doctrines such as *jus ad bellum* and *jus in bello,* war as the "school of the nation," and finally the linking of war to Darwinian theories regarding natural selection, survival of the fittest, and nations' "will to live."

The rise of powerful antimilitarist feelings after the world wars deeply eroded the idea of duty to the nation, even while "the language of rights now dominates political debate in the United States." The post-Vietnam shift to an all-volunteer force further diminished the sense of individual obligation to the whole, while military service often came to be seen as being only for those with no better prospects. Van Creveld notes darkly that "where rights reign supreme and duty has become an object of neglect, suspicion, and even derision—as it has in most Western societies—whether, if and when the test comes, they will be sufficient is anybody's guess."

The 1899 and 1907 Hague Conventions initiated the idea that there were, or should be, better ways to settle international disputes than by war. This trend was reinforced strongly after the ruinous world wars by numerous subsequent conventions and treaties and the establishment of the United Nations. In parallel, concepts of "war guilt" and rejections of the national use of force except strictly in self-defense supplanted older notions of "the right of conquest" and have tended increasingly to delegitimize war, at least in the West. Thus, for many Western thinkers, the search for a replacement for war ought to favor nonmilitary alternatives, such as police training teams, mediators, and "dialogs." In van Creveld's view, "both intellectuals and politicians keep promising their audiences security without sacrifice, privilege without responsibility. But what if terrorists/guerrillas/insurgents/freedom fighters refuse to answer empathy with empathy?"

In van Creveld's view, these five trends collectively have deeply undermined Western military effectiveness and societal resilience, aggravated by the inability or unwillingness to examine the underlying causal factors rigorously and honestly. He closes by asserting that the bedrock cause is that "large parts of both European and American societies, each in its own way, have come to see war not simply as an evil that is sometimes made absolutely necessary by circumstances but as the ultimate one that almost nothing can justify. This will have to change. Or else."

Many readers will reject various of the author's arguments as anachronistic or, in any event, "overcome by events," hence not of interest or worthy of further debate or assessment. However, that at least some of them represent significant threats to contemporary policies or agendas is suggested by the ruthless de facto suppression of vigorous debate on sensitive topics by senior officers and top civilian leaders (which invariably leads to self-censorship, particularly among ambitious officers). Such intimidation is pure intellectual thuggery, which in itself

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is a great institutional danger, especially in the military profession, where free thinking, combined with robust debate, is the essential prerequisite for not being outthought and outfought by future foes.

Almost as dangerous as intellectual thuggery is willful ignorance of "unpleasant truths" or empirical evidence. This was illustrated most notoriously by Secretary of the Navy Ray Mabus's recent a priori policy decision, made in the fashion of *Alice in Wonderland*'s Red Queen ("Sentence first, verdict afterwards!"), to open all ground combat positions to women regardless of any data that might result subsequently from the Marine Corps's rigorous yearlong study regarding the performance of mixed-gender units. That sort of thing corrosively undermines the institutional trust essential to the success of any military organization.

Pussycats doubtless is controversial. However, van Creveld's arguments are coherent and intellectually substantive, even if one may disagree with some of the assumptions he makes to support them. Because they explicitly address the most fundamental criterion for assessing military forces—*their combat effectiveness*—they are very worth pondering by serving military officers and civilian policy makers, especially those more senior. Certainly the question of why Western military might, in conjunction with the other elements of state power, has not been more effective during the past half-century is a crucial one, given the multiple dangerous challenges the West confronts both today and over the longer term.

JAN VAN TOL

Assessing China's Naval Power: Technological Innovation, Economic Constraints, and Strategic Implications, by Sarah Kirchberger. Berlin: Springer-Verlag, 2015. 318 pages. $129.

Few recent works on the Chinese navy have arrived with a more intriguing pedigree than this volume. It is unusual to find any in-depth work on the Chinese military being done by European researchers. *Assessing China's Naval Power,* the product of a German academic and released by a respected European publisher, is essentially unique in the field. Further, the author comes at the problem with a diverse résumé, having applied her academic training in East Asian politics as an analyst with the German shipbuilder Blohm + Voss. Despite these selling points, the work fails to deliver an original or compelling view of the fast-changing Chinese People's Liberation Army Navy (PLAN).

Dr. Kirchberger sets out to create an objective and largely materialist yardstick by which to measure Chinese naval development. While dealing briefly with issues of policy and strategy, she notes that matériel "defines the upper limit of what is achievable through naval strategy." As she seeks objective comparisons, Kirchberger uses other Asian and the so-called BRIC (Brazil, Russia, India, China) navies as the benchmark for "normal" naval development. While interesting, this effort to quantify the analysis results in a strained attempt to extract meaning from what is quantifiable from available sources.

As an example, in one vignette Kirchberger compares Asian naval forces with the total areas of the exclusive economic zones (EEZs) their nations

claim. The result suggests that China has an average level of patrol-capable vessels, but that the PLAN submarine force, at one submarine per 35,716.75 square kilometers of EEZ, is comparatively large. It is tempting to critique such an approach on the details: the figure used for China's EEZ is smaller than the scope of its expansive maritime claims; and administration of maritime claims in China is a function of its rapidly growing coast guard and maritime militia (not explicitly included), whereas for many of the other nations analyzed the navy performs law-enforcement functions. More significant is the irrelevance of the figures themselves. By that yardstick, the U.S. Navy (not included in this analysis) defends one of the world's largest EEZs with a paltry one submarine per 210,000 square kilometers of EEZ. Navies are developed for strategic purposes, which vary from case to case.

Additionally, the focus on comparing the PLAN with developing nations' navies ignores the fact that one of the driving combat tasks for the PLAN is countering USN presence in Asia. Taking the U.S. Navy as a yardstick for Chinese naval development matters because it is the yardstick the Chinese themselves have set. That does not mean the PLAN needs or desires to emulate USN force structure in detail, but considering both sides of a two-sided interaction is critical to understanding.

More interesting is Kirchberger's analysis of China's shipbuilding capabilities. Drawing on her experience in the shipbuilding industry, Kirchberger assesses that the Chinese civil shipbuilding industry, though massive, offers few advantages in the production of naval combatants. In the critical maritime electronic sector, the book argues that the European arms embargo and centralized Chinese state control have stymied most meaningful innovation. Chinese combatants are presented as collections of imported and copied systems, with the assumption that the systems-integration problems such a model implies significantly hamper their combat performance. The Chinese decision to purchase the Russian-made *Sovremenny*-class destroyer and Kilo-class submarine in the middle of the previous decade is seen as a tacit admission of systemic deficiencies in Chinese maritime systems development. However, Kirchberger arguably underestimates China's success at both systems integration and adaptation of foreign technologies. For example, China received limited numbers of Russian-manufactured MINERAL ME radars and reverse engineered them with enough success that they now are deployed on every Jiangkai II frigate produced. Kirchberger dismisses these systems as poor copies.

While an earnest effort, at its heart this volume fails on its sources. Dependent on other secondary, primarily English-language, works, it contains few if any references to Chinese-language sources. As the volume was published in 2015, most of these sources are from 2013 and prior. For example, Kirchberger's most consequential conclusions about the PLAN submarine force hinge on a 2007 analysis of PLAN patrol activity during the prior decade. The result is a view of the Chinese navy that arguably is accurate as of about 2010, but that does not account for the rapid changes in the scope and complexity of PLAN platforms, capabilities, and operations in the intervening years.

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Given the relatively small number of academics doing serious analysis of the PLAN, the introduction of a new point of view is always to be welcomed. In this case, however, naval professionals interested in Chinese naval development would be served better by going directly to the sources behind this volume.

DALE C. RIELAGE

Deng Xiaoping's Long War: The Military Conflict between China and Vietnam, 1979–1991, by Xiaoming Zhang. Chapel Hill: Univ. of North Carolina Press, 2015. 296 pages. $34.95 (e-book $33.99).

This book will be welcomed equally by historians, political scientists, and international relations specialists. It is a worthy addition to existing literature and belongs on any bookshelf dedicated to understanding modern China and Southeast Asia. Xiaoming Zhang, an associate professor in the Department of Strategy at the Air War College, has provided valuable additional information and analysis concerning the People's Republic of China's invasion of Vietnam in 1979. The Chinese invasion was planned deliberately and analytically, then for nearly a month the People's Liberation Army (PLA) fought fiercely against China's neighbor and former ally. At the end of this period, the two countries settled into a continuing active and deadly border dispute that lasted a decade. Taking advantage of recently declassified Chinese documents and an impressive number of interviews, Dr. Zhang has advanced significantly our understanding of why the Chinese chose to initiate the somewhat Orwellian-sounding "counterattack in self-defense against Vietnam," how the war was conducted, and why the subsequent conflict along the Vietnamese-Chinese border lasted so long.

As the history of the conflict unfolds, Deng Xiaoping becomes more and more the central figure and key Chinese decision maker. By the conclusion of the book, Dr. Zhang presents a convincing case that the war of 1979 was indeed Deng's war—a war into which he entered as much to preserve and promote his plans for economic modernization as to affect the balance of power in the international political system, while simultaneously aiming to rehabilitate and start the process of modernizing the PLA.

The book explains how the recent North Vietnamese victory over the Americans and the South Vietnamese had a surprisingly deleterious effect on Vietnam's previously amiable and long-term alliance with China. Flushed with victory and boasting a hardened and well-equipped army, the Vietnamese became, to Chinese eyes, increasingly arrogant and unfriendly. Vietnam's invasion of Cambodia and its deepening friendship with the Soviet Union led Deng to see China's position as potentially imperiled, threatened by the USSR to the north and the Vietnamese to the south. In particular, the invasion of Cambodia in December 1978 was viewed as proof of Hanoi's ambition to make Vietnam a hegemonic power in Southeast Asia, and added significantly to Deng's concerns.

Deng, who already had determined that economic and industrial modernization was the way ahead for China, arrived at an apparently counterintuitive conclusion. Significant combat operations conducted against Vietnam, the Soviet Union's most important regional ally, would signal to the United States

and other Western powers that China was a reliable partner that could be counted on to do what was needed. In return, the West would be more likely to continue to support Chinese efforts to modernize, and the perceived Soviet threat would be reduced.

However, as Zhang explains, the Chinese army had not fought a major war in three decades. Its tactics were outdated and its logistics support was inferior, and no officer below the rank of battalion commander was battle tested. Furthermore, the PLA did not enjoy a positive reputation within China's general population. In contrast, the Vietnamese army had decades of recent combat experience, large stores of modern Soviet and captured U.S. military equipment, and the intangible benefits that come with victory.

A massive propaganda campaign to improve the image of the PLA was launched. Significant amounts of military stores were moved into the Guangzhou and Kunming military districts. Army planners prepared for a massive offensive designed to seize several major northern Vietnamese cities and wreck two Vietnamese divisions in the process. The whole campaign was designed to "teach Vietnam a lesson."

Zhang provides a detailed account of the fighting that followed. The Chinese executed their plan successfully, albeit at a much higher cost than anticipated. Zhang debunks common claims by Vietnamese that the majority of their combatants were local militia fighters. While it is true that several elite Vietnamese divisions were engaged in Cambodia, far more regular army units fought in the north than the Vietnamese indicated. The war was almost exclusively a ground war, although both the Vietnamese and Chinese air forces carried out many reconnaissance missions.

After nearly thirty days of fairly hard fighting, Chinese forces withdrew to the border, having achieved their geographic objectives and inflicted significant casualties on enemy forces. The operation had been calibrated skillfully to "punish" Vietnam, without going so far as to bring the Soviets into the fray. Deng then directed the army to continue to fight along the border until the Vietnamese withdrew from Cambodia. It would take a decade—and the visible decline of the Soviet Union—but in the end Vietnamese leaders acquiesced and Deng got what he wanted. During this period Vietnam's economy suffered. China's southernmost provinces also suffered, but the nation reaped the benefits of modernization and Western engagement.

Chinese military leaders deliberately used the ensuing chronic border conflict to "blood" much of their army and local militias. The war also provided new heroes to place in the public eye. However, in one of the more poignant portions of the book, Zhang describes how China's Vietnam experience affected many of the participants in much the same manner as it had their earlier U.S. equivalents. Strategically, the war also saw the Chinese army embrace combined operations and a turn to modernization as a requirement for victory.

Zhang makes a convincing argument that Deng Xiaoping calculatingly used the Chinese military instrument to achieve strategic, domestic, and personal goals. His war was one of deliberate choice. Potential Vietnamese hegemonic ambitions were thwarted; Vietnam would be forced to leave Cambodia. China's ties to the West

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were strengthened; Soviet influence in the region was weakened.

China reaped other benefits, although some were perhaps mixed. Vietnam would—and still does—view China with suspicion. Other countries in the region now know that China did, and could once again, wage offensive war, if seen to be in the interest of the state. The Chinese military, once so abysmally behind technologically, has transformed itself. Combined arms operations, performed haltingly at best in 1979, are now common.

Zhang frequently and conscientiously reminds the reader that, although knowledge of the Sino-Vietnamese conflict has increased greatly, it is important not to embrace any conclusions, even the most apparently convincing, as definitive. This is because some Chinese and all the Vietnamese records have yet to be declassified. The warning is appropriate, but should not detract from Zhang's analysis, nor from a deep appreciation of his work.

RICHARD J. NORTON

OUR REVIEWERS

Richard J. Norton is a professor of national security affairs at the Naval War College. He is a retired naval officer and holds a PhD from the Fletcher School of Law and Diplomacy, Tufts University. His most recent publications include articles in the *Naval War College Review* and *Marine Corps University Journal.*

Dale C. Rielage serves as director for intelligence and information operations for the U.S. Pacific Fleet. He has served as 3rd Fleet N2, 7th Fleet Deputy N2, senior intelligence officer for China at the Office of Naval Intelligence, and director of the Navy Asia-Pacific advisory group. He is the author of *Russian Supply Efforts in America during the First World War*.

Prior to his retirement from the U.S. Navy in 2007, Captain *Jan van Tol* served as special adviser in the office of the vice president. He was a military assistant to the Secretary of Defense's principal adviser for net assessment from 1993 to 1996 and again from 2001 to 2003. At sea, he commanded three warships, two of which, USS *O'Brien* (DD 975) and USS *Essex* (LHD 2), were part of the U.S. Navy's forward-deployed naval forces based in Japan. Captain van Tol's analytic work has focused mainly on long-range strategic planning, naval warfare, military innovation, and war gaming.

REFLECTIONS ON READING

Professor John E. Jackson of the Naval War College is the Program Manager for the Chief of Naval Operations Professional Reading Program.

Chief of Naval Operations Admiral John Richardson is a strong supporter of reading books of consequence as a way for all members of the Navy team to develop as leaders and citizens. He recently said, "I realize that it takes dedication to devote time to reading, but it is fundamental to growth as a naval professional." He has directed his reading program planning team at the Naval War College to expand the Chief of Naval Operations Professional Reading Program (CNO-PRP) to include a larger selection of titles, and to augment the books with other learning tools such as reading guides, videos, and related articles. Final steps toward launching the new program are being taken now, but the general outline of the changes is highlighted below:

- The recommended book titles will be arranged in groups that align with the tenets of the "Design for Maintaining Maritime Superiority"; these are "Strengthening Naval Power at and from the Sea"; "Achieving High-Velocity Learning at Every Level"; "Strengthening Our Navy Team for the Future"; and "Expanding and Strengthening Our Network of Partners." The books also will be cross-referenced and linked to subjects related to the four core attributes of the Navy's professional identity: integrity, accountability, initiative, and toughness.
- Recognizing that the Navy is a war-fighting entity that nonetheless shares some of the characteristics of a large corporate enterprise, the books will be categorized as primarily operational in nature or more corporate in focus.
- The new CNO-PRP will recommend books that form the basis of the Navy's cultural and historical legacy. These dozen books form a canon of fundamental reading that can be of value to all sailors.
- The majority of the books that will comprise the new program fall into broad categories associated with the Design's "lines of effort" and its "core

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attributes." The approximately forty titles in these categories build on the foundation the canon establishes.

- A list of history and fiction books will be identified for consideration, as well as a group of titles of a more casual nature (a sort of informal "Navy book club").
- A final list of titles will identify books that will challenge the conventional wisdom, getting readers to think from different perspectives.

The intent of the various lists and categorizations is to help sailors find books of professional value among the millions in publication at any time. Many of the books identified in the CNO-PRP will be available for free loan from the MWR Digital Library.

The next article in the Reflections on Reading series will discuss specific titles, authors, and subjects of interest. The motto of the new CNO-PRP is "Read, Write, Win!," and we believe that any investment in time spent reading the outstanding books in the program will pay great dividends in enhancing your professionalism.

JOHN E. JACKSON