

**HEARING ON CHINA'S MILITARY REFORMS AND
MODERNIZATION: IMPLICATIONS FOR THE UNITED STATES**

HEARING
BEFORE THE
U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION

**ONE HUNDRED FIFTEENTH CONGRESS
SECOND SESSION**

THURSDAY, FEBRUARY 15, 2018

Printed for use of the
United States-China Economic and Security Review Commission
Available via the World Wide Web: www.uscc.gov



UNITED STATES-CHINA ECONOMIC AND SECURITY REVIEW
COMMISSION

WASHINGTON: 2018

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The Commission’s full charter is available at www.uscc.gov.

March 1, 2018

The Honorable Orrin Hatch
President Pro Tempore of the Senate, Washington, DC 20510
The Honorable Paul Ryan
Speaker of the House of Representatives, Washington, DC 20515

Dear Senator Hatch and Speaker Ryan:

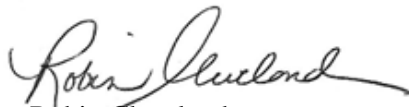
We are pleased to notify you of the Commission's February 15, 2018 public hearing on "China's Military Reforms and Modernization: Implications for the United States." The Floyd D. Spence National Defense Authorization Act for 2001 § 1238, Pub. L. No. 106-398 (as amended by the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015 § 1259b, Pub. L. No. 113-291) provides the basis for this hearing.


At the hearing, the Commissioners received testimony from the following witnesses: Cortez Cooper, Senior International/Defense Researcher, RAND Corporation; John Costello, Cybersecurity Policy Fellow, New America Foundation; Kevin McCauley, Independent Analyst; Ben Lowsen, China Advisor, U.S. Air Force; James Holmes, Ph.D., J.C. Wylie Chair of Maritime Strategy, U.S. Naval War College; Brendan Mulvaney, Ph.D., Director, China Aerospace Studies Institute; Michael S. Chase, Ph.D., Senior Political Scientist, RAND Corporation; Tate Nurkin, Executive Director, Strategic Assessments, Jane's by IHS Markit; Jacqueline N. Deal, Ph.D., President and CEO, Long Term Strategy Group; and Kathleen Hicks, Ph.D., Senior Vice President, Henry A. Kissinger Chair, and Director of the International Security Program, Center for Strategic and International Studies. The hearing provided insight into how China's ongoing military reform efforts and President Xi's vision for achieving the "China Dream" are shaping the People's Liberation Army's long-term defense planning, weapons development, and acquisition programs. The hearing specifically assessed the political and security drivers shaping China's military modernization efforts; the reformed Central Military Commission's role in coordinating modernization priorities with the military services; the development of forces capable of conducting joint operations; and implications for the United States.

We note that the full transcript of the hearing is posted to the Commission's website. The prepared statements and supporting documents submitted by the participants are now posted on the Commission's website at www.uscc.gov. Members and the staff of the Commission are available to provide more detailed briefings. We hope these materials will be helpful to the Congress as it continues its assessment of U.S.-China relations and their impact on U.S. security.

The Commission will examine in greater depth these issues, and the other issues enumerated in its statutory mandate, in its 2018 Annual Report that will be submitted to Congress in November 2018. Should you have any questions regarding this hearing or any other issue related to China, please do not hesitate to have your staff contact our Congressional Liaison, Leslie Tisdale, at 202-624-1496 or ltisdale@uscc.gov.

Sincerely yours,


Robin Cleveland
Chairman


Carolyn Bartholomew
Vice Chairman

cc: Members of Congress and Congressional Staff

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CHINA'S MILITARY REFORMS AND MODERNIZATION: IMPLICATIONS FOR THE UNITED STATES

THURSDAY, FEBRUARY 15, 2018

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION

Washington, DC

The Commission met in Room 285 of the Hall of the States Building, 444 North Capitol Street NW, Washington, DC at 10:00 a.m., Vice Chairman Carolyn Bartholomew and Senator James Talent (Hearing Co-Chairs) presiding.

OPENING STATEMENT OF VICE CHAIRMAN CAROLYN BARTHOLOMEW HEARING CO-CHAIR

VICE CHAIRMAN BARTHOLOMEW: Welcome everybody. I'll note that in our last hearing we had two commissioners on the disabled list. They're with us today, but we have one, our chairman, who got quite ill. So we're down one on our disabled list but welcome to all of our witnesses and to our guests.

Today is the second hearing of the U.S.-China Economic and Security Review Commission's 2018 Annual Report cycle. We're going to focus on China's military reforms and modernization and implications for the United States.

Last year Senator Talent and I co-chaired a hearing on China's advanced weapons, a critical part of enhancing the PLA's offensive capabilities. Today we are focusing on another aspect of China's military modernization: the reform of its forces and its impact on weapons programs.

The Chinese Communist Party believes that a strong military is essential to maintaining its hold on power in an increasingly competitive geostrategic environment.

Since becoming General Secretary of the CCP, Xi Jinping has conveyed his vision for achieving the "China Dream" through the "great rejuvenation of the Chinese nation." President Xi as chairman of the Central Military Commission, China's top military decision-making body, has emphasized that a strong military is necessary to reach this goal.

At the CCP's recent 19th Party Congress, President Xi revised the milestones set out for the military's development strategy. He announced an interim goal for the PLA to achieve modernization by 2035 and modified the long-term objective to become a world-class military by 2049.

China's efforts to reach its military development goals will depend on the PLA's ability to implement its most sweeping reform and reorganization since the 1950s, which began in 2016 and will last through 2020. The reform effort centralizes President Xi's control over the military and seeks to improve the PLA's capability to fight regional conflicts at greater distances from China.

Therefore, to better understand the challenges the U.S. and its allies and partners may face in the Indo-Pacific concerning Chinese military modernization, this hearing will examine Beijing's national-level modernization priorities, drivers behind the modernization, force enablers, and how the PLA is coordinating these priorities from the national level down among the military services.

We look forward to exploring these topics in more detail and hearing the superb lineup of witnesses.

Before I conclude, I'd like to thank the Commission staff, particularly Kris Bergerson and Ethan Meick, for their work in pulling together this hearing and our witnesses for all of the effort they have put into preparing their excellent testimonies.

Let me now turn to my hearing co-chair, Senator Jim Talent, for his opening remarks.

PREPARED STATEMENT OF VICE CHAIRMAN CAROLYN BARTHOLOMEW HEARING CO-CHAIR

Good morning, and welcome to the second hearing of the U.S.-China Economic and Security Review Commission's 2018 Annual Report cycle, China's Military Reforms and Modernization: Implications for the United States. Last year, Senator Talent and I co-chaired a hearing on China's Advanced Weapons, a critical part of enhancing the PLA's offensive capabilities. Today, we are focusing on another aspect of China's military modernization, the reform of its forces and its impact on weapons programs.

The Chinese Communist Party believes that a strong military is essential to maintain its hold on power in an increasingly competitive geostrategic environment. Since becoming general secretary of the CCP, Xi Jinping has conveyed his vision for achieving the "China Dream" through the "great rejuvenation of the Chinese nation." President Xi, as chairman of the Central Military Commission, China's top military decision-making body, has emphasized that a strong military is necessary to reach this goal.

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Let me now turn to my hearing co-chair, Senator James Talent, for his opening remarks.

OPENING STATEMENT OF SENATOR JAMES TALENT HEARING CO-CHAIR

HEARING CO-CHAIR TALENT: Thank you. Good morning. I want to join my colleague in welcoming and thanking the experts who are with us today.

In carrying out the Commission's mandated task of examining China's military capabilities and their implications for the United States, this hearing also seeks to understand the drivers behind China's ongoing military modernization at the service level. Beijing realizes that the PLA continues to lag behind the United States in the areas of military culture and operational effectiveness.

China's military reform effort is intended to address deficiencies at the service and operational levels so Beijing can shrink the military capability gap between the United States and China, build the capability to conduct joint operations for fighting in conflicts along China's periphery, and eventually project force throughout the Indo-Pacific region and beyond.

These modernization requirements are affecting ground, naval, air and missile forces as they pursue their service-level modernization efforts to enable ground operations that are more mobile with rapidly deployable troops, naval and air operations further from China's coast, and long-range precision strike capabilities that could threaten U.S. troops based in Asia and the Pacific.

Ultimately, the objective of China's military modernization plan is to become a world-class military, broaden China's capability to expand its role in international affairs and challenge the military presence of the United States in the Indo-Pacific region.

We seek insights into these developments so the Commission may provide the Congress with recommendations that help the United States maintain peace and stability in the Asia Pacific region.

As a reminder, the testimonies and transcript from today's hearing will be posted on our website at www.uscc.gov. You'll find other resources there as well, including our past hearings, our annual reports to the Congress, and staff reports.

Also, please mark your calendars for the Commission's next hearing, "China, the United States, and Next Generation Connectivity," which will take place on March 8.

And I will defer to my colleague to introduce the first panel.

**PREPARED STATEMENT OF SENATOR JAMES TALENT
HEARING CO-CHAIR**

Good morning. I join my colleague in welcoming and thanking the experts who have joined us here today.

In carrying out the Commission's mandated task of examining China's military activities and their implications for the United States, this hearing also seeks to understand the drivers behind China's ongoing military modernization at the service level. Beijing realizes the PLA continues to lag behind the United States in the areas of military culture and operational effectiveness. China's military reform effort is intended to address deficiencies at the service and operational levels so Beijing can shrink the military capability gap between the United States and China, build the capability to conduct joint operations for fighting in conflicts along China's periphery, and ultimately to project force throughout the Indo-Pacific region and beyond.

These modernization requirements are affecting ground, naval, air, and missile forces as they pursue their service-level modernization efforts to enable ground operations that are more mobile with rapidly deployable troops, naval and air operations further from China's coast, and long-range precision strike capabilities that could threaten U.S. troops based in Asia and the Pacific.

Ultimately, the objective of Chinese military modernization is to become a world-class military by the middle of the 21st century, broaden China's capability to expand its role in international affairs, and challenge U.S. military presence in the Indo-Pacific region.

We seek insights into these developments so the Commission may provide the Congress with recommendations that help the U.S. maintain peace and stability in the Asia Pacific region.

As a reminder, the testimonies and transcript from today's hearing will be posted on our website at www.uscc.gov. You will find other resources there, including our past hearings, Annual Reports to Congress, and staff reports. And please mark your calendars for the Commission's next hearing, "China, the United States, and Next Generation Connectivity," which will take place on March 8.

I will now kick off our first panel by introducing the three experts here to discuss China's military reforms, national-level modernization drivers, and PLA force multipliers.

PANEL I INTRODUCTION BY VICE CHAIRMAN CAROLYN BARTHOLOMEW

VICE CHAIRMAN BARTHOLOMEW: Excellent. Thank you.

So our first panel this morning will examine how the ongoing military reforms are having an impact on China's national-level military modernization priorities, the drivers behind military modernization, and force enablers that may enhance the outcome of military modernization.

Our first panelist we welcome back Mr. Cortez Cooper, a senior international/defense researcher with the RAND Corporation, where he provides assessments of security challenges across the political, military, economic, cultural and informational arenas for a broad range of U.S. government clients.

Before joining RAND, Mr. Cooper was the director of the East Asia Studies Center for Hicks and Associates, served as a senior intelligence analyst in the U.S. Navy, and has 20 years of military service, including as a China Foreign Area Officer.

Mr. Cooper will address the drivers, force planning, and the new Central Military Commission structure concerning China's military modernization efforts and implications they hold for U.S. defense planners.

Following Mr. Cooper will be Mr. John Costello--also a return witness for us--a Cybersecurity Policy Fellow at the New America Foundation and the Executive Director of the China Cyber and Intelligence Studies Institute.

Previously Mr. Costello was a Senior Analyst for Flashpoint and a Congressional Innovation Fellow with the Republican staff of the House Oversight and Government Reform IT Subcommittee, an analyst at Defense Group, and a member of the U.S. Navy and intelligence community.

He most recently co-authored a chapter on Chinese information warfare in the edited volume *China's Evolving Military Strategy*.

Mr. Costello will discuss the drivers behind the creation of the PLA's new Strategic Support Force and how the force may enhance military modernization and enable PLA joint operations.

Mr. Costello will be followed by Mr. Kevin McCauley--a new witness--welcome, Mr. McCauley--an independent analyst who writes on the PLA and Taiwan military affairs. Mr. McCauley served as a senior intelligence officer for the Soviet Union, Russia, China and Taiwan during his 31 years working in the U.S. government. As senior China analyst for the U.S. Army National Ground Intelligence Center, Mr. McCauley served on advisory boards and working groups supporting the U.S. intelligence community, the National Intelligence Council, and U.S. Pacific Command.

Among his recent publications is "PLA System of Systems Operations: Enabling Joint Operations." He will address China's creation of the Joint Logistics Support Force and how the force may enhance PLA joint operations.

We look forward to hearing all of your testimonies. Please keep your opening remarks to seven minutes. I'm sure we'll have many questions.

Mr. Cooper, we'll go ahead and start with you.

OPENING STATEMENT OF CORTEZ COOPER, SENIOR INTERNATIONAL/DEFENSE RESEARCHER, RAND CORPORATION

MR. COOPER: Thanks very much, Vice Chair Bartholomew and thanks also to Senator Talent and the other distinguished members of the Commission. It's an honor to be here with you today.

My testimony will briefly examine three areas related to Chinese military modernization and restructuring. First, I'll examine the key factors driving PRC military force modernization. Second, I'll discuss the objectives and goals for current PLA force restructuring, and finally I'll take a look at implications of PLA restructuring and modernization for the U.S. and allies.

Under Xi Jinping, the Chinese Communist Party in 2016 launched the most extensive restructuring of China's national defense establishment since the 1980s. Xi's principal objective in restructuring is to ensure the absolute loyalty of the PLA to the Party and to Xi personally as the Party's paramount leader.

His organizational and structural changes also address major command, control and operational deficiencies that have plagued the PLA for decades.

Now before discussing this restructuring in more detail, it's important to first examine the drivers for Chinese military modernization. As was the case with his predecessors, Xi's military modernization programs and priorities are based on Communist Party strategic guidelines to the military. The current guideline, revealed in China's 2015 Defense White Paper, directs the PLA to "win informatized local wars" with emphasis on struggle in the maritime domain.

Informatization focuses on the development and employment of an integrated network for rapid information collection, fusion, dissemination and decision in complex campaigns, and the formation of task-based units to conduct joint operations enabled by such a network.

China's leaders develop these strategic guidelines based on perceived threats to PRC national interests given changes to the geostrategic environment and the nature of warfare.

Xi has summarized China's core interests as "national sovereignty, security and development interests." Security generally refers to the maintenance of Communist Party control over the breadth and depth of Chinese territory.

Sovereignty refers to territorial integrity and national unification interests, specifically Taiwan, Tibet, and Xinjiang, but also bearing on maritime sovereignty claims in the East and South China Seas.

Development concerns those interests deemed vital to sustained economic growth.

PRC Defense White Papers include an extensive list of "security threats and challenges" to these interests. Examining threat perception patterns, it's possible to discern Beijing's top priorities for its evolving security strategy and subsequent modernization initiatives.

Taiwan separatism figures prominently. The United States is directly mentioned in a threat context, as the U.S. adjusts its Asia-Pacific strategy to strengthen alliances and expand military presence, and white papers also cite "hegemonism," "power politics," and other indirect references to the U.S. Combined, all these references put the United States above all other listed threats.

Most of China's short- to mid-term defense industrial programs are therefore driven by a requirement for the PLA to address capability gaps should it be called upon to meet any of these perceived threats. The warfighting potential presented by U.S. forces in support of Taiwan is largely behind China's drive to develop an informatized reconnaissance-strike capability to find,

fix and target forces and installations in the region out to hundreds of kilometers from PRC shores and borders.

Turning now to the current restructuring effort itself. Although Xi inherited and is forwarding the logic and direction of modernization, he alone among the post-Tiananmen leaders has overcome bureaucratic hurdles to force the organizational changes needed to realize modernization objectives.

Xi laid the groundwork for current restructuring through his anti-corruption campaign and eradicated alternate power centers by eliminating the four PLA General Departments and streamlining the old seven Military Regions into five new Theater Commands.

With centralization of military authority in his hands, Xi is focusing on revamping combat formations for joint operations. The primary impediment to progress for the PLA on its path to joint operations was the Military Region organizational structure, which was heavily geared to ground force dominance. Replacing that system with five theater commands is a major step toward promoting joint organizations with greater navy and air force leadership.

Assigning responsibility for joint planning and command and control at theater echelon also pushes control closer to the operational space, potentially provides full-time joint planning staffs in strategic directions along China's periphery and beyond PRC land borders and facilitates multi-region campaigns that require subordination of one command to another.

PLA restructuring is very likely to improve joint operational capabilities in the next five to ten years, but sources are unclear about the unit levels at which "jointness" will occur and the specific concepts for force allocation, deconfliction, and lower level command and control.

Progress will largely depend on the PLA continuing to evolve away from large maneuver elements to smaller, more flexible units with more combat and combat support capability at the tactical level. It's a time and resource-intensive endeavor that will consume at least the next decade and probably beyond.

Beyond the restructuring itself, perhaps most important for the PLA to attain joint informatized capabilities will be the marriage of potentially disruptive technologies to military concepts over the next 15 to 20 years: technologies such as quantum computing and communications, hypersonics, artificial intelligence, nanomaterials and biotechnology. Progress in these areas will to a great extent determine the nature of U.S.-PRC military competition over the next three decades.

China likely will achieve a high level of proficiency commensurate with integrated joint operations goals by the mid-2030s or a little beyond. These goals focus on giving the PLA capabilities to contest all domains of conflict--ground, air, sea, space, cyberspace and electromagnetic--throughout the Indo-Pacific region, greatly increasing the risks and costs of U.S. and allied responses to regional contingencies.

U.S. responses to meet these challenges should, on the one hand, maintain or even increase China's perception of the prohibitive risk involved in using force to settle regional disputes or threaten U.S. interests. And, on the other hand, to signal to China that the U.S. and its allies will maintain the edge in applying advanced technologies for military purposes.

In terms of maintaining or increasing PRC risk aversion, the U.S. should consider developing a menu of proportional response options linked to specific levels of Chinese coercion or aggression in the region. My written testimony goes into further detail on some potential options in this area.

The U.S. should also consider increasing the number and scope of bilateral and multilateral training exercises with regional allies and partners to exercise the rapid deployment

of forces to new, austere, dispersed locations near regional hot spots; demonstrate improved capabilities and new operational concepts for sea control and mobile defense of maritime features and lines of communication; and demonstrate capabilities and concepts to provide flexible communications and intelligence to widely dispersed forces in the region.

Congress may also wish to consider prioritizing funding for existing or repurposed systems that have the potential to disrupt Chinese plans, concepts and operations, but are currently insufficient in quantity, such as extended range cruise missiles, mobile integrated air and missile defenses, multi-role unmanned aerial and undersea vehicles, and improved protective measures for high-value platforms and bases.

Finally, to ensure that China doesn't "leapfrog" the U.S. and its allies in future capabilities, Congress may wish to consider defense authorization guidance that calls for a comprehensive assessment of how China defines and prioritizes the utility of specific civil-military technologies; and through appropriations and oversight auspices, consider an integrated government-commercial sector counter-intelligence initiative to mitigate the compromise of U.S. technical and industrial capital.

Thank you for your time and attention and I look forward to your questions.

**PREPARED STATEMENT OF CORTEZ COOPER, SENIOR
INTERNATIONAL/DEFENSE RESEARCHER, RAND CORPORATION**

PLA Military Modernization: Drivers, Force Restructuring, and Implications

Cortez A. Cooper III

CT-488

Testimony presented before the U.S.-China Economic and Security Review Commission on February 15, 2018.



For more information on this publication, visit www.rand.org/pubs/testimonies/CT488.html

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PLA Military Modernization: Drivers, Force Restructuring, and Implications

Testimony of Cortez A. Cooper III¹
The RAND Corporation²

Before the U.S.-China Economic and Security Review Commission

February 15, 2018

Under Xi Jinping, the Chinese Communist Party (CCP) has launched the most extensive restructuring of China's national defense establishment since the reforms of the 1980s under Deng Xiaoping. While Xi's predecessors, Jiang Zemin and Hu Jintao, made significant contributions to People's Liberation Army (PLA) strategy, doctrine, and force modernization, the changes underway since early 2016 are far more ambitious in terms of aligning China's military prowess with its regional and global interests. Xi's principal objective in restructuring is to ensure the absolute loyalty of the PLA to the CCP and to Xi personally as the party's paramount leader. His organizational and structural changes, if successful, also address major command, control, and operational deficiencies that have plagued the PLA for decades.³ Xi sees both objectives as essential to reinforcing CCP control and guiding China's ascendance as a great, global power. Xi refers to this broader grand strategic vision as the "Chinese Dream."

In Xi's explanation, the Chinese Dream is "the goal of completing the building of a wealthy, powerful, democratic, civilized, and harmonious socialist modernized nation" by the 100th anniversary of the People's Republic of China in 2049.⁴ Interim goals to achieving the "dream" are encapsulated in a set of policy objectives to be achieved by 2021 (the centennial of the CCP's

¹ The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

² The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

³ Michael S. Chase, Jeffrey Engstrom, Tai Ming Cheung, Kristen Gunness, Scott Warren Harold, Susan Puska, and Samuel K. Berkowitz, *China's Incomplete Military Transformation: Assessing the Weaknesses of the People's Liberation Army (PLA)*, Santa Monica, Calif.: RAND Corporation, RR-893-USCC, 2015.

⁴ "Xi Jinping Addresses Exhibition on China's Renaissance," *Xinhua*, November 29, 2012. As of January 30, 2018: http://news.xinhuanet.com/politics/2012-11/29/c_113852724.htm.

founding) and 2035, spanning political, military, social, cultural, and economic fields.⁵ To realize these objectives and overcome opposition from powerful vested interests, Xi has consolidated power over the key organs of party, military, and state to guide structural, systemic reforms aimed at improving China's ability to control its domestic population, compete in the global economy, and defend China's expanding array of national interests. Structural reform stood out as the primary focus of the Third Plenum of the 18th CCP Congress in November 2013, and this continues to pervade much of Xi's agenda. With the start of China's 13th Five-Year Program in 2016, Xi set in motion the massive PLA restructuring effort that will define missions and determine capabilities for the Chinese military over the coming decades.

Defense spending patterns and Xi's personal interest in PLA restructuring indicate that the Chinese military will meet many of the modernization goals it seeks to achieve between 2020 and 2049. These goals focus on giving the PLA capabilities to conduct what Chinese military strategists call informatized, integrated joint operations.⁶ By 2035, if not before, the PLA likely will be able to contest all domains of conflict—ground, air, sea, space, cyberspace, and electromagnetic—throughout the Indo-Pacific region, greatly increasing the risks and costs of U.S. and allied responses to regional contingencies.

U.S. responses to PLA modernization should plan to fund and deploy the capabilities to meet these challenges and mitigate future risk to U.S. interests and forces posed by PLA modernization. Such responses should, on the one hand, maintain or even increase China's perception of the prohibitive risk involved in using force to settle regional disputes or threaten U.S. interests, and on the other, signal to China that the United States and its allies will maintain the edge in applying advanced technologies to military purpose. In both areas, U.S. actions will drive Chinese reactions. Congress, in its oversight of the Intelligence Community and the Departments of Defense and State, may wish to stress the importance of assessments that evaluate Chinese responses to counter U.S. and allied security initiatives.

In terms of maintaining or increasing Chinese risk aversion, the United States should consider the following responses:

- Develop a menu of proportional response options linked to various levels of Chinese coercion or aggression in the region. Such options could include increased Freedom of

⁵ “Full Text of 18th Party Congress Report,” *Xinhua*, November 17, 2012. As of December 15, 2017: http://news.xinhuanet.com/english/special/18cpcnc/2012-11/17/c_131981259.htm. The general military milestones include the following:

The first step is to lay a solid foundation by 2010, the second is to make major progress around 2020, and the third is to basically reach the strategic goal of building informatized armed forces and being capable of winning informatized wars by the mid-21st century.

“China's National Defense in 2006,” *Xinhua*, December 29, 2006. As of December 15, 2017: http://www.chinadaily.com.cn/china/2006-12/29/content_771191.htm.

⁶ The U.S. Department of Defense (DoD) describes “informatization” as “conditions in which modern military forces use advanced computer systems, information technology, and communication networks to gain operational advantage over an opponent” and interprets the concept as referring to “high-intensity, information-centric regional military operations of short duration.” See Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China*, Washington D.C.: U.S. Department of Defense, 2011, p. 3. See also Information Office of the State Council, *China's National Defense in 2010*, March 2011.

Navigation Operations (FONOPS) in the South China Sea; semipermanent air, naval, and special operations forces rotations to the Philippines, Singapore, and Australia; exercises or joint patrols with Vietnam; and legal and economic disincentives for unilateral Chinese effort to increase military and paramilitary presence and infrastructure in contested areas.

- Increase the number and/or scope of bilateral and multilateral training exercises with regional allies and partners to rapidly deploy forces to new, austere, dispersed locations near regional hot spots.
- Demonstrate improved capabilities and new operational concepts for sea control operations and mobile defense of maritime features and lines of communication.
- Demonstrate command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities and concepts of operation that provide flexible communications and intelligence to widely dispersed forces in the Indo-Pacific.
- Prioritize funding for existing or repurposed systems that have the potential to disrupt Chinese plans, concepts, and operations but are currently insufficient in quantity, such as extended range cruise missiles, mobile integrated air and missile defenses, multirole unmanned aerial and undersea vehicles, and improved protective measures for high-value platforms and bases.⁷

Although the resource weight that the CCP and Chinese state put behind the development of militarily applicable disruptive technologies is of growing concern, most of the military modernization underway in China corresponds to achieving what the United States has already attained in its networked, precision-strike capabilities. To ensure that China doesn't "leapfrog" the United States and its allies in future capabilities, the United States should:

- clearly signal the intent to lead in any military application of disruptive technologies through DoD innovation programs or other channels
- consider defense authorization guidance that calls for a comprehensive assessment of how China defines and prioritizes the utility of specific civil-military technologies
- through appropriations and oversight auspices, consider building an integrated government-commercial sector counterintelligence effort to mitigate the compromise of U.S. intellectual, technical, and industrial capital.

The remainder of this testimony is organized into four sections. The first section analyzes the drivers of PLA modernization and the current restructuring effort. The second section provides an overview of the consolidation of Xi's power through PLA restructuring. The third section reviews the operational implications of restructuring, and the associated timelines. The final section considers implications and recommendations for the United States.

⁷ For a more complete discussion of potential options and associated costs, see David Ochmanek, Peter A. Wilson, Brenna Allen, John Speed Myers, and Carter C. Price, *U.S. Military Forces and Capabilities for a Dangerous World: Rethinking the U.S. Approach to Force Planning*, Santa Monica, Calif.: RAND Corporation, RR-1782-RC, 2017. In this study, the authors posit that increasing the U.S. defense budget by \$50 billion (to 3.5 percent of GDP) to fund additional systems as noted on this list, would provide significant improvements in U.S. conventional deterrence *vis-a-vis* China, Russia, Iran, and North Korea.

PLA Modernization Drivers: Restructuring to Meet the Threat

As was the case with his predecessors, Xi's military modernization programs and priorities are based on concepts delineated in CCP strategic guidelines to the military. Over the course of the People's Republic of China's history, three iterations of these guidelines represented major new military strategies, and several others represented adjustments to the strategy existing at the time.⁸ The most recent major or new guideline, issued in 1993 and encapsulated by the directive to the PLA to prepare for "winning local wars under high-technology conditions," has been adjusted twice, once in 2004 and again in 2015. The 2004 adjustment directed the PLA to prepare to "win local wars under conditions of informatization," and the current guidance, as revealed in China's 2015 defense white paper, directs the PLA to "win informatized local wars" with emphasis on struggle in the maritime domain.⁹

Chinese military science sources describe key modernization efforts as driven by an "information system-based system-of-systems" approach, akin to U.S. network-centric warfare.¹⁰ The "system-of-systems" and "informatization" approaches have focused on the development and employment of an integrated network for information collection, fusion, dissemination, and command decision in joint campaign operations as well as the formation of task-based organizations to conduct the "integrated joint operations" (IJO) enabled by such a network.¹¹ In addition to the focus on local, informatized war, the latest strategy also highlights the importance of "active defense"—a term that has deep historical roots in Chinese military thought but has evolved to conform to a new security environment and a new era in warfare. Active defense in its current form requires offensive, regional force projection capabilities to defend China's interests beyond her land borders.¹² The 2015 strategy particularly stresses the importance of projecting capabilities in the maritime and informational domains.

China's leaders have developed the strategic guidelines largely based on perceived threats to national interests given changes to the geostrategic environment and the evolving nature of

⁸ M. Taylor Fravel, "China's New Military Strategy: 'Winning Informatized Local Wars,'" *China Brief*, Vol. 15, No. 13, July 2, 2015.

⁹ For the official English translation of the white paper, see "Full Text: China's Military Strategy," *China Daily*, May 26, 2015. As of February 6, 2018: http://www.chinadaily.com.cn/china/2015-05/26/content_20820628.htm.

¹⁰ DoD's 2013 China report describes the system of systems concept as: "This concept requires enhancing systems and weapons with information capabilities and linking geographically dispersed forces and capabilities into an integrated system capable of unified action." Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, Washington, D.C.: U.S. Department of Defense, 2013, p. 12.

¹¹ For a discussion of system of systems operational capability, see Kevin McCauley, "System of Systems Operational Capability: Key Supporting Concepts for Future Joint Operations," *China Brief*, Vol. 12, No. 19, October 5, 2012. China's interpretation of IJO focuses on the development of joint command organizations with integrated command networks to enable rapid combat decision and execution. See the Academy of Military Science's journal, *Zhongguo Junshi Kexue*, Vol. 4, October 2010.

¹² For a discussion of the "active defense" concept, see Timothy R. Heath, Kristen Gunness, and Cortez A. Cooper, *The PLA and China's Rejuvenation: National Security and Military Strategies, Deterrence Concepts, and Combat Capabilities*, Santa Monica, Calif.: RAND Corporation, RR-1402-OSD, 2016, pp. 34–35.

warfare.¹³ PLA force transformation and modernization are therefore inextricably tied to and driven by CCP threat perceptions as promulgated through multiple official channels. These threats were expressed in the Mao, Deng, and early Jiang years via many documents to include military strategic guidelines. From 1998 to the present, China's biennial defense white papers have been a primary conduit for delineation of the threats to Chinese national interests and objectives, both domestic and foreign, for which the PLA must prepare and modernize.

China's national interests revolve around stability of political (i.e., CCP) and social systems, national sovereignty, national security, territorial integrity, national unification, and economic and social development. Chinese leaders often speak of three specific core interests, summarized by Xi during a 2014 meeting with the PLA's delegates to the National People's Congress as "national sovereignty, security, and development interests."¹⁴ Security generally refers to the maintenance of CCP control over the breadth and depth of the Chinese state. Sovereignty refers to territorial integrity and national unification interests, focused specifically on Taiwan, Tibet, and Xinjiang;¹⁵ but also bearing on maritime sovereignty claims in the East and South China Seas.¹⁶ Development concerns those economic and other interests deemed vital to sustained economic growth critical to the nation's development. The 2013 defense white paper points out the increasing importance of protecting resources, trade routes, and citizens overseas.¹⁷ In March 2017, Xi participated in a meeting of the PLA delegation to the National Party Congress, where he and the delegates discussed the importance of protecting China's overseas interests.¹⁸ Authoritative sources also make the same argument with regards to China's interests in new strategic domains, such as space and cyberspace.¹⁹

¹³ Fravel, 2015.

¹⁴ "Xi Jinping Attends PLA Delegation Plenary Meeting" [习近平出席解放军代表团全体会议], *People's Daily* [人民网], March 11, 2014. As of January 30, 2018: <http://lianghui.people.com.cn/2014npc/n/2014/0312/c376707-24609511.html>

¹⁵ Embassy of the People's Republic of China in the United States of America [中华人民共和国驻美利坚合众国大使馆], "MND: Adjustments to Mainland Military Disposition Toward Taiwan Will Depend on the Situation" [国防部：大陆对台湾军事部署是否调整视情况而定], January 20, 2008. As of January 30, 2018: <http://www.china-embassy.org/chn/zgyw/glyw/t709316.htm>

¹⁶ Caitlin Campbell, Ethan Meick, Kimberly Hsu, and Craig Murray, *China's "Core Interests" and the East China Sea*, U.S.-China Economic and Security Review Commission, May 10, 2013. As of December 15, 2017: <https://www.uscc.gov/sites/default/files/Research/China's%20Core%20Interests%20and%20the%20East%20China%20Sea.pdf>. "China's Core Interests Are Not to Be Challenged" [中国核心利益不容挑战], *People's Daily* [人民网], May 25, 2015. As of December 15, 2017: <http://politics.people.com.cn/n/2015/0525/c70731-27053920.html>

¹⁷ Ministry of National Defense of the People's Republic of China [中华人民共和国国防部], *National Defense White Paper: The Diversified Employment of China's Armed Forces* [国防白皮书：中国武装力量的多样化运用], April 16, 2013. As of January 30, 2018: http://www.mod.gov.cn/affair/2013-04/16/content_4442839_3.htm

¹⁸ Wang Shibin [王士彬], "Xi Jinping Attends PLA Delegation Plenary Meeting and Delivers Important Speech" [习近平出席解放军代表团全体会议并发表重要讲话], Ministry of National Defense of the People's Republic of China [中华人民共和国国防部], March 12, 2017. As of December 15, 2017: http://www.mod.gov.cn/leaders/2017-03/12/content_4775317.htm

¹⁹ Xiao Tianliang, ed. [肖天亮主编], *Science of Strategy* [战略学], Beijing: National Defense University Publishing House [国防大学出版社], 2015, p. 2.

The 2013 and 2015 white papers include a fairly extensive list of “security threats and challenges” to China’s interests. These include:

- the U.S. adjusting its Asia-Pacific strategy to strengthen alliances and expand military presence
- a Japanese threat to territorial sovereignty and maritime rights
- Taiwan “separatism”
- natural disasters, security accidents, and public health incidents
- factors affecting social harmony and stability
- increasing risk to China’s overseas investments
- major powers developing more sophisticated space and cyber technologies.²⁰

Through examining threat perception patterns across the defense white papers and other authoritative sources, it is possible to discern Beijing’s “top priorities” for adjustments to strategy and subsequent modernization initiatives. Taiwan separatism figures prominently, and most white papers cite general separatism, including in Tibet and Xinjiang, as a threat. The United States is directly mentioned in a threat context, and every version of the white paper cites “hegemonism” as a threat—an oblique reference to the United States. There are also mentions of “power politics,” “neo-colonialism,” “color revolutions,” and even “neo-gunboat diplomacy” that likely are indirect references to the United States. Combined, all these references put the United States above all other listed threats. All versions also cite advanced military technologies as posing a threat to Chinese national security.

U.S. and Japanese alliance actions in the Asia-Pacific region are grouped as a general threat. Defense white papers and other authoritative sources have mentioned the United States increasing its military presence in the region in conjunction with Japan pursuing remilitarization. In effect, whenever the United States does the former, it emboldens Japan to do the latter.²¹ China’s concern about improvements in military technologies (the Revolution in Military Affairs) also follows this logic. The more technologies improve, the more states will pursue them to gain a strategic advantage over their competitors or to at least avoid losing ground, thereby sparking a possible global arms race and increasing the possibility that local wars will become more disruptive to the global economy.

To be sure, PLA modernization is not always linked to specific threats. CCP leaders from Deng forward have stressed the goal of establishing a strong army in conjunction with creating a wealthy nation. However, this Strong Army Concept and the threat-based logic of PLA modernization are not mutually exclusive and are even interconnected. Official CCP and PLA writings stress the need for a strong army not for its own sake but rather to guard against threats in an increasingly complex security environment and preserve China’s economic gains. The 2015 *China’s Military Strategy* white paper argues that a “Strong Army” is part of the Chinese dream, necessary to protect the nation and deal with a range of threats.²²

²⁰ Ministry of National Defense of the People’s Republic of China, 2013, p. 2.

²¹ Ge Dongsheng [葛东升], *On National Security* [国家安全战略论], Beijing: Military Science Publishing House [军事科学出版社], 2006, pp. 30–39.

²² Ministry of National Defense of the People’s Republic of China, 2013.

PLA doctrine follows from the threat-based strategic guidelines. Operational regulations that likely represent PLA doctrine followed each of the three major guidelines—another set of new regulations was issued following an adjustment to guidelines in the 1970s.²³ The 1993 guidelines drove the development of the fourth and current set of PLA operational regulations, which were issued in 1999 and included campaign guidance documents that for the first time included both service-specific and joint campaigns.²⁴ Although “fifth generation” operational regulations have not been issued, there is evidence that doctrine is in a period of flux and new regulations bearing the mark of Xi’s restructuring goals likely are imminent.²⁵ These regulations will almost certainly stress improved joint capabilities in line with current restructuring efforts.

The path from party strategic guidelines to the formation of doctrine carries forward to defense research, development, and acquisition (RDA), force structure adjustments, training guidance, and development of new capabilities and concepts for deterrence and combat operations. This is particularly in evidence from the issuance of the 1980 guidelines to the present. The trajectory of strategic guidance, operational regulations, force structure changes, and defense programs since 1980 clearly indicate Chinese leaders’ understanding of the fundamental changes to the nature of warfare due to information technology and the “revolution in military affairs.” Party threat perceptions from 1999 to the present indicate a particularly acute sense of vulnerability in the maritime, electro-magnetic, space, and cyberspace domains.

These vulnerabilities appear even more acute considering the potential for China’s forces to come into conflict with the U.S. military in a regional contingency. Most of China’s short- to mid-term defense industrial programs are driven by a CCP requirement for the PLA to address capability gaps faced by the force should it be called upon to defeat a regional adversary with competing sovereignty or territorial claims, and confront U.S. or allied forces responding to such a contingency. The warfighting potential presented by U.S. operational forces in support of Taiwan is largely behind China’s successful drive to extend PLA capacity to find, fix, and target forces and installations in the region to hundreds of kilometers from Chinese shores and borders. A large body of Chinese professional military education materials make clear that China has absorbed lessons learned from U.S. performance in contemporary conflicts and harnessed those insights to shape its development of an informatized reconnaissance-strike capability.²⁶

The full military modernization that the CCP expects by mid-century, if achieved, will be completed because the PLA achieves networked C4ISR and counter-C4ISR capabilities that enable very complex combinations of systems and subsystems to kinetically or nonkinetically defeat or paralyze key points and nodes in enemy operational systems, all within the enemy’s decision cycle.²⁷ Priority programs include but are not limited to:

²³ Elsa B. Kania, “When Will the PLA Finally Update Its Doctrine?,” *The Diplomat*, June 6, 2017.

²⁴ Wang An and Fang Ning, *Textbook on Military Regulations and Ordinances*, Beijing: Military Science Press, 1999, pp. 124–138.

²⁵ Kania, 2017.

²⁶ Michael S. Chase, Cristina L. Garafola, and Nathan Beauchamp-Mustafaga, “Chinese Perceptions of and Responses to Conventional Military Power,” *Asian Security*, 2017, p. 5.

²⁷ McCauley, 2012.

- an integrated air defense systems (IADS) to defend against American airpower over Chinese territory or on its periphery
- large numbers of conventional land attack and antiship ballistic missiles to threaten U.S. land-based aircraft in the region, aircraft carrier operations, and U.S. basing and supply chains
- platforms, such as the new Type 055 cruiser's vertical launching system, to launch cruise missiles in quantities to overwhelm U.S. or allied defenses
- an undersea sensor system and improvements to China's relatively weak antisubmarine warfare capability to detect, track, and degrade U.S. submarines operations off the Chinese coast
- long-range radar, jamming, antisatellite, and cyber capabilities to detect U.S. movements and blind, jam, and/or incapacitate U.S. space and radar systems
- unmanned aerial vehicles and other systems to conduct ISR missions as well as strikes and battle damage assessment.²⁸

Chinese strategists clearly believe that the threat of regional conflict, particularly involving the U.S. and/or Japan, will require a much higher level of interservice integration and survivable, multipurpose command and control (C2) systems and networks than the PLA has ever managed. Closely analyzing PLA campaign literature paints a picture of a force that will use a blend of offensive and defensive concepts to gain information dominance at the outset of conflict, and to use this advantage to conduct long-range precision strikes against a technologically advanced enemy's most valued high-tech weapons systems and supply lines.²⁹

Restructuring Command and Control: Consolidating the Chairman's Power

Since 2014, Chinese media references to the "Central Military Commission [CMC] Chairman Responsibility System" have forcefully driven home the degree to which Xi, as chairman of the CMC, exercises direct control over disciplinary, administrative, and operational activities of the PLA.³⁰ Although Xi inherited and is forwarding the logic and direction of modernization discussed earlier in this paper, he alone among the post-Tiananmen leaders has been able to overcome bureaucratic hurdles to force the organizational changes needed to realize modernization objectives. The first objective is to sustain the absolute loyalty of the PLA to the CCP in the person of the CMC chairman, and the second is to achieve a C2 structure at all levels of the PLA that enables joint operations in informatized local war.

With the reorganization set in motion in early 2016, Xi places the PLA more tightly under

²⁸ For more information on specific systems, please see Eric Heginbotham, Michael Nixon, Forrest E. Morgan, Jacob L. Heim, Jeff Hagen, Sheng Li, Jeffrey Engstrom, Martin C. Libicki, Paul DeLuca, David A. Shlapak, David R. Frelinger, Burgess Laird, Kyle Brady, and Lyle J. Morris, *The U.S.-China Military Scorecard*, Santa Monica, Calif., RAND Corporation, RR-392-AF, 2015, pp. 28–35.

²⁹ Wang Houqing and Zhang Xingye, eds., *On Military Campaigns*, Beijing: National Defense University Press, 2000.

³⁰ See James Mulvenon, "The Yuan Stops Here: Xi Jinping and the 'CMC Chairman Responsibility System,'" *China Leadership Monitor*, No. 47, Summer 2015. As of February 1, 2018: <https://www.hoover.org/publications/china-leadership-monitor/summer-2015-issue-47>

the institutional control of the CCP and makes it more personally obedient to him. Xi laid the groundwork for restructuring in large part via his anticorruption campaign. The anticorruption sweep to date has netted over 50 general officers, including the most senior general officers to have been purged in the last 20 years.³¹ Although undoubtedly aimed at destroying corrupt patron-client links and abuses of privilege associated with control over administrative and resource decisions, the anticorruption campaign has also, at least to this point, given Xi the power needed to clear obstructions to his reorganization goals.

In terms of eradicating alternate power centers to Xi and the CMC, the key changes are the elimination of the four PLA General Departments and streamlining of the seven Military Regions (MRs) into five Theater Commands. The old General Department functions are subsumed by 15 functional organs established directly under a revamped CMC, centralizing C2 in the CMC and its chairman.³² While transitioning the MR system to a more joint Theater Command structure may be primarily oriented to improve interservice operability, it also enhances CCP control. With the change, the PLA services are now principally responsible to the CMC for manning, equipping, and training activities, while the theaters assume operational control of forces under the supreme command of the CMC.³³ Along with the anticorruption drive, having separate entities to manage administrative and operational functions may enable CMC efforts to break up relationships based on bribery and corrupt procurement practices.³⁴ It remains to be seen if the PLA will rotate officers among different theaters to inculcate a joint culture, but such activity would further weaken old patron-client relationships.

Any reform of this magnitude, which also includes a force reduction of 300,000 personnel, entails risk to the reformer. Xi has softened the blow by not only continuing the trend of double-digit defense budget increases, but also through several initiatives to raise both the standard of living of servicemembers and their status in the eyes of Chinese society. He has actively promoted the importance of the PLA through a schedule of visits to PLA units across China that dwarfs those of his predecessors. Presiding over a massive military parade marking the 90th birthday of the PLA this past summer, Xi dressed in camouflage and expressed his pride in the PLA as guarantor of China's security and prosperity—a coming-out party reinforcing both Xi's control and the PLA's priority in party and state resource decisions.³⁵

³¹ Li Xiaoting, "Cronyism and Military Corruption in the Post-Deng Xiaoping Era: Rethinking the Party-Commands-the-Gun Model," *Journal of Contemporary China*, Vol. 25, No. 107, 2017, pp. 696–687.

³² Chien-wen Kou, "Xi Jinping in Command: Solving the Principal-Agent Problem in CCP-PLA Relations?" *China Quarterly*, No. 232, December 2017, p. 7.

³³ See Joel Wuthnow and Phillip C. Sanders, "Chinese Military Reforms in the Age of Xi Jinping: Drivers, Challenges, and Implications," *China Strategic Perspectives 10*, Washington D.C.: National Defense University Press, March 2017, p. 19.

³⁴ Li Shaomin, "Assessment of an Outlook on China's Corruption and Anticorruption Campaigns: Stagnation in the Authoritarian Trap," *Journal of Contemporary China*, Vol. 24, No. 2, 2017, p. 142.

³⁵ Kou, 2017, pp. 8–9.

Restructuring Theaters and Services: Preparing for Integrated Joint Operations

With greater centralization of military authority, Xi desires to make the PLA a more effective and capable fighting force by revamping combat formations for joint, informatized operations. The primary impediment to progress for the PLA on its path to integrated joint operations was the MR organizational structure, which had both operational and administrative obligations and was heavily geared to ground force dominance. On February 1, 2016, the CMC officially replaced the MR system with four Theater Commands responsible for operations in each of the cardinal directions and a fifth responsible for defense of Beijing. The reorganization also established a distinct PLA Army headquarters, granted military service status for the PLA Rocket Force (formerly 2nd Artillery Force), established a Joint Logistics Support Force, and created a Strategic Support Force that consolidates many intelligence, space, cyber and electronic warfare organs and responsibilities. The reorganization is a major step toward reducing the dominance of the ground forces while promoting joint organizations with greater Navy and Air Force leadership and re-engineering logistics and support systems.

While the command lines from Theater headquarters to the separate service units are nascent and somewhat unclear, each theater has a joint operations command center (JOCC) to exercise operational C2 of its forces. The CMC also has a JOCC in its Joint Staff Department to exercise joint C2 at the supreme command level. Assigning responsibility for joint planning and C2 at theater echelon is in part justified by the need to push C2 closer to the operational space, particularly considering the requirement to operate outside the traditional confines of China's borders.³⁶ The Theater Command system, complemented by the establishment of a central PLA JOCC, potentially provides full-time joint planning staffs in strategic directions along its periphery. The PLA also will have the opportunity to achieve more effective C2 to integrate joint C4ISR capabilities and plan for multiregion campaigns that require subordination of one command to another.³⁷

The MR system emphasized “mechanized and semimechanized” warfare with fixed boundaries and armor operations.³⁸ This downplayed air and naval operations and inhibited the development of training and concepts to contend with operations that occur outside the territorial boundaries. By instituting a JOCC at each theater, Beijing has put the structures in place both for managing crises and conflict on the periphery, as well as potentially for overseas deployments over the coming decades. Possibly the most consequential progress from the restructuring will come from the development over time of joint force packages for overseas operations in line with the CMC's expectation of “unprecedented global change.”³⁹

³⁶ “Hu Jintao Urges Army to Perform ‘Historical Mission,’” *People's Daily*, March 14, 2005. As of August 31, 2017: http://en.people.cn/200503/14/eng20050314_176695.html

³⁷ Liu Wei, ed., *Theater Joint Operations Command* [战区联合作战指挥], Beijing, National Defense University Press, 2016.

³⁸ Wei, 2016.

³⁹ “Central Military Commission Opinion on Deepening the Reform of National Defense and the Armed Forces,” *Xinhua*, January 1, 2016. As of August 31, 2017: http://news.xinhuanet.com/mil/2016-01/01/c_1117646695.htm

The C4ISR and the air and naval capabilities needed to support expeditionary operations—i.e., operations thousands of miles from China’s shores—likely remain beyond China’s grasp for at least the next decade. Combined with the structural reforms underway, however, China’s advances in space-based capabilities, drone technology, and information processing could provide sufficient means to provide targeting quality data to deployed Chinese forces anywhere in the world by 2030 or 2035.⁴⁰ China can build on the experience of a near-continuous naval presence in the Gulf of Aden for over a decade. Although China has only just begun to negotiate with foreign governments for the rights and authorities needed for overseas basing and operations, the PLA’s recent establishment of a base in Djibouti could provide an initial basis for deploying forward command staffs, facilities, and even forces.

PLA restructuring is very likely to improve joint operational capabilities in the next five to ten years, but available sources are unclear about the unit levels at which “jointness” will occur and the specific concepts for issues such as force allocation, deconfliction, and lower-level C2. China’s ability to achieve the types of effects and capabilities they have observed in U.S. operations will largely depend on continuing to evolve away from large maneuver elements of the MR system to smaller, more flexible units with more combat and combat support capability at the tactical level. For example, the PLA Army is currently experimenting with battalion-level formations that have artillery, reconnaissance, armor, intelligence, and air defense assets under battalion command. While this is notable progress and represents advances within a service to improve combined arms operations—translating this to “jointness” remains a time- and resource-intensive endeavor that will consume at least the next decade and probably beyond.

In addition to the time it will take to fully restructure national and theater C2, complete joint organizational experimentation and implementation, and establish doctrine and training regulations, the PLA faces the following hurdles to the realization of restructuring goals:

- Adapting to restructuring and reorganization demands will produce some level of turmoil in war mobilization plans and processes.
- Creating a “joint-minded” officer corps remains aspirational for the PLA. The PLA has not established a culture that develops commanders to manage complex joint operations in an information-saturated environment, and the rate of change driven by information technology compounds the problem.
- China’s ground force-centric culture appears to be changing, but revamping thought processes and the professional military education system across the force will be tortuous.
- The CCP’s ubiquitous focus on internal security responsibilities may divert resources from a more outward-looking PLA as economic growth slows.⁴¹

⁴⁰ I base this assessment on activities to date in the Gulf of Aden deployments and the establishment of the Djibouti base; advances in China’s space-based C4ISR architecture; increasing deployments by the PLA Navy beyond the first island chain in the Pacific and into the Indian Ocean; and perhaps most importantly, on the goals for 2035 stated by Xi in his opening speech at the 19th party congress of the CCP. In this speech, Xi expressed that the PLA would be “modernized by 2035,” in keeping with his intent for China to have pioneering global influence between 2035 and 2050. Zhao Lei, “Xi Calls New PLA Branch a Key Pillar,” *China Daily*, August, 30, 2016. As of January 11, 2018: http://www.chinadaily.com.cn/china/2016-08/30/content_26635294.htm

⁴¹ For a discussion of persistent shortfalls that will potentially plague PLA reform efforts, see Chase et al., 2015.

Beyond the restructuring itself, perhaps most important for the PLA to attain joint, informatized capabilities will be the marriage of new and potentially disruptive technologies to military concepts. Historically, China's military scientists are active and productive when CCP leadership provides priority and resources. The priority and resources are available now, and barring a more severe economic downturn than expected, this likely will remain the case for at least the next 15 to 20 years. The PLA's weapons and equipment plan for that period is not openly available, but Chinese science and technology priorities and civil-military integration goals clearly indicate that China intends to achieve military advantage from key technologies such as quantum computing and communications, hypersonics, artificial intelligence, big data applications, cloud computing, 3D printing, nanomaterials, and biotechnology.⁴² Success in these areas will to great extent determine the nature of U.S.-Chinese military competition over the next three decades.

Based on the trajectory of PLA reform and reorganization efforts to date, China likely will achieve a high level of proficiency commensurate with integrated joint operations goals by the mid-2030s or a little beyond—approximately a decade ahead of CCP mid-century objectives. This may render by 2035 (if not before) a PLA that is capable of greatly increasing the risks and costs of U.S. and allied contingency responses throughout the Indo-Pacific region. The PLA in this time frame likely will be able to contest all domains of conflict—ground, air, sea, space, cyberspace, and the electro-magnetic environment.

Implications and Recommendations for the United States

In developing responses to PLA modernization, given both the path of advanced military technologies and major restructuring, U.S. decisionmakers should remember two salient facts. First, China recognizes that major war with the United States would likely be ruinous in terms of China's stated national development objectives. The logic of China's defense policy and security strategy suggests a growing, but still low, tolerance for risk, and China's risk acceptance is to some extent tied to the willingness of the United States and its allies to confront Chinese behavior in hot spots, such as the South and East China Seas. Second, most of the military modernization underway in China corresponds to achieving the types of capabilities the United States has already attained. Many of China's capability development programs are direct responses to U.S. programs and capabilities that have been demonstrated from the first Gulf War to the present. Activities or initiatives to deter China from resolving regional or, in the future, global disagreements through military force should take into consideration these points.

Maintaining or increasing China's risk aversion may be increasingly difficult as PLA military capabilities improve, and some Chinese sources on crisis management and war control indicate that China's risk perception might already be changing in ways detrimental to peaceful resolution of regional disputes.⁴³ The precise nature of this change is difficult to assess, but likely involves Chinese perceptions both of an increase in Chinese strength relative to the United States

⁴² Lei, 2016.

⁴³ See Heath et al., 2016, pp. 17–27.

and its allies and of reduced U.S. willingness to pay the price of extended deterrence in Asia. The strength of our alliances, defense capacity of our allies and partners, and our military presence in the region impacts China's risk analysis. U.S. and allied leaders and planners should develop a menu of relatively proportional response options to various levels of Chinese coercion and aggression in the region, and should clearly exhibit in training and in actual crisis situations below the threshold of open combat the capability and will to confront China.⁴⁴

Such options could include an increase in FONOPS in the South China Sea; semipermanent air, naval, and special operations forces rotations to the Philippines, Singapore, and Australia; exercises or joint patrols with Vietnam; and pursuit of legal and economic disincentives for unilateral Chinese effort to increase military and paramilitary presence and infrastructure in contested areas. While there is escalation risk even in proportional responses, the capacity of the United States and its allies to have and use such options might increase China's perception of risk, complicating Beijing's security calculus. Specifically, U.S. decisionmakers could consider:

- increasing the frequency of bilateral and multilateral training exercises with regional allies and partners to rapidly deploy forces to new, austere, dispersed locations near regional hot spots
- demonstrating improved capabilities and new concepts for sea control operations and mobile defense of maritime features and sea lines of communication
- demonstrating C4ISR capabilities and new concepts of operation in training and exercises to provide flexible communications and intelligence to widely dispersed forces in the Indo-Pacific and highlighting them in media and strategic communications channels.

These same activities and demonstrated U.S. and partner capabilities will also impact the direction of Chinese RDA and capabilities development, particularly in high-technology areas. Adjustments to U.S. force posture in the Asia-Pacific region, better integration with Japanese and South Korean forces, and transformation of Japanese concepts of collective self-defense influence how the PLA invests in its future weapons programs, including hypersonic vehicles and other disruptive technologies. If it chose to do so, Congress, in its oversight of the Departments of Defense and State, and the Intelligence Community may wish to stress the importance of assessing how China responds to counter U.S. and allied security initiatives.

Perhaps most importantly for deterrence is ensuring that the U.S. invests wisely in the systems and capabilities today that can bolster extended conventional deterrence in the Indo-Pacific. This is primarily a matter of funding, not of technology. Congress may wish to consider appropriations for existing or repurposed systems that have the potential to disrupt the Chinese plans, concepts and operations described earlier in this testimony.⁴⁵ China is concerned about a future U.S. "third offset," but there are systems and capabilities at our disposal today that

⁴⁴ The recent stand-off between China and India in the Doklam region of Bhutan is potentially instructive in this regard. India combined back-channel diplomacy with China while its troops confronted PLA forces on the ground to maintain status quo in disputed territory. See Narayani Basu, "Diplomacy in Doklam: New Strategic Ground for India in South Asia," *The Diplomat*, September 2, 2017.

⁴⁵ For a discussion of specific systems, see David Ochmanek, *Recommendations for a Future National Defense Strategy*, Santa Monica, Calif: RAND Corporation, CT-484, November 30, 2017. As of January 30, 2018: <https://www.rand.org/pubs/testimonies/CT484.html>

potentially cause Chinese planners to question their capability to execute the campaigns they have outlined in their doctrinal writings—there are just insufficient quantities of them to accomplish this effect. Additional funding for extended range cruise missile systems, mobile integrated air and missile defenses, multirole unmanned aerial and undersea vehicles, and improved protective measures for high-value platforms and bases would help in this regard.

Regarding China’s ability to attain capabilities learned from U.S. joint operations and advanced weapons programs, it is incumbent upon U.S. leaders to ensure that we maintain technological and operational superiority and prevent China from “leapfrogging” us in networked, precision-strike capability through their “system-of-systems” approach. Whether through “third offset” innovation or other channels, the United States must clearly signal the intent to lead in any military application of potentially disruptive technologies. This will be difficult, given the resource weight that the CCP and the Chinese state put behind the development of artificial intelligence, super-computing, and bio-technology programs, but the United States cannot afford complacency. In this regard, Congress may wish to consider defense authorization guidance to DoD that calls for assessing and evaluating how China defines and prioritizes the utility of specific civil-military technologies, considering their “system-of-systems” approach.

A necessary first step to maintaining U.S. technological superiority is to shore up U.S. counterintelligence and law enforcement efforts that protect U.S. defense and dual-use technologies. Congress, through appropriations and oversight auspices, may wish to focus on building an integrated government-commercial effort to counter the compromise of U.S. intellectual, technical, and industrial capital. This involves, but is not limited to, cyber espionage threats and Chinese strategies to gain competitive advantage via state-sponsored economic initiatives.

U.S. defense planners should assume that China’s restructuring and modernization programs will produce a PLA capable of conducting the informatized, integrated joint operations clearly described in military science sources. Defense spending patterns and Xi’s personal interest in PLA restructuring indicate that the Chinese bureaucracy will see various priority military goals met between 2020 and 2040. The inherent difficulties and even contradictions in and between some of these priorities, however, are daunting. U.S. policymakers and decisionmakers must strive to fund and deploy the capabilities that will hold Chinese “informatized” joint plans and concepts at risk into the future and show the intent to maintain the strength of key alliances and the technological superiority that have underpinned regional stability and prosperity in the Indo-Pacific region for over six decades.

OPENING STATEMENT OF JOHN COSTELLO, CYBERSECURITY POLICY FELLOW, NEW AMERICA FOUNDATION

VICE CHAIRMAN BARTHOLOMEW: Thank you.

Mr. Costello.

MR. COSTELLO: Good morning. I want to say thank you to the U.S.-China Commission for having me back.

I've been following the Strategic Support Force since December 31 when it was created. In the interest of time, I'm going to skip over some of the more in-depth details on its structure. Just suffice it to say that Strategic Support Force is a service-level organization that's split between two co-equal branches: a space corps and a cyber corps. Space corps is responsible for space operations information support. Cyber corps is responsible for information warfare more broadly.

I think estimates on personnel are difficult, but I would put the estimates between 80 and 100,000 personnel within the Strategic Support Force.

As far as like why the Strategic Support Force has been created, its creation comes at an inflection point for the PLA as a whole. I think the relatively authoritative Science of Military Strategy really gives a comprehensive description of China's evolving strategic needs and is a prescient pretext for the creation of the Strategic Support Force. This was in 2013.

And this text bears to be quoted at length:

"Our nation's national interests have surpassed the traditional territorial, territorial sea and territorial airspace scope to continuously expand towards periphery and the world, and continuously extending towards the oceans, space and electromagnetic space.

In the future, great power competition will focus more and more on such contention and control of global public spaces as oceans, poles, space and cyberspace. Under this background, our military must expand its military strategic view and provide strong and powerful strategic support within a greater spatial scope to maintain national interests."

It's under this context that we should view the Strategic Support Force. The SSF demonstrates the evolution of Chinese thought on information as a strategic resource in warfare reflecting the paramount need to harness space, cyber, and the electromagnetic spectrum for military superiority while denying its use to adversaries.

The prevailing Chinese view is that while these domains exist as "international public spaces" in peacetime, conflict produces a zero-sum contest for their control. Their importance is largely owed to their use as the primary conduits by which information is collected, processed, transmitted and received.

The system of systems infrastructure by which information is collected, processed--excuse me. The system of systems infrastructure this enables is viewed by the Chinese military as a cornerstone of modern military operations and a necessary component to fulfill the PLA's ambitions of becoming both an informatized and world-class military.

The SSF can be said to have three primary functions and roles in the Chinese military: information support, information warfare, and force development.

The two interrelated missions of information support and information warfare closely, though not entirely, align with the Force's subordinate space and cyber corps. The integration of information support and information warfare by design advances the PLA's ability to achieve information superiority by having two of its primary components as core missions of the Force.

The military's mandate to modernize and operate further from China's shores drives the Force's information support mission, which, in turn, demands more of its information warfare forces. Placing the two missions together allows this relationship to proceed in lockstep and in balance so that the military's growing reliance on information infrastructure never exceeds its ability to contest or defend the domains that support it.

As China's military modernizes and moves outward however, the asymmetric advantages it has relied upon as a land-based, relatively low-tech power will narrow, and it will increasingly have to contend with high-tech adversaries on more equal terms. This places a priority on force construction and development, fielding advanced capabilities and more technically-proficient cadre that are able to narrow the gap or surpass strategic rivals in offense-oriented technologies.

The fact that the SSF follows the model of the former Second Artillery Corps is a clear indicator that the CMC hopes to apply similar successes it has had with its strategic missiles and nuclear forces to the space and cyber domains and view them as the primary domains of conventional deterrence for the foreseeable future.

As far as joint operations go, joint command is a primary objective of the reforms, and Chinese media specifically emphasize the Strategic Support Force is a supporting measure to enable joint command.

The SSF's role in strategic information support, which is the expansion of China's system of systems into space, cyberspace and electromagnetic space, is the primary way it enables joint operations by providing connective substrate that helps integrate the separate service elements. The Strategic Support Force's ability to provide what they call an "information umbrella" of space-based C4ISR, intelligence support, and battlefield environment assessments helps forge a common intelligence picture among joint forces in theater commands.

According to some PLA commentary, the SSF ensures the centralized management, centralized employment, and centralized development of support resources and acts as an important support for PLA's joint operating system of systems. It should also be noted that purely on an organizational standpoint, the SSF creates, alters the power dynamics across the PLA in a way that is mutually reinforcing with other reforms.

It takes some of the most strategic capabilities, those focused on information, away from the military and places them directly under the Central Military Commission, allowing them to use information to alternatively command, control and empower subordinate forces, including the joint theater commands themselves.

So implications. While China's more immediate and pressing concern is, no doubt, the mastery of and military superiority over its periphery--to include the enduring imperative of Taiwanese reunification--China's expanding national interests forces the Central Military Commission to set for itself a global, if not limited, force as an ultimate objective.

Liu Huaqing's three-phased expansion of the first-island chain, second-island chain, and global maneuver set against Xi Jinping's revised development objectives for the People's Liberation Army are both informative about what observers can expect from Chinese military in the coming decades.

Both argue for regional supremacy by 2030 and a global, world-class reach by mid-century. If the 1990s were about doctrine, the 2000s about development, and the 2010s about organizational realignment, the next stage for China can be defined as "scale." There is little doubt that China is able to field a modern, high-tech force for punctuated limited periods and smaller scale engagements, but it lacks the capacity to do so in a global reach and for sustained periods that its growing interests will require.

Moreover, its own high-tech development is remarkably uneven, a fundamental material deficit that will diminish its ability to scale operations. To paraphrase William Gibson, for China, "The future is already here; it's just not evenly distributed."

How the Central Military Commission diffuses those benefits from the center without sacrificing control is one of the central challenges China faces in military modernization.

The Strategic Support Force offers the Central Military Commission a uniquely powerful instrument in achieving many of these objectives. The CMC's direct control over the Force recalls its administration of the Second Artillery Corps and is likely an attempt to apply that success towards information support and information warfare, a co-dependent pairing on which the integrity of PLA operations regionally and globally increasingly rely.

Scaling its operations means increasing information brace supports, safeguarding the use of the space, cyber, and electromagnetic domains.

Finally, the Force allows the CMC the benefit of technological progress without attendant loss of control. The preponderance of strategic capabilities and technical intelligence under the force's remit allows it to be wielded alternatively to empower or control subordinate joint commands.

In my written testimony, I have a more fulsome description of recommendations. But they generally fall down into two categories: shaping Chinese expansion and maintaining supremacy in cyberspace. I'm running short on time, but I will very succinctly describe those.

There is much the United States can do to shape or counter Chinese expansion and its confidence to project power. Pairing of information support and information warfare within the same force is an overt indicator that China sees its ability to project power as a function of its ability to achieve information dominance quickly.

The need to maintain this balance breeds opportunity for the United States, who can borrow a page from China's asymmetric warfare playbook to employ capabilities that can complicate, raise costs for, and ultimately show and shape Chinese military expansion.

We can do this in two ways. One, investment in electronic warfare. While the U.S. dominance in cyber capabilities and kinetic strike are without question, it lacks a robust offering to bridge the gap between cyber, which can be unreliable, and kinetic strike, which risks escalation.

Electronic warfare, whose effects remain durable and reliable through different stages of conflict, allows the United States a more granular "ratchet" in controlling escalation and conflict short of open warfare.

Second is to achieve a set of effects against the Strategic Support Force itself. Chinese military ability to project power and defend itself strategically almost entirely rests in the SSF. To kick the legs out from under the SSF is to kick the legs out from under the Chinese military.

Maintaining supremacy in cyberspace. I know I'm running short on time so I'll just say this very quickly. The United States--China is in a very critical period. Its military cyber strategy has not changed in 20 years. We've seen no movement or development in how it views cyberspace. I mean the tactics and operations it described in 1999 have largely remained relevant as they are today and convergent.

The question then is now that the military has gotten everything it's asked for, realignment and consolidation and a new interest group for cyber, how is it going to change? How is it going to conceive of a cyber policy and use of force in cyberspace? That breeds a particularly interesting opportunity for the United States. That means in the next ten years China is going to be defining for itself how it will conceive of use of force in cyberspace. That means

that we're entering an incredibly critical period where the United States has the ability through its own actions and reactions to cyber operations to shape Chinese views of the domain, its own vulnerability and insecurity, and its role in international strategic stability.

I look forward to hearing your questions.

**PREPARED STATEMENT JOHN COSTELLO, CYBERSECURITY POLICY FELLOW,
NEW AMERICA FOUNDATION**

China's Strategic Support Force: A Force for a New Era

Testimony to the U.S.-China Economic and Security Review Commission

February 15, 2018

John Costello

Introduction

The Strategic Support Force's creation comes at an inflection point for the PLA as a whole. China has accelerated the ongoing shift of its military posture from land-based territorial defense to extended power projection, not only in the East and South China Seas but also beyond them.¹ As part of this transition, China's leaders have expressed a growing desire to protect their country's interests further afield in the "strategic frontiers" of space, cyberspace, and the far seas.² The relatively authoritative 2013 edition of the *Science of Military Strategy* gives a comprehensive description of China's evolving strategic needs that give a prescient pretext for the creation of the Force. The text bears to be quoted at length [emphasis added]:

*Our nation's national interests have surpassed the traditional territorial, territorial sea, and territorial airspace scope to continuously expand towards the periphery and the world, and continuously extending towards the oceans, space, and electromagnetic space. The risk for great powers fundamentally is competition that revolves around realizing of the maximization of national interests. In the future, this kind of competition will focus more and more on such contention and control of such global public spaces as the ocean, poles, space, and cyberspace, etc. Under this background, our military must expand its military strategic view and provide strong and powerful **strategic support** within a greater spatial scope to maintain national interests.*

The text goes on to say that that "preparations and pre-positioning in fighting for new strategic spaces is both an important brace-support for a country's use of these international public spaces, and also an important action in contesting new military strategic commanding heights."³ China's 2015 Military Strategy White Paper, an even more official document, similarly describes the three as "critical domains" and echoes their importance to China's national interests.⁴ The SSF's design is a logical fit for improving China's access to the space and cyber domains in peacetime and contesting them in wartime.

¹ Chris Sharman, "China Moves Out: Stepping Stones Toward a New Maritime Strategy", *China Strategic Perspectives*, No. 9, Center for the Study of Chinese Military Affairs, Institute for National Strategic Studies, National Defense University Press, April 2015, p. 5

² For an expansive discussion of this concept, see Zhou Bisong [周碧松], *Strategic Frontiers* [战略边疆], National Defense University Press [国防大学出版社], 2016. See also *SMS* (2013 Ed.), p. 73.

³ *SMS* (2013 Ed.), p. 73

⁴ Ministry of National Defense of the People's Republic of China [中华人民共和国国防部], "China's Military Strategy" [中国的军事战略], State Council Information Office [国务院新闻办公室], May 26, 2015, http://www.mod.gov.cn/auth/2015-05/26/content_4586723.htm

The SSF's "remote operations"⁵ in the far seas and beyond are aimed at achieving strategic national objectives through counter-intervention and power projection.

The Strategic Basis of the Strategic Support Force

The SSF demonstrates the evolution of Chinese thought on information as a strategic resource in warfare, reflecting the paramount need to harness space, cyber, and the electromagnetic spectrum for military superiority while denying their use to adversaries. The prevailing Chinese view is that while these domains exist as 'international public spaces' in peacetime, conflict produces a zero-sum contest for their control.⁶ Their importance is largely owed to their use as the primary conduits by which information is collected, processed, transmitted, or received. The 'system of systems' infrastructure this enables is viewed by the Chinese military as a cornerstone of modern military operations, and a necessary component to fulfill the PLA's ambitions of becoming both an informatized and 'world-class' military. After the reforms, the responsibilities for fielding the most critical of these systems, and defending the battlespaces they use at the national level, have been incorporated together under the aegis of the Strategic Support Force. The Strategic Support Force can be said to have three primary missions and functions: information support, information warfare, and force development.

The two interrelated missions of 'information support' and 'information warfare' closely, though not entirely, align with the Force's subordinate space and cyber corps. The integration of information support and information warfare by design advances PLA's ability to achieve information superiority by having two of its primary components as core missions of the Force. The military's mandate to modernize and operate further from China's shores drives the Force's information support mission which, in turn, demands more of its information warfare forces. Placing the two missions together allows this relationship to proceed in lockstep and in balance, so that the military's growing reliance on information infrastructure never exceeds its ability to contest or defend the domains that support it.

As China's military modernizes and moves outward, the asymmetric advantages it has relied on as a land-based, low-tech power will narrow, and it will increasingly have to content high-tech adversaries on more equal terms. This places a priority on force construction and development, fielding advanced capabilities and more technically-proficient cadre that able to narrow the gap or surpass strategic rivals in offense-oriented technologies. The SSF follows the model of the Second Artillery Corps and is a clear indicator that the CMC hopes to apply similar successes it has had in development of strategic missiles, which have become a cornerstone of conventional deterrence, to the space and cyber domains.

Force Organization and Structure

Before the reforms, the rapid advancement of the technical capabilities of Chinese space, cyber, and EW forces stood in stark contrast with the PLA's stagnant operational structure, which remained virtually unchanged throughout the 2000s, despite significant shifts in operational realities. In the years immediately leading up to the PLA's latest reorganization, there has been a growing realization in PLA scholarly circles that the PLA's structure and organization, not its technological capabilities, had emerged

⁵ Zhou Bisong [周碧松], "Strategic Frontiers" [战略边疆], zlzy.81.cn, http://zlzy.81.cn/tb/2016-08/15/content_7231775.htm

⁶ Citation from SMS 2013.

as the foremost roadblock facing PLA modernization efforts.⁷ The key organizations responsible for space, cyber, and electronic warfare missions remained stove-piped, even as the PLA's strategic literature increasingly called for greater integration of these forces as an operational necessity.⁸ It is therefore unsurprising that the PLA saw the current period of major reforms as an opportunity to finally realign its sprawling space, cyber, and electronic warfare capabilities into a unified force.

Administratively, the SSF operates like the former Second Artillery Force (第二炮兵部队, or PLASAF), which was similarly a *budui* (or 'force') that functioned like a service and consolidated strategic capabilities under the direct command of the CMC.⁹ Of its first-level departments, the SSF has a standard four-department administrative structure that includes the SSF Staff Department (参谋部), Equipment Department (装备部),¹⁰ Political Work Department (政治工作部),¹¹ and a Logistics Department (后勤部). Alongside these departments, the Force also maintains headquarters for its space

⁷ Dennis J. Blasko, "The "Two Incompatibles" and PLA Self-Assessments of Military Capability," *China Brief Volume: 13 Issue: 10*, Jamestown Foundation, May 2013, at <https://jamestown.org/program/the-two-incompatibles-and-pla-self-assessments-of-military-capability/>

⁸ *SMS* (2013 Ed.), p. 169

⁹ For a more involved discussion on the status of the Strategic Support Force, see Kevin L. Pollpeter, Michael S. Chase, Eric Heginbotham, *The Creation of the PLA Strategic Support Force and Its Implications for Chinese Military Space Operations*, The Rand Corporation, 2017, p. 21-22

¹⁰ The Strategic Support Force's Equipment Department is listed as a participating organization in the upcoming "2018 Seventh Exhibition on New Technologies and Equipment for Military Logistics" [2018 第七届军事后勤保障新技术与新装备展览会] to be held on June 23, 2018; see <http://www.hui.net/news/special/key/1sim4hc9rsgMu>; A Senior Colonel Xiao Zhiyu (肖志宇) from the SSF Equipment Department was referenced as a speaker and attendee to the "2017 China Civil and Military Dual-use Technology Conference" [2017 中国军民两用技术研讨会] held in conjunction with an opening ceremony for the newly-established Changzhou Military-Civilian Fusion Industrial Park [常州军民融合产业园] on May 21, 2017, see <http://edp.hit.edu.cn/ba/07/c7876a178695/page.htm>

¹¹ "Major General Feng Jianhua Promoted to Director of Strategic Support Force Political Work Department" [冯建华少将升任战略支援部队政治工作部主任], *china.caixin.com*, February 29, 2016, <http://china.caixin.com/2016-02-29/100913753.html>; Feng Jianhua (冯建华) is listed as a 'deputy Military Theater leader-grade' and was subsequently promoted to Lieutenant General in October 2017, see <https://xw.qq.com/cmsid/20171030A0IZEL00>. The Strategic Support Force Political Work Department deputy directors have been listed as Major General Chen Jinrong (陈金荣), see http://www.thepaper.cn/newsDetail_forward_1429068, and Huang Qiusheng (黄秋生), see http://www.thepaper.cn/newsDetail_forward_1749068

and information warfare forces in the Space Systems Department (航天系统部, or SSD)¹² and Network Systems Department (网络系统部, or NSD),¹³ respectively.

Space Corps: This reorganization of China's myriad space capabilities into a coherent, unified space corps is a response to organizational challenges that arose from space forces being dispersed throughout the military. Previously, the PLA was tasked with executing space missions using assets spread across the General Armament Department and General Staff Department.¹⁴ The space corps has now subsumed nearly every aspect of PLA space operations that were formerly controlled by GAD and GSD, including space launch and support, space telemetry, tracking, and control (TT&C), space information support, space attack, and space defense.¹⁵ It is currently unclear what responsibilities, if any, the SSF's space corps has for anti-satellite missile (ASAT) research, development, testing, and operations, nor is it known whether the SSF has a role in the related discipline of ballistic missile defense (BMD). Both missions could presumably fall under the categories of space attack and defense, respectively, which would place them under the Strategic Support Force's remit. Alternatively, these missions may be assigned to the PLA Rocket Force, which already has a role in missile operations, or the PLA Air Force, which have already demonstrated a limited capability in both anti-satellite missiles and ballistic missile defense.

Cyber Corps: The Strategic Support Force's cyber mission has been given to the Network Systems Department (网络系统部, or NSD), a 'deputy theater command leader' grade (副战区级) organization that acts as the headquarters for the SSF's cyber operations forces, sometimes referred to as a 'cyber corps' or 'cyberspace operations forces' (网军 or 网络空间作战部队). Despite its name, the Network Systems Department and its subordinate forces are responsible for information warfare more broadly, with a mission set that includes cyber warfare, electronic warfare, and potentially psychological warfare. At first glance, the Network Systems Department appears to represent a renaming, notional reorganization, and grade promotion of the former GSD Third Department (总参三部, or 3PLA), which appears to have moved in its entirety. Much as the institutions of the former GSD provided the partial

¹² "Strategic Support Force Space Systems Department Test Equipment Materials Purchasing Bureau Medical Equipment Advertisement for Public Open Bid and Tender" [战略支援部队航天系统部试验装备物资采购局医疗设备公开招标采购公告], chinabidding.org.cn, August 25, 2016, http://www.chinabidding.org.cn/PurchaseInfoDetails_pid_1558826.html.

¹³ "Our Board Convened the Eleventh Meeting of our Fifth Board of Directors and the 2017 Military-Industrial Enterprise Salon" [我会召开第五届第十一次理事会议暨 2017 军工企业沙龙], Shenzhen Promotion Association for Small and Medium Enterprises [深圳市中小企业发展促进会], August 31, 2017, <http://www.szsmc.com/cn/dtdetail/81/755.html>

¹⁴ For an excellent analysis of the status of these missions prior to the reforms, see Mark A. Stokes and Dean Cheng, *China's Evolving Space Capabilities: Implications for U.S. Interests*, U.S. China Economic and Security Review Commission, April 26, 2012, p. 4-5

foundation for the creation of the Space Systems Department, they also form the organizational core of the NSD. The Network Systems Department maintains the former Third Department's headquarters, location, and internal bureau-centric structure. In at least one instance, the NSD has been referred to as the "SSF Third Department" (战略支援部队第三部), mirroring its former appellation.¹⁶

Support for Joint Operations

In December 2015, the Central Military Commission restructured the principal responsibilities of the military's main components under a new paradigm encapsulated by the official phrase "CMC leads, theaters fight, and services build" (军委管总, 战区主战, 军种主建), envisioning a division of labor that would see the new theaters focus on operations, the services on force construction, and the CMC on supervising and managing both. This approach resulted in a new dual-command structure with an administrative chain from the Central Military Commission to the services and an operational chain from the Central Military Commission to the five joint-force theater commands. In theory, this would imply the Strategic Support Force's subordinate elements would be under the operational command of the five military theaters. In practice, however, much like the nuclear-armed PLA Rocket Force (解放军火箭军, or PLARF), the SSF's capabilities have been deemed sufficiently strategic that they report directly to the Central Military Commission for operations.¹⁷

The reforms have also substantially altered the command context for joint operations, redefining long-standing organizational relationships and creating new responsibilities across the PLA command bureaucracy. The reforms have created a new Joint Staff Department (JSD), created from the former Army General Staff Department, which holds direct command over traditional Services, Theater Commands, and the Strategic Support Force and Rocket Forces, two services which retain dual responsibilities for 'force construction' and operations. The JSD was based on the former General Staff Department, which had effectively been triple-hatted in the past – serving as a notional joint command headquarters, ground force headquarters, and as administrative headquarters for strategic missions and units. The reforms split these responsibilities apart, forming a new ground force headquarters, establishing the Strategic Support Force from pre-existing space, cyber, and electronic warfare forces, and elevating both the General Staff Department and many but not all of its subordinate organs to the Central Military Commission as the Joint Staff Department. The Joint Staff Department's bureaus oversee various aspects of military command, including operations, intelligence, cyber and electronic warfare, communications, and battlefield environment support.

Joint command is a primary objective of the reforms and Chinese media has specifically emphasized that the Strategic Support Force is intended to help enable joint operations. The SSF's role in strategic information support directly enables joint operations by providing a connective substrate that helps to integrate separate service elements. The Strategic Support Force's ability to provide the 'information

¹⁶ See Guo Rui [郭瑞] and He Xiaoyuan [贺筱媛], "Pretreatment Method for Intelligent Analysis of Battlefield Situational Data" [面向战场态势数据智能分析的预处理方法], *Electronic Technology and Software Engineering* [电子技术与软件工程], Volume 16 (2017); Guo Rui's affiliation is listed as the Fifth Bureau of the Strategic Support Force's Third Department (战略支援部队第三部第五局)

¹⁷ Liu Wei [刘伟], *Military Theater Command Joint Operations Command*, [战区联合作战指挥], pg. 340.

umbrella' of space-based C4ISR, intelligence support, and battlefield environment assessments helps forge a common intelligence picture among joint forces within Theater Commands, a fundamental requirement to fulfill the PLA's mission of winning 'informatized local wars.'¹⁸ According to some PLA commentary, the SSF ensures the "centralized management, centralized employment, and centralized development" of support resources¹⁹ and acts as an 'important support' for the PLA's joint operation 'system of systems' (体系).²⁰ At the time of its establishment, Xi Jinping urged the SSF to "support system of systems integration" (体系融合), technical interoperability, information-sharing, and intelligence fusion among the services.²¹ The deputy director of the SSF's 54th Research Institute, Lü Yueguang (吕越光), goes further and states that "information-dominant system of systems integration" challenges will become the "fundamental requirement for future joint operations."²²

The Strategic Support Force diverges in several crucial respects from its apparent conceptual inspiration, the U.S. Strategic Command. First and foremost, STRATCOM provides strategic C4ISR support to the U.S. Combatant Commands as a joint force construct rather than as a singular service like the Strategic Support Force. As a joint functional combatant command, STRATCOM coordinates among a number of subordinate elements from the Army, Navy, Air Force, and Marine Corps to prosecute its primary missions of nuclear operations, space operations, information warfare, strategic C4ISR support, and ballistic missile defense.²³ The SSF lacks responsibility for nuclear forces (a core mission of the PLA Rocket Force), but has similar missions for information warfare, support to ballistic missile defense, and strategic C4ISR. The decision effectively elevates enabling joint operations as a primary mission and basic function of the Force. For their part, Chinese defense commentators intimate that the difference is an intentional, judging the approach was reached after applying lessons learned from observing foreign

¹⁸ Kevin Pollpeter, Eric Anderson, Jordan Wilson, and Fan Yang, *China Dream, Space Dream: China's Progress in Space Technologies and Implications for the United States*, U.S. China Economic and Security Review Commission, 2017, p. 15

¹⁹ "What Kind of Force is the Strategic Support Force Inspected by Xi Jinping?" [习近平视察的战略支援部队是一支怎样的力量?], CCTV, August 30, 2016, <http://news.cctv.com/2016/08/30/ARTI2Xi1zgynCfj6TYsecOcb160830.shtml>

²⁰ "Xi Jinping: Strive to Establish a Powerful, Modern Strategic Support Force" [习近平：努力建设一支强大的现代化战略支援部队], Xinhua, August 29, 2016, http://news.xinhuanet.com/politics/2016-08/29/c_1119474761.htm

²¹ "Army Leading Organs, Rocket Force, and Strategic Support Force Established," [陆军领导机构火箭军战略支援部队成立], Xinhua, January 1, 2016, http://news.xinhuanet.com/politics/2016-01/01/c_1117646667.htm

²² "New-Quality Weapons Decide Victory on the Future Battlefield" [新质利器决胜未来战场], *China Military Online*, March 11, 2016, http://jz.chinamil.com.cn/zhuanti/content/2016-03/11/content_6954336.htm

²³ "Components," U.S. Strategic Command, 2017, <http://www.stratcom.mil/components/>

militaries, where distribution of strategic support across the different services resulted in redundancies in force development and a counterproductive rivalry for funding and resources.²⁴

Implications and Recommendations

While China's more immediate and pressing concern is, no doubt, mastery of and military superiority of its periphery – to include the enduring imperative of Taiwanese reunification – China's expanding national interests forces the Central Military Commission to set for itself a global, if not limited, force as an ultimate objective. Liu Huaqing's three-phased expansion of first-island chain, second-island chain, and global maneuver set against Xi Jinping's revised development objectives for the People's Liberation Army are both informative about what observers can expect from the Chinese military in the coming decades. Both argue for regional supremacy by roughly 2030 and a global, 'world-class' reach by mid-century. If the 1990's were about doctrine, the 2000's about development, and the 2010's about organizational realignment – the next stage for China can be defined as 'scale'. There is little doubt that China is able to field a modern, high-tech force for punctuated, limited periods, but it lacks the capacity to do so at scale and for sustained periods that its growing interests will require. Moreover, its own high-tech development is remarkably uneven, a fundamental material deficit that will diminish its ability to scale operations. To paraphrase William Gibson, for China, "The future is already here, it's just not evenly distributed." How the Central Military Commission diffuses those benefits from the center without sacrificing its control is one of the central challenges China faces in military modernization.

The Strategic Support Force offers the Central Military Commission a uniquely powerful instrument in achieving many of these objectives. The CMC's direct control over the Force recalls its administration of the Second Artillery Corps, whose own history shows rapid development of missile capabilities in defiance of expectations. The SSF is likely an attempt to apply that success towards information support and information warfare, a co-dependent pairing on which the integrity of the PLA's operations regionally and globally increasingly rely. "Scaling" its operations means increasing information base supports and safeguarding the use of the space, cyber, and electromagnetic domains on which they rely. Finally, the Force allows the CMC the benefit of technological progress without attendant loss of control. The preponderance of strategic capabilities and technical intelligence under the force's remit allows it to be wielded alternatively empowering or controlling subordinate joint commands and services.

Shaping Chinese Expansion

There is much the United States can do to shape or counter Chinese expansion and confidence in its ability to project power. The pairing of information support and information warfare within the same force is an overt indicator that China sees its ability to project power as a function of its ability to achieve information dominance quickly. It also means that skepticism about China's ability to achieve information dominance or safeguard its use of information spaces may restrain its extended expansion of and buildout of scale and more robust information support systems. This in turn may constrain PLA operations, or at least raise doubts about freedom of movement and viability of sustained operations. The need to maintain balance breed opportunity for the United States, who can borrow a page from the

²⁴ http://www.qsttheory.cn/laigao/2016-09/29/c_1119646359.htm

Chinese ‘asymmetric warfare’ playbook to employ capabilities that may complicate, raise costs for, and ultimately slow and shape China’s military expansion. The United States can do two things:

- **Invest in Electronic Warfare:** While China’s development of electronic warfare capabilities can only be offset by changes to U.S. C4ISR systems, holding China’s use of the electromagnetic spectrum at risk is still key in raising costs of potential aggression. As China expands outward, its military too becomes subject to many of the inherent vulnerabilities it has long intended to exploit in against the United States, including a dependent on Space, cyber, and the spectrum. While the U.S. dominance in cyber capabilities and kinetic strike are without question, it lacks a robust offering to bridge the gap between cyber, which can be unreliable, and kinetic strike, which risks escalation. Cyber effects have high opportunity costs, biasing considerations against their use any use short of conflict. Electronic warfare, whose effects remain durable and reliable through different stages of conflict, allows the United States a more granular ‘ratchet’ in controlling escalation and conflict short of open warfare.
- **The Strategic Support Force as a Priority Cyber Target:** The preponderance of strategic capabilities in the Strategic Support Force means that it is perhaps the critical enabling factor in China achieving military objectives in conflict, whether the scenario is counterintervention (also known as A2/AD), Taiwan invasion, or border/maritime disputes. The SSF enables long-range precision strike, domain surveillance, reconnaissance and targeting for support, and wields asymmetric capabilities in space, cyber, and electronic warfare to coerce and compel adversaries. Degrading or denying the SSF’s ability to perform these missions will take the legs out from under China’s military operations. U.S. Cyber Command needs to focus on developing a set of cyber effects that can decapitate or dismantle the Strategic Support Force, a centerpiece in China’s ‘system of systems’. However, it is worth noting that lacking a dedicated C4ISR system of its own, China’s nuclear forces are wholly dependent on the SSF for reconnaissance, targeting, guidance, and support; thus any targeting of the SSF may be taken as an overt attempt to deny China’s ability to defend itself against and employ nuclear weapons.

Maintaining Supremacy in Cyberspace

The United States faces a broad set of challenges with regards to China in cyberspace. Though the overall instances of Chinese hacking U.S. companies for intellectual property theft have decreased, Chinese cyber operations have largely continued unfettered, shifting objectives and finding new divisions of labor among China’s various intelligence organizations. In particular, the ‘economic espionage’ mission has largely shifted to the Ministry of State Security, leaving the People’s Liberation Army to refocus on its primary responsibilities for military espionage and cyber offense. The Strategic Support Force is the primary organization responsible for this mission, though it shares it with regional and service-level bureaus and units. The expanded force-wide cyber mission is overseen by a newly-established ‘Network-Electronic Bureau’, a new incarnation of the former 4PLA. We can expect that Chinese forces will be more disciplined, employ common tools, tactics, techniques, and procedures – which hampers attribution, and be more focused on fulfilling wartime military preparations.

The creation of the Strategic Support Force puts into place the last piece of China’s efforts to control and shape its information security environment, a comprehensive whole-of-nation program that approaches something of a grand strategy. As the SSF works to bridge the gap between China’s military capabilities

and those of the United States, its civilian agencies are undergoing a multi-year effort control information flows, physical devices, software, and internet services in the country. This is an effort to increase China's resilience and vulnerability to hostile cyber attack and politically-motivated information manipulation. The U.S. risks being asymmetrically vulnerable if Chinese attempts to develop offensive capabilities are not properly shaped or are not met with an equivalent U.S. response to shore up its own cyber resilience. The United States should focus on two efforts:

- **The U.S. Can Shape Chinese Cyber Operations:** The United States needs to start viewing its use of cyber operations – and how it responds to hostile cyber actions - largely in the context of how it may shape China's cyber policy and use of force in the domain. Despite having an identified military strategy since 1999, China's cyber forces have never truly been in a position to operationalize it, largely focused on development, impeded by bureaucratic divisions, or waylaid by an errant focus on economic espionage. The SSF effects a realignment that places the burden of developing a cohesive cyber deterrence concept and use of force policy back in the hands of national policymakers. It is likely China has not come to hard conclusions on these issues and, given the diversity and volume of current and former military voices arguing for different policy positions, we can expect that there is considerable disagreement about which course of action would be most beneficial to Chinese interests. This means that the next 10 years, the period where these policies will be formed, are particularly critical. U.S. action, and reaction, has the power to strengthen or diminish policy voices in China, set precedent, and international norms that China can thereafter abide by or exploit. The United States needs to recognize that it holds the power to shape its future potential adversary in this domain and decide how to proceed in a manner that maintains international strategic stability and preserves U.S. interests.
- **The U.S. Must Resist the “Fetish of the Offense” in Cyber Operations:** The United States needs to shift its focus towards systemic resilience and cybersecurity. Unless the United States advances the ability for both government and commercial enterprises to secure their own systems, the United States will be increasingly vulnerable in an environment where nation-states and non-state actors alike are rapidly catching up in offensive capabilities. Investment in cyber offense is not going to mitigate or protect us from these glaring vulnerabilities. ‘Cyber deterrence’ while conceptually useful in envisioning raising costs for conventional military operations, does not possess the reliability, demonstrability, or scale of threat inherent in nuclear weapons that would deter military operations in their entirety – nor does it negate an adversary's ability to engage in cyber operations to respond in kind. Unlike nuclear and conventional operations, offense and defense are separate battlefields – it is unlikely we will be able to use cost calculus in one to affect the other outside of the military realm. The best deterrent in this regard is emphasis on information sharing and cybersecurity, which increases costs for attackers and confounds ability for adversaries to develop effects that can deliver decisive military or strategic advantage for any given point in time. This places ‘cyber readiness’ for an adversary on shifting sands, subject to continuous compromises and denial, and disincentivizes cyber operations as a viable military course of action.

Note: This testimony was adapted from a forthcoming monograph on the Strategic Support Force to be published by National Defense University, written by John Costello and Joe McReynolds.

OPENING STATEMENT OF KEVIN MCCAULEY, INDEPENDENT ANALYST

VICE CHAIRMAN BARTHOLOMEW: Thank you.

Mr. McCauley, welcome.

MR. MCCAULEY: Yes. Thank you. I too would like to thank the Commission for inviting me here.

It's an honor to be here to speak on the PLA's joint logistics system and the Joint Logistic Support Force. I'll cover some of the key judgments of my analysis and research on joint logistics.

The People's Liberation Army considers joint logistics an important foundation for its emerging integrated joint operations capability.

An integrated C4ISR system provides the foundation for the joint logistics support network.

In 2004, the PLA began a series of joint operations, experimental exercises, including joint logistics, in the former Jinan Military Region. This led to the establishment of a joint logistics system in the Jinan theater in 2007 and finally to the implementation of force-wide logistics reforms under President Xi that are currently being undertaken, and the current reforms are scheduled for completion by the end of 2020.

In late 2015 and early 2016, President Xi consolidated all military elements under the Central Military Commission, including the establishment of a Logistic Support Department with macro-management responsibilities. Basically what the PLA talks about is sort of top-down management.

A Joint Logistic Support Force, JLSF, was established in September 2016 to unify joint logistics forces at the strategic level and also support the five new joint theater commands at the campaign level.

The JLSF is key to building a modern logistics support system and critical for implementing integrated joint operations, supporting joint training, and providing strategic and campaign joint logistics.

Joint logistics modernization emphasizes the incorporation of information technologies, the use of logistics networks and databases, and systems to monitor supply levels and unit requirements to provide logistics just in time and at just the right place. The PLA's ultimate objective is to achieve a precision logistics support capability to meet the requirements of a dynamic and fluid battlespace.

Civil-military integration is a key component of logistics support leveraging the civilian economy and industry. The JLSF is responsible for civil-military integration related to logistics requirements and wartime mobilization. This includes outsourcing of logistics and promoting research and development of dual-use technologies. The intent is to maximize the efficient use of military and civilian resources.

The PLA's association with civilian businesses is bringing modern business practices, such as modern inventory control and delivery methods, into the joint logistics system as a precision logistics capability emerges. And just recently the PLA teamed up with a private company to start using drones or UAVs to deliver logistic support to widespread units in complex terrain.

The widespread use of civilian infrastructure, resources, and transportation by the PLA during a conflict could make identification of military forces and targeting during a conflict difficult for an opponent.

Wartime logistics mobilization includes manpower, financial, material, facility and equipment mobilization. Mobilization includes military resources and reserve forces as well as the requisitioning from the civilian sector. China also maintains strategic reserves of critical raw materials.

Corruption has been a major problem affecting PLA logistics. If corruption is not at least curbed, it could adversely impact logistics modernization and eventually combat operations for the PLA.

China's growing economic strength and overseas strategic interests and commitments, such as the Belt and Road Initiative and peacekeeping operations, are providing impetus for the PLA's development of strategic delivery capabilities and overseas bases.

The PLA considers a strategic delivery capability as a strategic deterrent, an important factor in determining the outcome of a war, an important requirement enabling overseas logistic support and joint operations, and an important means for gaining global influence.

While the PLA's force projection capabilities are currently limited, they will continue to grow in the future as the force acquires larger and more capable transport aircraft, helicopters, amphibious warfare and comprehensive support ships. The PLA can also mobilize civilian transportation for support.

A joint logistics system is likely to be largely functional by the end of 2020 or soon thereafter, with refinements, adjustments and modernization continuing after that point.

Currently China has engaged in supporting non-war missions overseas, including peacekeeping and anti-piracy missions, and evacuation of citizens from danger. This can provide positive areas of engagement with the PLA.

The threat to U.S. and allied interests globally will likely increase in the future, as the PLA's joint logistics, strategic delivery, and integrated joint operations capabilities and experience increase both quantitatively and qualitatively, combined with Beijing's more aggressive strategy.

And I have recommendations at the end of my paper that I've delivered. I won't go into them in detail here. A number of them have to do with research areas in regards to joint logistics, which I don't think there's a lot of current analysis conducted on, and I'll be happy to entertain any questions.

PREPARED STATEMENT OF KEVIN MCCAULEY, INDEPENDENT ANALYST

15 February 2018
Kevin McCauley
Independent Analyst

Testimony before the U.S.-China Economic and Security Review Commission

“China’s Military Reforms and Modernization: Implications for the United States.”

Modernization of PLA Logistics: Joint Logistic Support Force



Joint Logistic Support Force Emblem

Key Judgments

- The People’s Liberation Army (PLA) considers joint logistics an important foundation for its emerging integrated joint operations capability.
- An integrated C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) system provides the foundation for a joint logistics support network.
- In 2004, the PLA began a series of joint operations experimental exercises, including joint logistics, in the former Jinan Military Region (MR). This led to the establishment of a joint logistics system in the Jinan Theater in 2007, and finally to the implementation of

force-wide joint logistics reforms under President Xi Jinping. The current reforms are scheduled for completion by the end of 2020.

- In late 2015 and early 2016, President Xi consolidated all military elements under the Central Military Commission (CMC), including the establishment of a Logistic Support Department with macro-management responsibilities.
- A Joint Logistic Support Force (JLSF)¹ was established in September 2016 to unify joint logistics forces at the strategic level and support the five new joint theater commands.
- The JLSF is key to building a modern logistics support system, and critical for implementing integrated joint operations, supporting joint training, and providing strategic and campaign joint logistics.
- Joint logistics modernization emphasizes incorporation of information technologies, the use of logistics networks and databases, and systems to monitor supply levels and unit requirements. The PLA's ultimate objective is to achieve a precision logistics support capability to meet the requirements of a dynamic, fluid battlespace.
- Civil-military integration² is a key component of logistics support leveraging the civilian economy and industry. The JLSF is responsible for civil-military integration related to logistics requirements. This includes outsourcing of logistics and promoting research and development of dual-use technologies. The intent is to maximize the efficient use of military and civilian resources.
- The PLA's association with civilian businesses is bringing modern business practices, such as modern inventory control and delivery methods, into the joint logistics system as a precision logistics capability emerges.
- The widespread use of civilian infrastructure, resources and transportation by the PLA during a conflict could make identification of military forces and targeting during a conflict difficult for an opponent.
- Wartime logistics mobilization includes manpower, financial, material, facility and equipment mobilization. Mobilization includes military resources and reserve forces as well as requisitioning from the civilian sector. China also maintains strategic reserves of critical raw materials.
- Corruption has been a major problem affecting PLA logistics. If corruption is not at least curbed, it could adversely impact logistics modernization and combat operations.

¹ The PLA uses "logistic" in the titles of the CMC Logistic Support Department and the Joint Logistic Support Force, but the more conventional "logistics" elsewhere.

² The PLA uses the term civil-military integration rather than civil-military fusion.

- China’s growing economic strength, and overseas strategic interests and commitments, such as the Belt and Road Initiative and peacekeeping operations, are providing impetus for the PLA’s development of strategic delivery capabilities and overseas bases.
- The PLA considers a strategic delivery capability as a strategic deterrent; an important factor in determining the outcome of a war; an important requirement enabling overseas joint logistics and joint operations; and an important means for gaining global influence.
- While the PLA’s force projection capabilities are currently limited, they will continue to grow in the future as the force acquires larger and more capable transport aircraft, helicopters, amphibious warfare and comprehensive support ships. The PLA can also mobilize civilian transportation.
- A joint logistics system is likely to be largely functional by the end of 2020 or soon thereafter, with refinements, adjustments and modernization continuing.
- Currently China is engaged in supporting non-war missions overseas including peacekeeping and anti-piracy missions, and evacuation of citizens from danger. This can provide positive areas of engagement with the PLA.
- The threat to US and allied interests globally could increase in the future, as the PLA’s joint logistics, strategic delivery and integrated joint operations capabilities and experience increase quantitatively and qualitatively, combined with Beijing’s more aggressive strategy.

Background on Joint Logistics

Joint Operations Evolution

The PLA intensively focused military science research into joint operations and the Revolution in Military Affairs based on information technologies (informationization – 信息化) following Operation DESERT STORM in 1991. The PLA actively analyzes foreign military operations for lessons learned. After the turn of the century, PLA academics began to transition their analysis to integrated joint operations (一体化联合作战) considered a more advanced form of joint operations. By 2005 the PLA was directed to focus research on developing an information system-based system of systems operational capability (基于信息系统的体系作战能力) as the foundation for implementing integrated joint operations. System of systems operations is the integration of C4ISR, modular task organized force groupings, weapons and equipment into a seamless entity where the sum is greater than the parts; expressed by the PLA as $1 + 1 > 2$. Modularity provides a “plug and play” capability to optimize force groupings based on operational requirements.³

³ Kevin McCauley, [PLA System of Systems Operations: Enabling Joint Operations](#), (Washington, DC: The Jamestown Foundation, 2017), pp. 5 -12

Joint Logistics

Joint logistics is an important operational element for implementing joint operations. The PLA considers logistics support difficult in future wars featuring a multi-dimensional and expansive battlespace with fast paced, dynamic operations, as well as high consumption and destruction rates. Precision logistics support (后勤精确保障) is the objective of logistics modernization. It is considered the basic method of support responding to these complex requirements, improving overall efficiency, and reducing duplication and waste of resources. Precision logistics uses the minimum resources to meet requirements at the precise time and place – a military version of the business concept of “just-in-time” logistics. The intent is to integrate joint logistics assets at the strategic, campaign and tactical levels, as well as leveraging civilian logistics. System of systems operational capability with an integrated C4ISR system (for the PLA, the command information system 指挥信息系统) is required to build an integrated support network. This support network provides unified command and control, and analysis and forecasting of logistics requirements for timely and accurate distribution of resources. The fielding of Beidou Satellite Navigation System terminals throughout the PLA is particularly important for logistics units providing critical supplies to dispersed units on the battlefield.⁴

Joint Logistics Experimentation

The former Jinan MR began a theater joint logistics experiment in 2004. This coincided with joint operations experimentation in the areas of command, coordination, and task organized joint force groupings by the Jinan MR. In 2007 a joint logistics structure was established in the Jinan Theater. This experimentation and establishment of a joint logistics system provided experience leading to the reorganization of joint logistics under President Xi Jinping.⁵

Organization Reforms

PLA academics identified the need for a streamlined organization with fewer command levels over a decade ago. The current military reform efforts finally implemented a flatter command structure, consolidating all military forces under the CMC in a three-level command structure: CMC – Theaters – Forces. The new CMC departments are intended to provide strategic planning, macro management of subordinate forces, standardization, research and formulation of major policies to support ongoing reform and restructuring efforts. The CMC Logistic Support Department (后勤保障部 - LSD) formed from the former General Logistics Department, coordinates military-civilian development strategy related to strategic reserves; the economy and industry; scientific and technological research; rail, road, air and maritime transportation integration of military requirements; as well as improving logistics reserve forces. Research projects conducted in 2017 included cloud and software design supporting logistics, military energy, medicine, and strategic delivery to improve combat effectiveness. Additional responsibilities include ensuring high professional, specialized and technical skill levels for logistics personnel.⁶

⁴ Kevin McCauley, [PLA System of Systems Operations: Enabling Joint Operations](#), (Washington, DC: The Jamestown Foundation, 2017)

⁵ [CCTV](#), July 31, 2017

⁶ [Chinamil.com.cn](#), September 13, 2016; [PLA Daily](#), June 12, 2017; [PLA Daily](#), April 27, 2016; [MOD](#), January 12, 2016

Corruption has been a major problem effecting PLA logistics in the past. Many of the officers accused of corruption have been logistics officers. The effectiveness of President Xi's anti-corruption campaign is unclear, although it has likely curbed corruption. The embezzlement of funds intended for purchasing supplies, logistics equipment and maintaining stocks in depots could adversely impact PLA operations in a conflict if it were to continue.⁷

This consolidation of centralized control over all military forces by President Xi Jinping and the CMC is in part an attempt to correct past modernization implementation problems. In the past high-level general guidance would be issued, with implementation left to lower echelons. This led to a great variance in implementation within the force obstructing standardization and integration. The PLA is now emphasizing high-level direction to enforce standardization and uniformity during the military modernization process. If successful, this will lead to improvements throughout the force, including logistics.⁸

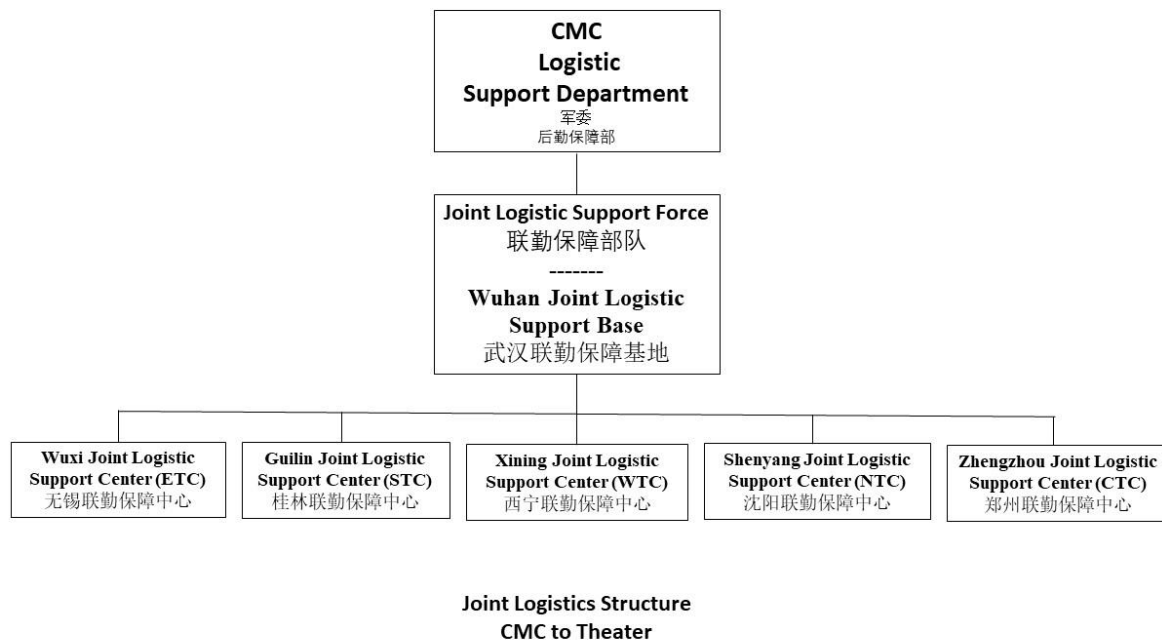
The Joint Logistic Support Force (联勤保障部队) was established September 13, 2016 as part of the CMC. The JLSF is responsible for accelerating the construction of the joint logistics system and forces. The Wuhan Joint Logistic Support Base (武汉联勤保障基地) is essentially the JLSF headquarters with five Joint Logistic Support Centers (联勤保障中心), one supporting each theater command (TC) as shown in the figure below. The five centers are staffed by personnel from the services⁹ (Army, Navy, Air Force and Rocket Force), and provide joint logistics support within their respective theaters and to forces transiting their region during multi-regional exercises or operations. The Wuhan base and five centers are composed of multiple units, ammunition depots, warehouses, fuel depots, hospitals and underground facilities spread over a wide geographic area.¹⁰

⁷ Kevin McCauley, President Xi Clears the Way for Military Reform, [China Brief](#), February 4, 2015

⁸ Kevin McCauley, [PLA System of Systems Operations: Enabling Joint Operations](#), (Washington, DC: The Jamestown Foundation, 2017)

⁹ Although currently the leadership appears to be Army officers.

¹⁰ [Chinamil.com.cn](#), September 13, 2016, [Xinhua](#), December 16, 2016; [China Youth Daily](#), January 19, 2017



The PLA considers the establishment of a joint logistics system as critical for success in achieving an integrated joint operations capability, supporting joint training, and providing joint support. President Xi Jinping stated that the JLSF is a strategic measure to deepen military reform and build a modern logistics support structure providing strategic and campaign support. The logistic base and centers form a modern joint logistics system integrating logistics units and capabilities,

providing centralized and decentralized support as required, as well as developing joint logistics tactics, research and experimentation. Joint logistics provides the main support, supplemented by the services in a unified structure with a division of responsibilities for general and specialized support capabilities.¹¹

PLA modernization identified the need to develop and strengthen large logistics support centers embedded with information technologies to improve efficiency and timeliness. These centers are intended to rapidly respond to emergency situations requiring large-scale logistics support. Reliance on military or civilian ground, air and sea delivery capabilities are important for effective logistics support within China or abroad. Logistics personnel from the five centers are sent to the theater commands to better understand operational missions and requirements to develop logistics support plans and support theater joint exercises. The Wuhan Joint Logistic Support Base incorporates the former strategic Wuhan Rear Base.¹² This base provides centralized strategic logistics support, while the five theater logistics centers provide campaign logistics support to the theater commands. The centers comprise units, facilities and functions to provide various types of logistics support to include the following: contingency logistics support brigades(后勤应急保障旅); medical support including hospitals and mobile medical units; motor transport and heavy equipment transport units; petroleum, oil and lubricant (POL) depots, oil pipeline groups(输油管线大队), and field fuel station detachments(野战加油站分队); ammunition depots; quartermaster depots; maintenance and repair; finance; and construction of military facilities. The centers can mobilize civilian transport services such as rail, motor, air and maritime transport, as well as mobilizing other civilian assets such as maintenance or construction.¹³

The joint logistics system is responsible for supplying general items that are used by all the services. The equipment support function that had been responsible for maintenance and repair appears to be included in the joint logistics system. Service (Army, Navy, Air Force, and Rocket Force) logistics are responsible for service specific logistics requirements.

Contingency logistics support brigades are modular adhoc units to provide rapid comprehensive logistics support in a main operational direction. There are also reserve logistics support brigades available for mobilization. A PLA publication on joint operations recommended strengthening and expanding the contingency support capabilities in general and the brigades specifically by increasing their mobility and modern equipment. The publication also identified the need to enhance support personnel quality and specialized training. Subunits include motor transport, medical, POL, materiel, and repair. The brigades have specialized equipment such as palletized supply vehicles and can monitor unit consumption through information systems to anticipate requirements and provide precision logistics support.¹⁴

¹¹ [PLA Daily](#), August 9, 2017; [PLA Daily](#), December 23, 2017; [CCTV](#), September 14, 2016

¹² The GLD also contained three Qinghai-Xizang Base. The Nenjiang Rear Base and the Chenhu Base were reportedly sold to private companies in 2001. Regional networks were based on large cities, such as Beijing, Shenyang, Jinan, Nanjing, Chongqing, Guangzhou, Chengdu and Xi'an.

¹³ [People's Daily](#), June 20, 2011; [PLA Daily](#), November 11, 2016; [PLA Daily](#), December 1, 2016; [PLA Daily](#), December 5, 2016; [China Youth Daily](#), January 19, 2017; [PLA Daily](#), December 17, 2017; [Chinamil.com](#), February 24, 2017

¹⁴ [PLA Daily](#), November 12, 2012; [Chinamil.com](#), August 15, 2013; [PLA Daily](#), October 9, 2013; [Chinamil.com](#), July 26, 2014; *Joint Operations Research*, (Beijing: National Defense University Press, 2013), pp. 289-290

The exercise North-2016B (北部-2016B) provides a good example of JLSF joint support during training. A joint support network (联合保障网络) and a modular campaign support group (战役支援保障群) were established. The JLSF employed fixed-point support, accompanying support in the main direction, skip-echelon support during the exercise. The campaign support group was a modular unit providing medical, ammunition, fuel, transportation, equipment repair and other support functions.¹⁵

Logistics Modernization

Background

Former President Jiang Zemin identified logistics as an important component of military modernization. The goal is establishing a precision logistics system executing full-dimensional, rapid, accurate and timely logistics support. The PLA has extensively studied U.S. logistics support to global operations, providing impetus to its logistics modernization. Former President Hu Jintao likewise stressed the importance of joint logistics to winning wars. A result was the CMC issuance in 2007 of the “Outline for Comprehensive Building of Modern Logistics.” This proposed an integrated advanced logistics supply structure, integration of a civilian logistics supply model, application of information technologies, and an accelerated logistics construction. The current military reform effort continues through the end of 2020, with adjustments and refinements of the restructuring taking place. The PLA has accelerated the three-stage long-term modernization plan, with completion by 2035 instead of 2049. The PLA is already identifying emerging and disruptive technologies that could lead to another Revolution in Military Affairs based on the integration of intelligent technologies (智能化) into weapons and equipment.¹⁶

Logistics Modernization Requirements

Requirements for future combat include a combination of fixed and mobile echelon-by-echelon and skip echelon support, with strengthening of the skip echelon method for flexible and rapid support. Joint logistics for informationized warfare requires the following:¹⁷

- Integration of information technologies into logistics equipment to support precision logistics and mobilization.
 - Transformation of military logistics support by actively employing the internet of things, big data, cloud computing and other new concepts for campaign support and building a smart battlefield environment.
- Accelerate innovation and systems of systems integration of strategic, campaign and tactical support forces.
- Eliminate traditional problems of compartmentation and multi-level bureaucracy.

¹⁵ [CCTV](#), July 31, 2017

¹⁶ [People’s Daily](#), June 20, 2011; Kevin McCauley, “The PLA Accelerates Modernization Plans,” Jamestown Foundation [China Brief](#), January 12, 2018; [China News](#), December 25, 2007; [Xinhua](#), October 1, 2009

¹⁷ *Information System-Based System of Systems Operations Study*, (Beijing: National Defense University Press, 2012), pp. 63-67; [PLA Daily](#), December 12, 2016

- Civil-military integration of strategic assets and projection forces, including civil air transport and large transport ships.
- Accelerate overseas support means and facilities construction to safeguard overseas national interests, as well as fulfill international and peacekeeping obligations.
- Establish an integrated theater with a base system focused on general purpose and special integrated logistics support bases to meet theater requirements.
- Groupings of flexible, mobile strategic logistics contingency support forces, mobile maritime support forces including large supply ships, and PLAAF emergency mobile support groups and air refueling forces.
- Small, light, mobile, modular tactical logistics groups.

Precision Logistics Support

The PLA's concept of precision logistics support was derived from the new requirements identified to support modern informationized warfare. Logistics needs to make full use of information technologies and modern equipment to organize and implement precision logistics support. Precision logistics can optimally leverage logistics resources, reduce redundancy and waste to increase efficiency. Cost effectiveness of logistics support is an important factor in PLA calculations.¹⁸

The use of information technologies is at the core of precision logistics. The command information system (the PLA operational C4ISR system) consisting of integrated and automated command platforms provides networking, a common operating picture, databases and monitoring systems to forecast and track consumption rates and stocks of supplies. Satellite navigation positioning system provides accurate locations for units dispersed on the battlefield and a rapid messaging system important for the implementation of precision logistics. Advanced field equipment and modular logistics units will provide greater delivery speed and flexibility for mobile and accompanying logistics support.¹⁹

Informationization

The PLA is improving the command information system to provide greater connectivity between units and provide a common operating picture to all command posts down to the brigade level and likely to battalion command vehicles. Logistics forces are incorporating information and intelligent technologies combined with logistics practices adapted from civilian businesses to provide inventory control and rapid delivery. Command automation systems assist planning and monitor unit logistics requirements to provide optimized and timely delivery of supplies on the battlefield.²⁰

The JLSF has established a Joint Support Big Data Center (联保大数据中心) to support information integration and sharing to support rapid decision making and response. Theater joint

¹⁸ *Precision Logistics Support Research*, (Beijing: National Defense University Press, 2010), pp. 1-2

¹⁹ *Precision Logistics Support Research*, (Beijing: National Defense University Press, 2010), p. 5 ²⁰

[PLA Daily](#), December 12, 2016

logistics support networks (战区联勤保障网), and military traffic information networks (军事交通信息网) support efficient dispatch of logistics units. A joint logistics support resource distribution map (联勤保障资源分布图) displayed on an integrated joint logistics support platform (一体化联勤保障平台) provides a common logistics operating picture.²¹

Through the integrated command platform, databases and monitoring provide status reports on supply requirements, unit locations (Beidou), battlefield situation maps, medical needs, and damage reports. This enables rapid response to support combat units. The communications system also enables consultation with military and civilian medical experts at distant locations providing battlefield medical advice.²²

The logistics base and centers have battlefield situation maps reportedly updated in real time displaying planning support decisions, geographic, meteorological, hydrographic environments, ground, air and maritime friendly and enemy situation, satellite transits, electronic spectrum data and other information to support command and coordination.²³

BeiDou Satellite Navigation Positioning System

The indigenously developed BeiDou Satellite Navigation System was designed to replace reliance on the U.S. GPS or other country's positioning systems. An additional feature of the BeiDou system is the communication messaging capability. Logistics units employ BeiDou to locate and provide critical supplies to combat units maneuvering on the battlefield.²⁴

Civil-Military Integration

Background

The Chinese concept of civil-military integration dates to the revolutionary era, with continual revision and refinement. The current form of civil-military integration began under former President Jiang Zemin, and continues to the present. The underlying objective is for the civil and military sectors to reinforce each other, using the other for leverage to promote modernization and scientific development of dual use technologies and industries, thus reducing redundancy and wasted resources, while maximizing efficiency, cost effectiveness, and use of resources.²⁵

In March 2008 the State Administration for Science, Technology and Industry for National Defense (SASTIND)²⁶ was established under the Ministry of Industry and Information

²¹ [PLA Daily](#), April 24, 2017

²² [CCTV](#), July 31, 2017

²³ [Wuxi Joint Logistics Support Center PLA Daily](#), September 16, 2016; [Xining Joint Logistics Support Center PLA Daily](#), September 16, 2016; [Joint Logistics Support Centers PLA Daily](#), September 16, 2016; [CCTV](#), July 31, 2017; [China Youth Daily](#), January 17, 2017

²⁴ [PLA Daily](#), March 30, 2010; [PLA Daily](#), November 19, 2013

²⁵ *Introduction to Civil Military Integration*, (Beijing: National Defense University Press, 2015), pp. 29-31

²⁶ SASTIND replaced the Commission for Science, Technology and Industry for National Defense (COSTIND), which included the China Atomic Energy Authority, the China National Space Administration, key technological universities, and key industries supporting weapons and equipment production.

Technology. SASTIND is a civilian agency promoting civil and military integration. The agency has responsibility for coordination, guidance, policies and regulations governing science, technology and industry. These actions support research and development for national defense as well as production of high tech weapons and equipment. Key civilian sectors include nuclear power, aircraft and aerospace, and the shipping industry. At the same time the CMC promulgated a plan for construction of a modern logistics system leveraging and combining the civilian sector for mobilization, and peacetime and wartime support.²⁷

Joint Logistics and Civil-Military Integration

The JLSF is responsible for civil-military integration related to logistics support. This is important for leveraging civilian expertise and capabilities to reinforce joint logistics. Outsourcing to the private sector of certain logistics requirements is intended to create greater efficiency, flexibility, and timeliness to support activities. The logistics force has arrangements with private companies to provide supplies directly to units. Logistics mobilization in wartime relies greatly on civilian resources. The concept of “supporting the front” (支前) has local governments and the population supporting military forces with manpower, material and financial resources, medical, transportation, maintenance, and engineering support, as well as intelligence.²⁸

The PLA’s association with civilian businesses is bringing modern business practices, such as modern inventory control and delivery methods, into the joint logistics system. Leveraging civilian research is also introducing emerging technologies into the PLA’s modernization plans. This civil-military integration is improving logistics flexibility and capabilities. An example is a recent Air Force experiment with a private company to use unmanned aerial vehicles (UAV) to transport supplies and spare parts to far flung units.²⁹

Key components of the integration are improving the military logistics research and production system supported by SASTIND, as well as improving military specialized talent and education. The current form of civil-military integration promotes the following objectives:³⁰

- Accelerating logistics mobilization capability through the integration of the civilian economy, industry, and infrastructure to support military requirements, and the leveraging of civilian capabilities in the areas of medical, materials, maintenance and transport.
 - Civilian construction projects are designed to meet military requirements. This includes civilian aircraft and shipping, construction of highways to include aircraft landing strips, and civilian airports and ports. In particular, the development of civilian transportation and communications infrastructure is designed to improve the national defense mobilization system.
 - Military logistics incorporates the civilian support system for military reserves, transportation and distribution.
 - Reform of the reserves and militia emphasizes high-tech capabilities.

²⁷ *Introduction to Civil Military Integration*, (Beijing: National Defense University Press, 2015), p. 34

²⁸ [Beijing Zhongguo Guofang Bao Online](#), April 18, 2017; [PLA Daily](#), May 3, 2017; [PLA Daily](#), September 13, 2016; *Military Terms*, (Beijing: Military Science Press, 2011), pp. 481-482

²⁹ [MOD](#), January 29, 2018

³⁰ *Introduction to Civil Military Integration*, (Beijing: National Defense University Press, 2015), pp. 32-39

- Integration of civil and military education is intended to provide the military with the highly qualified personnel needed to maintain and operate advanced information systems and equipment.
 - China is improving the training of national defense students and developing highly capable scientific research personnel to support the military.
 - The PLA is recruiting more college students and graduates with promises of greater benefits and advance placement in college programs upon demobilization The PLA is employing civilian and military colleges to train new recruits – Air Force pilot recruitment is an example of this program.
 - The modernized PLA requires officers, noncommissioned officers (NCO), and enlisted personnel with broad scientific and information technology knowledge and capabilities.
- Leveraging civilian scientific research for military use. This can include a two-way technology transfer to support both the civilian and military sectors. Currently, the PLA is displaying interest in quantum computing and communications, as well as artificial intelligence and other emerging technologies believed capable of the next revolution in military affairs.

Mobilization and Strategic Reserves

Logistics Mobilization

Logistics mobilization provides a rapid transition from a peacetime posture to wartime preparations. It can include partial or full mobilization. The wartime logistics mobilization system reaches from the President to the local level (see figure below). At each level from theater to county are subordinate offices responsible for different aspects of mobilization, for example the People's Armed Forces Office, Economic Mobilization Office, Civil Air Defense Office, and National Defense Education Office.³¹

³¹ *Modern War Logistics Mobilization*, (Beijing: PLA Press, 2015), p. 60; *Military Terms*, (Beijing: Military Science Press, 2011), p. 482



Logistics war preparation provides timely support in the event of war or emergency disaster relief. Wartime logistics mobilization includes the following:³²

- **Manpower Mobilization** – Call up of reserves to active duty and recruitment of civilians for active or reserve service. This includes the People’s Armed Police Force, which is now subordinate to the CMC.
- **Financial Mobilization** – Mobilization of the financial sector to support wartime requirements, including financial institutions support to pay for the conflict, use of loans, use and control of bank deposits, foreign exchange control, and limiting securities trading.
- **Materials Mobilization** – Modern war requires high consumption rates of materials to support the war effort. Relying only on stocks in depots might be difficult. Material mobilization includes almost any commodity, and includes requisitioning, emergency production, management and distribution activities. Main categories include military supplies for the troops such as food and clothing; fuel; medicine and medical equipment; construction materials; and logistics equipment.
- **Facility Mobilization** – Facility mobilization is the requisition of any facility required by the military, including the following: accommodation and office buildings including factories, schools, hotels, public housing, hospitals and civilian houses; material storage warehouses; civilian medical facilities and supply, including clinics, nursing homes, and medical manufacturing facilities; transportation facilities required for the movement of troops and materiel, including infrastructure, pipelines, and ferries. The widespread use of

³² *Military Terms*, (Beijing: Military Science Press, 2011), pp. 38-39, 481-482 and 558; *Modern War Logistics Mobilization*, (Beijing: PLA Press, 2015), pp. 18-19, 238, 253-262, 275-

civilian infrastructure and transportation can also make identification of military forces and targeting during a conflict difficult for an opponent.

- **Equipment Mobilization** – Mobilization of national and civilian equipment support, including equipment research and production, technical personnel and general supplies, maintenance resources, and acquisition of civilian equipment and resources to meet the increased wartime requirement for weapons and equipment. Equipment mobilization can also include food and food processing related equipment; fuel equipment; warehouse storage and handling equipment; health, sanitation and medical equipment; requisitioning of transport equipment, including ground, air and maritime transportation; specialized equipment for different climatic and terrain conditions; and engineering repair and construction equipment

Strategic Reserves

Unfortunately, few details are known on capacities and locations of PLA strategic reserves of supplies and equipment. The JLSF base and centers maintain depots of supplies and equipment for wartime support. China began storing strategic reserves of crude oil in 2007. China maintains secrecy of the size of its strategic petroleum reserve; foreign estimates placed it at approximately 400 million barrels in the middle of 2016. China's National Development and Reform Commission's (NDRC) State Bureau of Material Reserves is responsible for formulating national strategic material reserve strategy and plans, as well as day-to-day management of the strategic material reserve. The Bureau stockpiles critical raw materials, including rare earth metals. In the past China has employed traders to indirectly purchase materials for the reserves. The PLA also maintains strategic reserves of older weapons and equipment in conservation storage, primarily in underground facilities.³³

Logistics Support to Expeditionary Operations

The PLA is increasingly focused on long-range delivery of forces and the required logistics support. PLA academics analyze U.S. military global force projection capabilities for lessons learned. Increasing PLA capabilities to operate further from China's borders, combined with increasing global engagement and economic interests are driving the PLA to develop the capabilities needed to project larger force groupings further from its borders. The PLA has identified joint logistics, along with intelligence support, as an important requirement to support overseas operations.³⁴

Strategic Delivery

The PLA views a strategic delivery capability as a core element in China's strategic capabilities providing greater military flexibility. This is especially true as China enters a new historical stage with global interests. The expansion of China's national strategic interests includes the Belt and Road Initiative and other overseas economic projects, safeguarding Chinese nationals abroad, supporting peacekeeping missions, and anti-piracy escort missions.³⁵

³³ [OilPrice.com](#), March 29, 2017; NDRC [website](#); [Metal Bulletin](#), July 31, 2015; [Reuters](#), July 24, 2014

³⁴ [PLA Daily](#), December 12, 2016

³⁵ *Research on Problems of Strategic Delivery*, (Beijing: National Defense University Press, 2014), Forward

The PLA considers strategic delivery as a core element of military capabilities blending strategic mobility, logistics support, and national mobilization. Construction of a strategic delivery capability is required to respond to crises, safeguard the peace, deter war, protect national interests abroad, and win wars. Strategic delivery includes both military and civilian maritime, ground and air transport means. The PLA considers a strategic delivery capability as a strategic deterrent; an important factor in determining the outcome of a war; an important requirement enabling overseas joint logistics and joint operations; and an important means for gaining global influence.³⁶

The PLA has conducted trans-regional exercises since 2009 to improve the strategic delivery within China to respond to contingencies. These exercises are important for responding to internal or peripheral contingencies as China is a large country with complex terrain in many areas. While China is continuing to expand rail and road transportation lines, access to many areas in the west and the Qinghai-Tibet Plateau is limited. This increases the importance of military and civilian fixed and rotary-wing transport capabilities in these remote areas.

The PLA is fielding and developing larger transport aircraft and large amphibious warfare and comprehensive supply ships to support strategic delivery of forces. The Army Aviation force is expanding, new transport helicopters are being fielded, with a heavy lift helicopter planned. Current inventories and capabilities of fixed-wing transports, amphibious warfare and supply ships limit long-range strategic delivery, although capabilities will increase with the fielding of larger air and sea transport means. The Y-20 medium transport entered military service in 2016 and can reportedly carry the 58-ton Type 99A2 main battle tank. Press reports speculate that the Air Force will eventually receive 100 to 400 or more Y-20s. The PLA has developed and begun deploying the Y-9 medium transport. A Y-30 transport aircraft, reportedly capable of a larger payload than the Y-9, is in development. The PLA can also mobilize civilian aircraft.³⁷

Aircraft	Maximum Payload	Maximum Range	Estimated Inventory
Il-76 Transport	Medium 44 tons	4500 km/2795 miles	10
Y-20 Transport	Medium 66 tons	4400 km/ 2734 miles	6-13
Y-9 Transport	Medium 20 tons	5200 km/3231 miles	21

The Air Force and Naval Air Force have refueling tankers that can extend the range of fighter aircraft. The Air Force has 12 H6-U tankers and the Naval Air Force has four H6-DU tankers. The PLA also acquired three Il-78 refueling tankers from Ukraine. China has plans for new tankers in the future.³⁸

Refueling Tanker	Refueling Capacity	Combat Range	Estimated Inventory
H6-U / H6-DU	18.5 tons	5600 km/3480 miles	12 / 4
Il-78	65 tons	7600 km/4722 miles	3

³⁶ *Research on Problems of Strategic Delivery*, (Beijing: National Defense University Press, 2014), pp. 1-10

³⁷ [China Daily](#), January 28, 2013; [Xinhua](#), July 7, 2016; [WantChinaTimes](#), March 5, 2014; [MOD](#), November 13, 2014; [China Daily](#), December 20, 2017; [Global Times](#), September 14, 2017

³⁸ [Chinamil.com](#), September 8, 2015

The Navy has several comprehensive supply ships and large amphibious warfare ships to support strategic delivery. Supply and oiler ships are currently a weak link in Navy long-range operations. The Navy currently has approximately 11 tanker vessels (Type 908, Type 905 and Type 903), which is a low ratio to first-line ships.³⁹ The PLA Navy reportedly has more construction planned to improve support capabilities. The Type 901 comprehensive supply ship has a sophisticated logistics support system that allows real time monitoring via data link of consumption and remaining stocks of all ships under its assignment. The Type 071 amphibious dock ship (LPD) is the Navy's newest and most capable amphibious warfare ship. China has a number of older, less capable landing ships more suitable for local operations. The Type 075 landing helicopter dock under construction can provide command and control for amphibious landings.

Ship Class	Type/Tonnage	Maximum Speed	Capability	Estimated Inventory
Type 901	Supply/45,000	25 knots	Fuel, water, dry cargo; medical support; 2 x Z-8 helicopters	1; second ship launched in 2017 and being fitted out
Type 071	LPD/25,000	25 knots	500-800 troops & 15-20 amphibious IFVs; 4 x Z-8 transport helicopters; 4 x Yuyi LCAC	5; plans for total of 6
Type 075	LHD/40,000	23 knots	30 helicopters; can provide command and control	One under construction

The joint logistics force has identified civilian ships built to military specification for mobilization during exercises or wartime; the strategic delivery support fleet (战略投送支援船队). This force includes the capability to configure offshore platforms to provide maritime mobile ports for offloading materiel in cross-sea operations. The Navy reportedly has two mobile landing platforms to support amphibious operations.⁴⁰

Foreign Bases

The PLA has responsibility to protect its growing overseas national interests. Overseas operations in the past were primarily peacekeeping operations, anti-piracy escort missions, and evacuation of

³⁹ The US Navy has a ratio of 1 supply ship to 5 supported ships, whereas the PLA Navy has a ratio of approximately 1 to 15.

⁴⁰ [PLA Daily](#), April 16, 2017; [WantChinaTimes](#), May 26, 2015

citizens from trouble spots. These non-war missions have included long-range logistics support on a small scale. The development of China's first overseas base in Djibouti, described by Beijing as a logistics base, represented a first step in the country's global reach. China's Belt and Road Initiative is providing a requirement for a greater overseas military presence and maritime security. Senior Captain Fang Jian, vice president of the Dalian Naval Academy, speaking at a symposium "21st Century Maritime Silk Road and Navigation Support" in 2015, stated that in the future the PLAN may establish overseas military bases and strategic strong points for support and ship repair.⁴¹

Gwadar port⁴² in Pakistan and Hambantota in Sri Lanka have received press speculation as being the next Chinese foreign bases. Beijing has invested heavily in both ports' construction. A recent press report states that Jiwani, a port west of Gwadar, will be the next PLA joint naval and air base. China is investing in many foreign ports, some of which could eventually provide sites for additional PLA bases. Reports state that the state-owned China Merchants Group has invested in ports in nineteen countries and regions, including Asia, Africa, Latin America and the Middle East.⁴³

Command and Planning

The CMC Joint Staff Department (JSD) and the Joint Operations Command Center (JOCC) are responsible for operational planning and command and control. The JSD's Overseas Operations Division, subordinate to the Operations Bureau, is responsible for planning, preparation, and execution of overseas non-war military operations. This includes international peacekeeping, overseas naval escort missions, international relief, as well as protection and evacuation of Chinese citizens. The Operations Bureau would conduct planning and the JOCC would exercise command and control for combat missions abroad.⁴⁴

Implications for the United States

The implementation of a joint logistics system is fundamental for achieving an integrated joint operations capability, greatly enhancing the PLA's combat capability. The PLA appears to be more advanced in developing the joint logistics system than implementing joint operations. However, the PLA considers its joint logistics capability as weak.⁴⁵

The PLA's improvements in the joint logistics system, civil-military integration, and the wartime mobilization system will increase the PLA's capability to sustain combat. Expanding air and sea transport and sustainment capabilities, combined with the establishment of overseas bases will support overseas strategic delivery and sustainment of larger forces in the future.

⁴¹ [China Daily](#), February 5, 2016; [Ta Kung Pao](#), 12 July 2015; [Qianzhan](#), November 22, 2017

⁴² If the PLA creates a base in Pakistan, it would likely be at Jiwani west of Gwadar.

⁴³ [Eurasia Review](#), December 7, 2016; [South China Morning Post](#), January 5, 2018; [Washington Times](#), January 3, 2018

⁴⁴ Kevin McCauley, [PLA System of Systems Operations: Enabling Joint Operations](#), (Washington, DC: The Jamestown Foundation, 2017)

⁴⁵ [PLA Daily](#), December 12, 2016

Currently China is engaged in supporting non-war missions overseas: peacekeeping and anti-piracy missions abroad, and evacuating citizens from danger. This can provide positive areas of engagement with the PLA in the area of joint logistics.

The PLA considers a strategic delivery capability as a strategic deterrent; an important factor in determining the outcome of a war; and an important means for gaining global influence. China could well pose a future threat to US interests and those of its allies as the PLA's force projection capabilities continue to expand quantitatively and qualitatively, combined with Beijing's more aggressive strategy.

Civil-military collaboration in the logistics field is providing the PLA with modern business practices to enhance joint logistics capabilities. Additionally, the PLA is attentive to research in emerging technologies that can impact logistics and future warfare. The widespread use of civilian infrastructure, resources and transportation by the PLA during a conflict can make identification of military forces and targeting during a conflict difficult for an opponent.

Recommendations

Military-to-military contacts in the logistics area could provide greater insight on the Joint Logistic Support Force, its activities, and capabilities. This is a sensitive issue and would have to be accomplished on a completely reciprocal basis. Subjects such as logistics support for humanitarian assistance and disaster relief would provide initial areas of common interest, and still provide some conclusions on capabilities in other areas.

China has employed deceptive practices in the past in attempts to buy US companies and steal American intellectual property. Given the PLA logistical focus on civil-military integration the Committee on Foreign Investment in the United States (CFIUS) process should strongly examine logistics dual-use technologies to include the following areas of Chinese investment:

- Robotics and automation for production, warehousing and transportation;
- POL/oil pipelines technologies and software that improve distribution, management of large stocks, and efficiency during peacetime; and provide resiliency during wartime;
- Rapid prototyping/additive and subtractive automated manufacturing techniques to produce end-use materials in both small and high-volume production runs, including computer numerical control (CNC) automation of machine tools by means of computers executing pre-programmed sequences of machine control commands;
- Supervisory control and data acquisition (SCADA) control system architecture to provide high-level process supervisory management.

Closer monitoring of China's strategic reserves of critical raw materials, purchases of raw materials, and assessments of stocks should be conducted. Included should be analysis of key resources needed for wartime production.

There are several PLA joint logistics research areas requiring additional detailed analysis. Potential areas include the following:

- Overseas base, and strategic delivery (air, sea and ground) requirements to sustain a PLA expeditionary force; Navy at sea replenishment capabilities.
- Industrial mobilization capabilities for production of precision munitions to support a joint fire strike campaign on a sustained basis.
- Ability of Chinese industrial mobilization for surge production of materiel.
- Capability of Russia to provide key resources during a conflict.
- Logistics support to air and maritime blockade operations against Taiwan, including joint logistics requirements, and ability of the JLSF to sustain blockade forces for a lengthy blockade campaign.

PANEL I QUESTION AND ANSWER

VICE CHAIRMAN BARTHOLOMEW: Thank you very much.

We'll start our questions with Senator Talent.

HEARING CO-CHAIR TALENT: Thank you.

I have a number of questions, but I'm going to save some of them for a second round if we have it.

I'm going to explore here a little bit your thinking on generally what this modernization or reorganization plan is, how maybe we can relate it to what we do in the United States with regards to the Department of Defense.

So would it be fair to describe this reorganization as turning the CMC into an Office of the Secretary of Defense with Xi as the secretary of defense as well as the president? Is the, for example, is the joint staff they're going to have at the CMC, are they going to be reviewing theater operational plans the way our joint staff reviews regional combatant command staff?

They're creating an Equipment Development Department within the CMC and they're also going to have equipment departments within the services. Are they going to do what we did for awhile, which was basically have two different bureaucracies doing the same thing? But--in other words, you've got an oversight. Are they going to be doing different things or is the CMC Equipment Development Department going to be overseeing what the service offices do?

And then one other question. I think one of you touched on this. Do you see active plans to implement a joint assignment policy as their officer corps in particular works its way up the chain? That was the key to the United States achieving jointness, was a requirement that the officers circulate through, you know, joint billets. Do you see them starting to do that or is it too early to determine?

MR. COOPER: I'll take a stab, I guess, at that first question first, and I think I did talk about that in the written testimony. Right now a joint officer program that's as mature, you know, as our own system does not appear to be in place.

They have begun cross-assigning officers from a given service to positions that involve interface with the other services, and there is some professional military education efforts in that regard, but in terms of how that, you know, how that small effort fits into the larger PLA, it doesn't yet.

So the question would be with the formation of theater commands is there an intent or a plan or a program to have assignments that move through various joint, joint staff type positions on the theater command, say in the Joint Operations Control Center, and of course if that happens, I think I said in my written testimony, it would be a significant step toward, you know, toward jointness, at least in changing the culture of the PLA, which right now does not support that sort of activity and that kind of jointness.

HEARING CO-CHAIR TALENT: Yeah. Just as our services didn't when we started doing it 30 years ago.

MR. COOPER: Right, for quite awhile. And on the first part of the question, my colleagues might know a bit more on that in terms of following comparative, a little bit of comparative analysis between DoD and where, where the Chinese want to go.

I think from a capabilities perspective, a lot of what the PLA is doing from a capabilities perspective really is obviously copied on lessons learned from the U.S. campaigns over the past, you know, past two plus decades and are really based a lot on our network warfare, you know, theories and practices as evidence in the campaigns that we conducted.

So they're kind of looking for a second offset type capability, but then they want to be able to apply new and disruptive technologies to that to move it further down the road here in the next decade or two.

But in terms of the organizational structure, there are several differences. I think it's fair to say that Xi Jinping wants to occupy all of the senior positions in terms of who gets to stamp approval on administrative, organizational and operational decisions.

But I think below him in terms of the really--I think where the rubber meets the road, that's the joint planning for the theaters and in their strategic directions. So the joint planning against Taiwan, which includes counter mission operations against the U.S., the joint planning for a campaign on the Korean Peninsula if necessary, the joint campaign planning for a Sino-Indian contingency, the joint planning for South China Sea and East China Sea contingencies.

I believe that the joint operation folks at the theater level will, in fact, be responsible, and we don't have a lot--or I don't have a lot of evidence for that right now, but I believe they will be responsible for that planning process. But I think there will be a lot of intervention from the General Staff at that level in Beijing.

MR. COSTELLO: I think your question is a really interesting one. One of the key analytical tools is not mirror imaging but looking to see what China is doing that we've done before and if they're doing it differently and trying to look at sort of the logic, trying to work back the logic from that.

I've had it confirmed from people I mean who know and private sources that SSF was very much inspired by U.S. Strategic Command and is meant to largely fulfil the same purpose. You can see within the SSF, you can see equivalents to U.S. agencies.

You can see for the space corps, it looks to be something that's very similar to U.S. Space Command as well as National Reconnaissance Office. The cyber command is very obviously analogued to U.S. Cyber Corps.

What China does is China does something very, very different, and I think they claim it as innovative, but it's difficult to see it as anything other than a bureaucratically limited choice that they made. Instead of creating a joint command and had all the services sort of participate within a STRATCOM-like entity, they just created a whole new service.

On the one hand, they say this reduces redundancy. This increases, you know, the ability for them to prioritize and streamline resources and support. On other hand, it's very clear that bureaucratic impediments, the lack of a joint culture is, this is an end result of that.

How China sort of gets from here to there, I mean because it seems like every chance they have to sort of create a more joint force, they move towards sort of a bureaucratic compromise like the SSF.

You can see this in two ways: they're never really going to change and that joint will be just a token, you know, a token thing of the Chinese; you see it the opposite way, is that they're starting from the bottom and moving up.

One thing that these reforms certainly do, in my opinion, is that it increases the CMC's ability to force jointness on I think the operational level and below at the theater commands by holding hostage the type of domain reconnaissance and intelligence and all-source assessment that only the CMC can provide to the joint commands.

MR. McCAULEY: A few comments I have. I think there's a number of reasons behind what the PLA is doing. Part of it I think does sort of mirror what the U.S. has done although I think there's also differences.

I also think one of the important reasons for the consolidation of power under the CMC is

that previously when they had the four separate General Departments, decisions would be made on an issue, but the details on implementation would be left to lower levels, which would lead to lower levels implementing the decision in different non-uniform ways, and this led to a lot of problems when the PLA started emphasizing jointness because the communication systems weren't interconnected or integrated, and this led to a lot of problems, led to a lot of writing on what the PLA describes as top level design.

And I think that's one of the reasons, besides consolidation of power for Xi himself, is to allow this top level macro-management of the implementation of what decisions are made. And there's been quite a bit of writing on standardization and uniformity, and I think that's what they're trying to get at, is to get away from all the Military Regions' group armies, fleets doing their own thing, and it's different than what everybody else is doing. So there is this effort to provide uniformity.

Also, there's the factor that the General Departments have sort of become powerful entities in themselves, and I think Xi wanted to break that.

Also, his consolidation of power allowed him to sort of break the power of the ground forces. PLA academics have been writing about many of these reforms for over, well over a decade-and-a-half, but they've never been implemented until Xi came to power or consolidated the power under himself, and used corruption to get rid of people who were blocking implementation of some of the reforms. And so that has something to do with that.

On the issue of jointness, I think both the Joint Staff Department has some responsibility for operational planning, but the theaters do too, so I think it's sort of a joint effort between the Joint Staff Department and the theater commands to do planning probably with the Joint Staff Department providing strategic direction and with the theaters doing the detailed operational planning for the various contingencies that they need to plan on.

And finally one last thing on developing joint officers. I think this is going to be a long-term effort, and the emphasis on reforming the military academies and military educational institutions is part of this for the main point of the reform of military education is to develop joint talent and joint officers, and I think this could be a fairly long-term effort because the development of jointness had been stymied in the past by stovepiped services.

In fact, a recent article mentioned that one impediment to the implementation of joint operations is just the difference in terminology between the services and it's causing problems that have to be overcome.

MR. COOPER: Can I add one thing to a point that Kevin says because it's really important? I'm glad he brought it up.

In terms of providing that strategic level guidance from the joint staff level to the theaters, the other thing that is going to have to happen is a determination about those strategic functions that I think have always been with Beijing and probably will remain there, and that's responsibility for nuclear counter-strike campaign, that's responsibility for a lot of the stuff that John talked about, but we're not really sure yet how they're going to actually provide forces to theaters in a contingency.

And some of the capabilities that reside at the strategic level are going--you know, they're going to want to hold on to those at joint staff and CMC level, and figuring out how that works and how they're going to work through those issues, you know, is going to be difficult and time consuming.

MR. COSTELLO: That brings up a good point. I mean one sort of lens to view this is how they've, how they've dealt with cyber, which every service has created a capability to do

cyber. Every former Military Region did as well.

Presumably those still sit with their services and with the theater commands. And now you have the Strategic Support Force, which is an entirely separate sort of, you know, entity. One of things, one of the more interesting things that they did in the reforms was, is they took the 3PLA and the 4PLA. The 3PLA, which, you know, is responsible for espionage, they took that, and they made that the sort of colonel of the SSF.

They took the 4PLA and they pushed it into the CMC as a new network and electronics bureau under the Joint Staff Department.

What's interesting to me, and I think this is something interesting to watch, is to see how they proceed. I think this could honestly be a bellwether to figure out how they're going to sort of create a more sort of joint force, how given the fact that cyber exists in the theater commands and in all the services, how that Network and Electronics Bureau is going to exercise control or influence over the other ones.

That's something that we can test. That's a hypothesis that we can actually test for and what exactly the SSF's role is sort of in relation to that. One of the more interesting things here is that the new head of that bureau held a symposium at Wuhan College of Law about the applications of the Tallinn Manual to cyber conflict.

And that was bizarre because you don't see Chinese military talking about that in open press very often, and all of a sudden you have this completely unknown bureau that is a successor to the 4PLA who is responsible for cyber warfare talking about international, the application of Tallinn Manual to international cyber conflict.

I think that for me is a hypothesis I look to, you know, I look for evidence of and see how they're going to do that, including how they're going to manage, how they're going to manage the careers of officers who are all dealing with the cyber domain, common resources, et cetera.

I see we're--

VICE CHAIRMAN BARTHOLOMEW: Yes.

MR. COSTELLO: Sorry. Apologize.

VICE CHAIRMAN BARTHOLOMEW: All right. Thank you.

Commissioner Shea.

COMMISSIONER SHEA: Good morning and thank you, Mr. Costello and Mr. Cooper, for coming back and welcome, Mr. McCauley.

One question. To what extent is achieving reunification with Taiwan part of the "China Dream"? I know in your answer, Mr. Cooper, to Senator Talent's question, you mentioned a number of different contingencies that the Chinese might face, but to what extent has the Taiwan contingency remained a key organizing principle for PLA modernization?

And how would you assess the PLA's current capability to successfully conduct an invasion of the island?

MR. COOPER: Good question. I'll start again.

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: A small one. It's a small question.

MR. COOPER: I'll start again while they're thinking of better answers.

Taiwan is still the principal driver for the capabilities that the PLA seeks to gain in order to be able to conduct warfare in the region.

Now I think several people smarter than I before me have said that, you know, being able to handle a complex joint operation as would be required for an actual invasion of Taiwan--I'm thinking now about the, you know, I believe that they, the PLA, in their minds, have thought that

they will have to put boots on the ground at some point. They hope not to, but I think they plan to, in their contingency planning.

To be able to pull off a joint campaign, a complex campaign like that, the capabilities they need to develop, particularly in that they have to worst-case plan for U.S. involvement, will be applicable to any number of regional contingencies and the capabilities there. So, you know, again, it's not, it's not necessarily unique from that capabilities perspective. It remains unique, though, I think, as a real driver for the Chinese leadership in terms of what they have to be able to accomplish at some point in the future.

Now the question is at what point in the future is that? I think there's a lot of evidence that says that the capabilities need to be inherent by 2020. I would have said prior to Xi Jinping actually being able to pull off this reorganization, that that would have been probably a bridge too far. That would have remained aspirationally 2020.

I think now the capabilities in 2020 are going to be pretty, pretty impressive. The problem will be contesting all of the domains that could enter into, you know, a Taiwan fight if it came to that and if U.S. forces were involved.

And again I still think that they will be working on building a joint culture, working on the organizational changes and adapting to them and through all the difficult, difficult issues they have to do for a complex joint campaign like that.

I think that that will still be beyond their reach in 2020. But the biggest, the biggest problem in making that assessment always is, is about perceptions. If the capabilities, if they begin to realize capabilities are present in 2020, the PLA can turn to the civil leadership and say we've met the requirements you put on our plate for this for 2020 or so. Does that increase the likelihood of levels of brinkmanship or coercion by the Chinese government versus Taiwan?

A lot of that has to do with obviously the Taiwan domestic politics and things like that. But at that time if there's a willingness to push the envelope more, to become more assertive and aggressive in that area, again, the problem of the risk of miscalculations come into play. No Chinese leader can be perceived as being the leader that lost Taiwan.

So that's, you know, that plays into that. But again I still think that there's no time table and that the Chinese leadership would prefer to avoid use of force for the foreseeable future, for, you know, for decades if possible. But it is on the, you know, it is, reunification is a requirement, and again the Chinese dream. I think by 2049, there's an expectation that they will have realized their objectives vis-a-vis Taiwan.

COMMISSIONER SHEA: Uh-huh. Mr. Costello.

MR. COSTELLO: I think the 2020, at least from the information domain, I think the 2020, again, this is all based on open source information, I think the ability to achieve reunification by 2020 I think is a little early by five years. I think they're going to need some time to figure things out and create new operational paradigms.

I'm honestly and my own personal viewpoint is that the creation of the Strategic Support Force is a pivot basically saying that within the next five or ten years, they take as a given that they will close the door on military superiority, military supremacy around their periphery, particularly the East and South China Sea, and over Taiwan, and they're turning, they're turning their attention outwards and beyond that.

The fact that they're turning their attention outward and beyond that to areas beyond the first island chain I think is a tacit indication they believe that they will achieve military supremacy in their periphery in the next few years.

Now you could say that at least as far as fulfilling military objectives, the SSF has that

sort of three-phased approach, and at least, in my opinion, I think that military reforms are certainly a way to achieve that. That is an enduring objective of the Chinese military and that will continue to be until it's not any more one way or the other.

MR. McCAULEY: I agree that Taiwan is a primary contingency for the PLA. If you look at modernization, they are modernizing force-wide so it's not the only thing that's driving PLA modernization.

I think the primary overarching driver is they want to become a modern military force and they need to do that force-wide. It's not just about Taiwan although that's the most important contingency for the leadership.

Also, I think while the PLA probably has a capability to conduct air and sea blockades or joint fire strikes that could devastate Taiwan now, really the main short pole in the tent is the delivery systems. They don't have the amphibious lift to transport the forces that they estimate they would need if they were going to actually invade, put boots on the ground and conquer all of Taiwan.

That would be a multi-group army effort which would take a very large ship construction program, which would be very obvious to everyone around. So that's really, for the invasion scenario, that's really the key thing that would limit them and would be a big I&W indicator if they decided to go in that direction.

I think really they're looking at right now sort of influence campaigns, United Front, subversion to try to undermine Taiwan's will to resist. That probably won't be terribly successful, but it could cause some disruption internally.

Also I look at Taiwan and the Taiwan military, and at least in my opinion the Taiwan military capabilities are, have been degrading over time, especially under the previous administration, and that could be a factor in PLA planning and what they intend to do towards Taiwan as far as influence campaigns or possibly a coercion campaign such as a blockade to try to back up some of their influence campaigns internally.

COMMISSIONER SHEA: Thank you.

VICE CHAIRMAN BARTHOLOMEW: Thank you.

Commissioner Wortzel.

COMMISSIONER WORTZEL: Thank you all very much for excellent testimony.

VICE CHAIRMAN BARTHOLOMEW: You also need to speak up.

COMMISSIONER WORTZEL: All right. Thank you again for your testimony.

I've got kind of a linked question for Kevin McCauley and Cortez, and then, John, I'm going to ask you to expand on one.

Cortez, you talked about increasing Chinese risk aversion, and what you don't mention, which Kevin McCauley does, is whether there is any value to forms of military-to-military cadres? So as our military services are just eager to go over there and drink and eat and shake hands, but that doesn't do much to increase risk aversion.

So are their forms of contact that might increase risk aversion, and then for Mr. McCauley, to what extent does participating in disaster relief operations and practicing evacuations improve strategic logistics force capabilities? Are we helping them with something we really don't want to help with in the guise of saying, well, you know, this--what was it--"thousand ship navy" the U.S. Navy dreams of can do good things in the world.

Kind of a separate thing for you. Have you seen expeditionary logistics operations in the Strategic Logistics Force practice using reserve forces?

And then, John, you did not spend a lot of time on electronic warfare in your oral

testimony or your written testimony. You talked about it. But you seem to have set up a situation where this old internal battle between the 4th Department and the 3rd Department didn't get settled, and the 4th Department is still somehow out there seeking its own space.

So I guess that's three questions, maybe four. I'll stop and see if you can briefly address those.

MR. COOPER: I'll go first and then turn it over to Kevin. Just to make sure that--let me clarify it in terms of increased risk aversion. Unfortunately, I don't think right now that's the case. I think that China's risk aversion for a major conflict, a conflict that might erupt between China and the U.S., is still very low, but I believe the risk acceptance is changing as their military capabilities become more evident, and also potentially as they question U.S. resolve to meet certain requirements in the region. So I think that's not a good path.

Now how do we increase risk aversion and does mil-to-mil contact fit into that in any way? I'm still, and perhaps I'm in a growing minority, I still believe that military-to-military contact from the U.S. and forces in the People's Liberation Army is important. I think you kind of characterized the problematic nature of that relationship, if that's the way we run it.

You know it does need to be very, very carefully coordinated, you know, and I think we certainly have made efforts to do that. But at the same time, it needs a lot of thought in terms of what exactly we want it to accomplish.

I actually think probably it should not be the objective, the principal objective, of that military-to-military contact to evidence capabilities that would create higher, you know, create more risk aversion on the part of those we're contacting. I think that should be more for, a little bit more for bridge building and perhaps trying to undermine somewhat this general atmosphere of strategic mistrust between the two sides in the mil-to-mil contact.

Again, I don't want to present a lot of capabilities and things that they can learn from--

COMMISSIONER WORTZEL: You wouldn't change the NDAA of 2000?

MR. COOPER: Would not, no. And, but I don't think that it should be ruled out. I didn't put it in my written testimony because I thought that that should be the principal mil-to-mil contact objective, but I think that simply continuing to stress certain aspects of U.S. intent to maintain our presence and to strengthen our alliances in the region certainly should accomplish that objective, and that should be one of the things that underpins every contact we have with the PLA. It's just that constant message that we are here; we're here to strengthen our alliances. There's value for that and stability for the region, et cetera.

COMMISSIONER WORTZEL: Kevin.

MR. McCAULEY: I agree. I'm not sure that we've really gained a lot out of mil-to-mil contact so far, and I did propose it if it was carefully done. Maybe we would be able to get some insight into the joint logistic system since it is new, and I think we don't really fully appreciate it.

But I think in many ways, mil-to-mil contacts in the past that we haven't really gained much, and even demonstrating capabilities to them I don't think has acted as a deterrence. It's acted more as an impetus for incorporating those capabilities into the PLA.

And I don't think they would necessarily--they probably learn some detailed information from us depending on the contact, but they are very closely examining our expeditionary operations and our global joint logistics capability. One publication I looked at, almost the entire focus of the book is examining U.S. expeditionary global reach capability.

So they, I think, have a very good appreciation of our capabilities and are trying to implement those factors into their strategic delivery capability, which is still fairly nascent, but which I think they have definite plans to increase in the future and they see as important not only

for sort of soft power, gaining influence, but also hard power in case there were a conflict farther from their shores that they do need to increase this capability both with transport aircraft and amphibious and logistic support craft.

MR. COSTELLO: Larry, those are really good questions. So I didn't want to get into too much of the organizational dynamics in this. I believe I provided your staff with a longer, I think by last count is 57 pages, which goes into I think a lot of the questions you have.

I do want to make a few points. Between the 3PLA and 4PLA, the 4PLA definitely lost, and there's absolutely no doubt in my mind. The 3PLA became the centerpiece of the SSF. The 4PLA's electronic warfare units were transferred to the Strategic Support Force.

What the 4PLA got as a consolation prize was an inclusion in the CMC's bureaucracy. As far as electronic warfare goes, you know, the PLA is actually making real what we've known for a long time, since Dai Qingmin's 2002 on Integrated Network and Electronic Warfare. They're creating, you know, a paradigm across the force of network electronic warfare. And you see that within the SSF and you see that in the joint level. You see that in the joint commands.

I mean the SSF combines electronic warfare and cyber warfare at the joint level. It combines the Network and Electronic Bureau. And then you have the Network and Electronic Countermeasures "dadui" under joint staff of the Joint Staff Department. And you have the Network and Electronic Countermeasures "dui" at the theater commands.

So they're creating this sort of massive thing. The importance of network and electronic warfare, it's become a much sort of ballyhooed like, you know, sort of Chinese innovation. It's not really anything new. The key difference for the Chinese is that network and electronic warfare have a great deal of synergies at the strategic level where you're basically focusing on, you know, the broader concept of cyber space, and you know, space-based use of communications and networks.

So jamming or attacking them through cyber attack or kinetic attack, all three of those work in very synergistic ways. The closer you get to the battlefield, however, the closer you get down to sort of tactical level engagements or regional engagements, the less those two have those sorts of synergies.

So while you have that sort of paradigm at the strategic level and it's really important for the theater commands, I don't think it's going to be.

I didn't get into the U.S. response about how to sort of counter electronic warfare because I didn't want to discuss that in public setting.

VICE CHAIRMAN BARTHOLOMEW: All right. Commissioner Tobin, I'm going to have to--oh, Mr. McCauley, you have something to add, and then I'm going to ask everybody to truncate their answers a little bit for time.

MR. McCAULEY: Okay. I forgot to address one question on training, logistics training. I haven't seen a whole lot of integration of reserve forces--a little bit. And I think most of their training, though, is sort of focused on developing a precision logistics capability internally and for supporting operations right now more along their periphery rather than to long distances although the transregional exercises do give them some sort of expeditionary type training, not for great distances but at least for some distances with using air, sea and land transport.

COMMISSIONER WORTZEL: Thank you.

VICE CHAIRMAN BARTHOLOMEW: All right. Commissioner Tobin.

COMMISSIONER TOBIN: Thank you. Thank you all.

You've helped us understand the restructuring and the organizational changes. I'd like to go a little deeper on some of the cultural shifts that are going to take place.

Mr. Cooper, you spoke about the need to marry the disruptive technologies into the military structure. Mr. McCauley, you spoke about the State Administration for Science, Technology, and Industry being responsible for promoting civil-military integration. I'd like you to expand on that to explain a little bit further how it's going to work. Is it very centralized R&D that's going to be channeling down through the theater commands? How do you see this marriage of disruptive technology moving forward?

And Mr. Costello, if you could expand a little further on the concept of "system of systems" so that I, you know, I hear it a couple of times, and I want to make certain that I'm clear on what that means.

So Mr. Cooper and Mr. McCauley about the high-tech component, disruptive technologies, please.

MR. COOPER: Sure. I think I would look at it by asking, you know, how do we get to the PLA after next?

COMMISSIONER TOBIN: Yes.

MR. COOPER: So we've seen what the national level command and control structure down to theater looks like, and I think over the next five to six years, we're going to find out sort of the unit, the combat unit at the lower operational and tactical level, how that's going to unfold below the theaters.

But the element we haven't talked a lot about is at the services. The services are still going to be the principal--again, I'm going to mirror image here because we don't know for sure what it's going to look like in China now--but the services theoretically now would become more the force providers, the equippers, et cetera. And so they would take on responsibility for working with the appropriate bureaus and departments in the Central Military Commission to plan what the PLA after next looks like.

And that right now I have not seen a lot of sources on or conjecture on. It will be centrally managed, and I think that, again, that was, to shorten my point I think in the written testimony, and sort of recommending potentially a request for more in-depth analysis of what does the topography of the weapons and equipment plan for the PLA look like now that they had this organizational structure change? I don't know what that looks like. It will be highly centralized I'm pretty sure.

That part of the culture won't change. And that could be--again, that could be advantageous to China and not so much to us if we're not careful, but I think it will not be hard to ascertain where the CMC is going to choose, prioritize, and then resource technological advances.

And there are a few areas we've begun to see this. We just need to dig a lot more deeper. You know when some U.S. strategists talk about man-machine interface, we very much still see the man in the loop. Chinese sometimes when they write about the future and about AI, they don't see the man in the loop at all. It's much more dependent on sort of having automated and AI kind of capabilities that can--and again, that's either way, way off base or it's going to be extremely disruptive, and the main point is that we don't want to not know where they're headed and what they're thinking about. And I think their thinking will become more clear as we see where they put their resources.

VICE CHAIRMAN BARTHOLOMEW: I'll just note that our next panel actually is going to be on service level. So--

MR. McCAULEY: You know I think part of the civil-military integration is to sort of take that concept at top level design and direction and sort of marry military requirements with

civilian research and civilian assets.

Part of the civil and military integration is to save resources and creating efficiency within research and requirements for the military. But the military seems to be clearly identifying some emergent technologies and they're using that to help direct civilian research in that direction so it is a sort of a top level focus on providing resources against areas that they think will be really critical in the future, such as AI and quantum computing and quantum communications.

There's always divergencies within the PLA on different subjects although some of the writings I've seen sort of diverge from what Cortez was talking about. While they see the advantages of say AI, they still have this idea that even though technologies drive core military capabilities, it's still man who determines the outcome of war, and so I think for those thinkers to give up overall control, you know, manned control over operations and equipment operating would be fairly difficult for them to do.

COMMISSIONER TOBIN: So let me just say so centralized you both see it as happening, which will in some ways it could be to their strength, but it may not. It's not Skunk Works coming up and innovation can happen sometimes better that way.

Mr. Costello.

MR. COSTELLO: Very quickly. System of systems, RAND actually did a really good paper on this. Chinese view warfare as the contention of system of systems between opposing nations. System of systems at its core is a suite of information, is a complex of information systems that enable sort of cohesive military capability.

I'll say this. When it comes to innovation, sort of next-generation technologies, we need to sort of recognize that there's a--at least for the SSF, there's a third corps. There's a third like cadre here that I don't think is recognized enough. The Chinese military employs a vast number of civilian cadre that are focused on science, technology and research.

The SSF, it's almost as though that I would consider them to be a third branch of sort of the SSF. Also when you're talking about civil-military integration, at least from the SSF standpoint, the SSF has created partnerships at universities so that when students graduate they join the SSF. They have a partnership with Huawei for cyber defense.

I think, you know, looking at the sort of SSF, at least for quantum and artificial intelligence, SSF, I think, is going to be a key sort of force in sort of pushing these things forward. At least that's how the Chinese view it as a sort of a force for new type technology and force development.

The SSF's preponderance of technology and information provide natural synergies for training AI algorithms and also keeps them under the direct control of the Central Military Commission.

Quantum, most quantum, most sort of obvious use of quantum technologies is going to be in space-based communications, and the SSF has effective monopoly over that. Any attempts to sort of include, you know, quantum communications into military reach is going to undoubtedly have the SSF.

I think the broader, more interesting question is rather civil-military--not civil-military integration but civ-mil relations when it comes to advanced technologies, specifically in cyber space and some other ones, how the military resists any attempts for coordination, for greater coordination with civilian authorities, because they believe that could diffuse their power and their independence.

The question is when it comes to things that are cross-cutting between civ-military

domains--AI, biotech, cyber space, space--how the Chinese bureaucracy, how the Party itself is going to manage competing interests between the military and civilian establishment, or in the interest of cyber space where coordination is required, how it's going to allow for coordination because it's in the best interest of everyone in China, or balance the tradeoffs in security that lack of coordination would entail.

MR. McCAULEY: I've looked at system of systems operations in a lot of detail, and operational system of systems is sort of the counterpart to and foundation for joint operations. It's the integrated C4ISR system that ties together units, platforms and weapons and equipment, which then allows for integrated joint operations.

They've created a whole jargon which you really have to sort of understand all their terminology to almost understand what they're writing about. But they also talk about operational system of systems, and these are integrated force groupings which are sort of modular organizations that they can use as building blocks to build larger force groupings, and also because of the modularity, they can have sort of plug-and-play as requirements on the battlefield change. They can change and evolve the force structure to meet those new requirements. So it's kind of a complex concept they're developing. But it is very integral to everything that they're doing.

VICE CHAIRMAN BARTHOLOMEW: All right. Commissioner Stivers.

COMMISSIONER STIVERS: Thank you.

There seems to be a consensus from you all and from most everything that I've read that President Xi is consolidating his control and strengthened his control over the military.

Now understanding that this is the message that Beijing certainly wants to project and understanding that the system is opaque and that if there were divisions, we may not see them, have you, is there anything that you've come across that would contradict that consensus or that conventional wisdom?

Obviously rooting out corruption can have a different effect also in terms of creating enemies. And in many countries, you don't see the divisions until a crisis actually happens. So is there anything that you've come across or any information that would contradict that assessment?

MR. COOPER: I haven't seen that yet. I mean if you do a personnel reduction of 300,000 people, which is part of the reorganization and restructuring, at the same time that you're again sort of shattering or eliminating alternate power centers to that single power center, you know, there's going to be a backlash of some sort.

And, again, I haven't seen anything to indicate that that backlash is taking the form or shape that would threaten Xi's authority. I think he has wisely I think begun to really, you know, improve the perception of the PLA among the Chinese populace and really again has shown them to be a part of this, this great triumvirate, you know, Party first, you know, Party-state, and that he's done a very good job of raising the profile of the PLA and really of the average soldier in many respects at the same time he's doing this.

So I think he's, you know, I think he's keeping that base strongly behind him. I think what you'll see is when he actually breaks, if he--I should say "if" because I'm not sure that he will, but if he actually breaks with the transition, the constitutionally determined transition cycle that's been in place since, really since the early '90s, and did not step down from posts--and of course he holds three major posts--so steps down from posts in, you know, in 2022, then we'll see what happens as that begins to develop.

There will be internal, you know, maneuvering for the next generation of leadership and,

of course, generally speaking, he's really only "required," and I put that in quotations, to step down, you know, really from the presidency. There's no such really necessary requirement for the CMC Chairman or for the Party General Secretary. So there could be, you know, a mix of sort of how he maneuvers in that regard.

So I think as over the next couple of years as we begin to look toward 2020 to 2022 period of time and look at transitions before the next Congress, we'll see if there's something like that. But right now I don't see it.

MR. COSTELLO: I really don't have much to say on the topic. It's more of a procedural sort of observation. Correctly answering the question that you have means questioning our assumptions on an ongoing basis.

We need honestly better primary source research on a lot of what the Chinese are saying. There's a tendency to just not listen to them, which is problematic. We do need to listen to them. We need to listen to what they write or read what they write. We need to listen to what they say and obviously evaluate those against, you know, against realities, to seek truth from facts, to paraphrase someone.

We also need to, we also need to make sure that we include younger analysts in analyses, and I'll tell you why. Obviously that might be a little self-serving. I'm not sure. But the reason is--

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: It depends on whether you define yourself as younger or not.

[Laughter.]

MR. COSTELLO: I'm 31, man. I don't know. I'll say this. The point I'm trying to make here is that I think a lot of us get into group-think mentality, like the idea that Chinese, you know, cyber warfare--I mean for me Chinese cyber warfare strategy is inherently offensive. I think it's something we've assumed for a long time. It's something they've talked about and they recognize.

But I'm not entirely like--we do need to question that on an ongoing basis. Younger analysts tend to do that, and so I think just from a procedural standpoint, make sure including them and having them and having them at a seat at the table is important.

MR. McCAULEY: I pretty much agree with Cortez. I think Xi is consolidating power. While you do hear grumblings both within the military and the Party, it doesn't seem like it's anything serious for Xi to consider.

Of course, with an opaque system, it's always hard to know, you know, until something happens in that way, and then it's an intelligence failure. But he does seem to be consolidating power, and I think building credibility at least among nationalists and whatnot in the country, that is providing a good foundation for him.

VICE CHAIRMAN BARTHOLOMEW: All right. Commissioner Wessel.

COMMISSIONER WESSEL: I'll do my Garrett Morris imitation, if you will, also showing my age.

COMMISSIONER STIVERS: Who's that?

COMMISSIONER WESSEL: I know.

[Laughter.]

COMMISSIONER WESSEL: Thank you all for being here. And this is a fascinating discussion and thank you for the depth and breadth not only of your work but the preparation of your testimony.

I've been on the Commission since the beginning, since it was first created and I've been-

VICE CHAIRMAN BARTHOLOMEW: He was a young man when he started.

[Laughter.]

COMMISSIONER WESSEL: I was a young man. And watched over the years our expectations and projections of Chinese capabilities, the pace of which it has changed accelerate. You know, five or seven years ago when we heard about 2020 being the tipping point or, you know, that was fine, that was a ways off. It's less than two years away now.

So, you know, this is not a sanitary discussion. This is actually a question about capabilities and threats. We've had a change here in administration and new documentation out from the national security strategy and other statements.

What changes have you seen, if any, among Chinese statements, plans, et cetera, over the last year that might accelerate some of the tipping points, some of the challenges that we look at, and you stated in your testimony of, you know, 2020, 2025, you know, mid-century, et cetera? Have the Chinese accelerated their activities? Have there been big changes that you're concerned about over the last year?

MR. COOPER: I believe so, and again we're still talking, you know, nearly two decades out, but I think Xi Jinping's speech at the last Congress where he talked a little bit about 2035 and mid-2030s as a goal, there's no specific statement that says we will be able to do X, Y and Z, you know, against an adversary in a specific regional contingency or we will be able to project force to protect our interests beyond our greater periphery, you know, and out beyond the second island chain and beyond the Indian Ocean.

He didn't say that specifically. But just the context of his discussions with the military and his official speech led me to believe that really while that 2049 Centennial is kind of a target on the wall, that he expects, given the remaining time he has in power, whatever that is going to be, that he will at least have established the framework that's going to get them by the mid-2030s to where they want to be, which is really to be able to again basically control their periphery and potentially to be able to project force to secure--

COMMISSIONER WESSEL: But have you seen that as an accelerant, an accelerant over the last year, or is that just, you know, something that he's planned on for the last three years? You know, again, is there a response to U.S. policy and statements or is this sort of a continuum?

MR. COOPER: I think it's a continuum, but it's a little bit of an accelerant, and I think the accelerant, if I could characterize it, and hopefully turn it over to these guys for an answer, but if I could characterize it, it would be that Xi Jinping had a clear plan when he took over of what he wanted to do, but having a clear plan for what you want to do and being able to do it, being able to overcome those obstacles to actually set the restructuring in motion, and this is an entire restructuring to the national defense enterprise in China, he made that happen in beginning roughly mid-2014 with some small changes, and then laying the groundwork for the anti-corruption campaign, and then he actually set it in motion at the beginning of 2016, I think that's--you know, he realized then that his plans could be realized, and I do think that's--I do think that's kind of an inflection point.

VICE CHAIRMAN BARTHOLOMEW: Anybody else?

MR. McCAULEY: I think the PLA has been talking about the need to accelerate their modernization for a number of years now. In part, that's driven by their assessment that revolution in military affairs is being integrated into foreign militaries more quickly than it's

being integrated into the PLA, and I think what Xi has done and the reforms he has planned for 2020 have really, have accelerated the modernization effort within the PLA. It broke a lot of the impediments that were holding back because many of the things that we're seeing in the PLA have been talked about by PLA academics for more than a decade.

But Xi is allowing them to actually be implemented in the force, and we're seeing a widespread reorganization of the force with the Strategic Support Force, the Logistic Support Force. Last year, we saw a massive reorganization within the military to a brigade system and combined arms battalions. Again, these are things they have talked about, but they weren't being implemented.

And I think it's also in response to the fact that they're still trying to implement the revolution in military affairs based on information technologies, but they see that the next revolution in military affairs is going to be based on intelligent technologies, and they need to be able to get their information technology modernization so that they can then incorporate that next revolution in military affairs that they see coming down the road.

And I think that's what's running the impetus to try to speed things up and shortening modernization timelines.

MR. COSTELLO: Yeah. Kevin sort of reminds me, they call this "overtaking around the turn." They believe that the current sort of information age of warfare on which the United States is sort of the unrivaled paragon takes advantage of the United States' natural existing inertia and dominance in information technologies. And China can catch up to that.

However, China believes the next generation technologies, which is AI and quantum, don't necessarily--the U.S.' inherent advantage in information technology does not necessarily give it sort of unrivaled or supreme advantage in quantum or AI, and that it provides plenty of opportunities for China to "overtake around the turn."

What these technologies do, however, and I think this is important, is they offset the metrics of military power and transform them from just based on data towards processing power. I think that's important because it shows that China is trying to move from an asymmetric-centric sort of strategy to what you could call an offset-centric strategy, or one instead of exploiting vulnerabilities and weaknesses, it seeks to change the metrics by which wars are waged.

VICE CHAIRMAN BARTHOLOMEW: All right. I'm going to exercise the prerogative of the chair and ask my own question, and then we'll go to Senator Goodwin.

But as I was going through the material and listening to you all, I find myself--this might be semantics--but just struggling a little bit with this whole concept of modernization, how it's designed. How can you even put a time goal, a time, sort of a time frame onto modernization when it would seem to me that I mean we're always moving into the future and that modernization, what you do by the time 2030 comes around, especially, Mr. Costello, what you were just saying about, you know, data, AI, quantum, might be obsolete.

I mean how, how is a successful modernization defined? Is it--are the Chinese, are they viewing modernization in the context of their main competitor, which would be us, that they, that they are trying to be more like us, and that's what defines as modern, at the same time that they are preparing--what was the phrase that you just used--"overtaking around the bend"? I just would like to understand more sort of the definition of modernization.

MR. McCAULEY: I think the U.S. has been sort of the goal for their modernization effort based on information technologies. And I agree that, I mean modernization never ends. You still have to have planning and goals to achieve.

The PLA, I think, has been very good at being flexible in realizing that as you move

along these goals and timelines need to change from time to time and need to be adapted to new information and new requirements and that sort of thing.

I think they've been good at adjusting their modernization as they move along, but I think a key thing is that they see in the intelligent revolution of military affairs--the information revolution in military affairs, they're playing catch-up with the U.S.

They see the revolution in military affairs based on intelligent technology as the way to jump ahead of the U.S., but I think they still need to implement a lot of the information technology modernization first so that they can then really take advantage of the intelligent, and I think a lot of that has to do with just personnel development.

They need to really develop a corps of officers who are more adept in not only joint operations but also advanced technologies, which is also part of the civil-military integration. They're trying to leverage civilian scientists and develop civilian talents at a young because this starts in the grade school--military education--and they're trying to focus military education and develop young talent who can then be brought into the military and provide that corps of skilled talent that they need to develop modern operation systems.

I mean it's very complex and a lot of moving parts, but I agree, modernization never ends. It's always, you can't stand still.

MR. COOPER: I think there's an important aspect, though, that is, that is in the Chinese mind, the reason they're able to set some of these milestones and for Xi Jinping to even say that they will have completed something by 2049, and that relates to, you know, to the army kind of doing what the Party has already done. The Party, you know, was a revolutionary party and then it officially became a ruling party. It's not a revolutionary party; it's a ruling party.

The PLA still has to catch up with the revolution. They're still in that, they're still in that mode of having to make sort of this giant leap in order to be able to accomplish the basic objectives that the Party has said, the Chinese National, the National Development Strategy calls for.

And so until they can actually win wars over, against those threats that they perceive, and that's why, that's why I tend to stress threat perceptions when I talk about how they, how they modernize or how they restructure or how they see their--adjust their strategic guidelines.

When they put out the current major strategic guidelines, it's still the 1993 ones that Jiang Zemin put out, and they've been adjusted twice, big adjustments, but basically that was the realization then that the revolution of military affairs was occurring and that the PLA had nothing to do with it. It didn't understand it. It couldn't meet the requirements of it, and thus it could not fight any wars if it had to to protect their interests.

And so they look at, okay, the point at which we've at least completed that modernization. And then we need to continue to evolve of course. But when you complete that is when the PLA can win those wars to protect those interests against those threats, and they are just now beginning to see that and potentially to get the informatized capabilities that will catch them up, and then it's a matter then of simply being able to stay ahead.

VICE CHAIRMAN BARTHOLOMEW: Before you answer, Mr. Costello, I want to add a nuance, which is living in an era of intensifying disruptive technologies, and we're talking about, I mean none of us yet understand really what AI is bringing forward, what quantum is going to be doing, are the Chinese building a system, is the Chinese government building a system that is going to be more flexible than the system that we have and better able to incorporate and use these disruptive technologies than ours?

And we're going to let our young, our younger person here answer. Ooh, I would say just

one more thing, which is that people are already saying that if you have a 15-year-old and a 12-year-old, the 12-year-old is already using communication technologies that makes the 15-year-old obsolete. So, Mr. Costello, you better be young fast.

[Laughter.]

MR. COSTELLO: Yes, thank you.

I was reminded of that when Snapchat had an update recently and I didn't know how to use it anymore.

No, so, I mean the Chinese are very sort of direct on this. They believe there's no modernization without informatization, and they've increasingly sort of tagged sort of, you know, military's ability sort of at informatization as a metric of how, how much it's modernized. I mean I think, I don't think there's any specific sort of set of, you know, requirements. I think it's just sort of they know it when they see it. I think it's just, it's mostly expressed in sort of operating capability.

I think what you're asking is, is does China, China's industrial policy planning and civil integration, their methods of both sparking innovation and integrating it and applying it to the military, are they inherently better than the United States?

VICE CHAIRMAN BARTHOLOMEW: That, but also as they are doing reforms, are they positioning themselves in a way that will make them more flexible in adapting these disruptive technologies that are coming than we are? I mean are we, are we using paradigms that are older, that they are updating their paradigms? Are they only taking themselves to where we are?

MR. COSTELLO: I think that's a good question. So, you know, basically what you're asking is, is if they tag what their idea of modernization and development to that of the United States, once they get there, where do they go from there? I think it's a good question.

I really have no idea. I can't speak for the defense establishment as it stands today, but it seems as though that they are taking the matter very seriously. I mean they are--the Department of Defense is continuing to sort of understand how best to incorporate these technologies, how to create new operating models. I mean I'm pretty sure Secretary Mattis has said that innovation is also when it comes in the form of organizational change as well. I think these are all things that we're looking at.

A sort of deleted or cut section from my testimony dealt with that, but again it's not something I wanted to release publicly.

I think when China does develop or gets to a development sort of area where it does feel comfortable, it's going to deal with the same innovation dilemma that any sort of modernized military is going to deal with. I think it's difficult to say if they are going to be more flexible or less flexible than we are.

I think, I think that you could say that the Chinese bureaucratic culture and strategic culture is given to dogmatic thinking and likes to stratify, you know, stratify consensus at a higher level and then beats back anything that sort of like can threaten it from a lower level.

I think those are sort of bureaucratic impediments that would give an indication it would be difficult for them to be more flexible after--especially if they reach a level where they believe they are operating in top form. But, again, reform and change in bureaucratic culture, we can't account for whatever changes may be five to ten years from now, only to say that right now I would think that they would be far less flexible.

VICE CHAIRMAN BARTHOLOMEW: Mr. Cooper, Mr. McCauley, any quick observations?

MR. McCAULEY: I'd just say I see a lot of emphasis in current writings on the need for innovation, which tells me there isn't a lot of innovation within the PLA, and especially as far as operational methods or basically doctrine and tactics goes.

And they seem to be really emphasizing the need to develop new operational methods for conducting conflicts, and also you can see, even at the say tactical level, officers are sometimes having difficulty on integrating helicopters or artillery into tactical operations. So if they're having trouble with that, then, you know, much more difficult high-end technologies are going to be difficult to integrate.

Also I've been looking at sort of the change in operational methods, and while there is some change from say the 2006 Science of Campaigns and more recent publications on campaigns and tactics, it's not greatly different. I mean there's not a huge amount of innovation going on in their doctrine and tactics.

VICE CHAIRMAN BARTHOLOMEW: All right. Thanks.

MR. COSTELLO: One--

VICE CHAIRMAN BARTHOLOMEW: Quickly.

MR. COSTELLO: Very quickly. Recently, China took 120 researchers from across the military and brought them in as I think academicians of the Academy of Military Science. I can't emphasize--and it was sort of a blip, not--I can't really emphasize how important that is. That shows, in my opinion, that shows an overt sort of top-down design that is intended to take, you know, evolving notions of what technological requirements of warfare, integrate those into new strategic, new strategic paradigms.

I mean the problem with the Academy of Military Science is and National Defense University is that it is largely--it is an ivory tower in the military, and it's largely divorced from operating realities of, you know, at least for cyber forces. So taking those researchers, the sort of hidden cadre that I was talking about earlier, and sort of bringing them in, giving them a voice in the PLA sort of strategic think tank I think is extremely important.

VICE CHAIRMAN BARTHOLOMEW: All right. Thanks.

Senator Goodwin.

COMMISSIONER GOODWIN: Thank you.

Let's wrap up for lunch with sort of a wild diversion here.

[Laughter.]

COMMISSIONER GOODWIN: Not about Snapchat or being the youngest member of the panel.

[Laughter.]

COMMISSIONER GOODWIN: Understanding the focus of your work and certainly of today's hearing, I think the testimony I've heard here today only underscores why security issues like this can't be divorced or considered in a vacuum from broader issues surrounding our relationship with China, trade, investment in the United States, economic issues, and the like.

And I think we see that here as modernization efforts bring with it significant and perhaps growing interaction and integration with civilian firms, and Mr. Cooper, as you noted, the corresponding need for an integrated government and commercial effort to counter Chinese gains and offset the compromise of U.S. intellectual and technical capital.

And, indeed, Mr. McCauley, you even in your list of recommendations identified four or five areas of dual-use technologies that you propose CFIUS pay particular attention to when it comes to investment by Chinese entities.

So to get you outside your comfort level, say you get a call from a governor or a mayor or

an economic development official in a city or a state or a region that needs economic diversification and is constantly anxious and perhaps desperate for investment and all the economic development and job creation that comes with that. And they say we have a Chinese state-owned enterprise that's going to invest billions of dollars, a multi-billion dollar investment, to build a natural gas storage hub or distribution facility or one of these robotics plants, employing several hundred Americans. What's your advice to that governor or mayor? Is it worth the risks? What are the risks?

MR. COOPER: My advice in that particular case involving, you know, involving sort of energy and technologies associated with energy would be that we can't close all those doors nor would it be to our advantage to close all those doors.

And I think in that particular case probably even though I don't know much about related technologies to that sector, generally speaking would be, you know, that's something that you need to do after it's been through the appropriate, you know, evaluations, and probably in that case it wouldn't even be a CFIUS issue unless they were making specific investments in existing U.S. companies' infrastructure, et cetera.

But I think the bottom line in that is that in order to be able to make calls like that better, we need to understand from the Chinese perspective what they are evaluating in terms of civil-military integration and military-civil fusion. Either of those terms can be useful. But from a Chinese perspective, what are they prioritizing that they themselves can't innovate or aren't innovating or find it more cheap to go and exploit elsewhere and then bring home to apply to military purposes?

And that relates to, in my written testimony, this idea of getting much more detailed assessments of what's the topography of, you know, what's the shape, you know, the map of Chinese thinking, their desires, their priorities, and where are they really beginning to put money and put resources for things that we assess to be designed primarily for at least dual-use and maybe even principal military use?

So it's kind of a long answer to say it depends, but it really requires, I think, a pretty detailed, directed assessment process to say where are they going because the problem, you know, and I noted it in the written testimony, the problem is in the intelligence, counterintelligence battle in terms of protecting U.S. industrial, you know, intellectual and technical strength, we're losing that badly.

And if we don't do something about it, we're going to continue to lose it in even worse fashion. And, you know, again, I wish I could give more than that to it, but I think it's going to take some serious, some serious thinking and some more detailed assessments of the full range of things that are being prioritized potentially for military use.

MR. McCAULEY: Yeah. This is definitely out of my comfort zone, but, yeah, I think if it's not being done already, a very sort of holistic approach needs to be taken too. I think the real fear is either their acquisition of companies that have key technology and capabilities or developing a relationship with U.S. companies where they can get access to those technologies are really sort of the key things that need to be addressed and looked at.

And, in particular, sort of not only their economic espionage to acquire technologies from us, but also they use a number of other deceptive practices, and I think it has to be addressed and examined very carefully. I'm sure in many ways, it is, but I'm not sure--maybe a more holistic approach identifying technologies and identifying companies that have those technologies and making sure they don't get acquired or make sure that they're secure and their secrets aren't being stolen or gamed in some sort of deceptive practice because the Chinese have used, sort of cut out

people and businesses to acquire things in the past, and so that's sort of a difficult area to identify and guard against. But it's part of their acquisition process.

VICE CHAIRMAN BARTHOLOMEW: All right. Mr. Costello, anything to add?

MR. COSTELLO: I think the issue of supply chain security and entanglement is incredibly, incredibly complex, and do we have three or four more hours?

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: We don't.

MR. COSTELLO: Other than that, I don't have anything to add.

VICE CHAIRMAN BARTHOLOMEW: All right.

Thank you very much to our witnesses. This was a very interesting discussion. We were supposed to break for lunch a little bit early today until 12:35. Since we're doing it a little bit late, we'll start again at 12:40. So thank you to everybody, and we'll see you again at 12:40.

[Whereupon, at 11:48 a.m., the hearing recessed, to reconvene at 12:39 p.m., this same day.]

PANEL II INTRODUCTION BY SENATOR JAMES TALENT

HEARING CO-CHAIR TALENT: Okay. We will reconvene for panel two. Our second panel today will focus on how China's military reform effort has affected their ground, naval, air and missile force modernization efforts, how service modernization requirements are coordinated with the Central Military Commission, and the timeline associated with China's modernization efforts.

So first we'll hear from Mr. Ben Lowsen. Is that pronounced right?

MR. LOWSEN: That's perfect, sir.

HEARING CO-CHAIR TALENT: Good. A China advisor for the U.S. Air Force who specializes in Chinese political and security affairs. He previously worked as an Asia advisor for the U.S. Navy and served in the U.S. Army as a field artillery officer and China specialist.

His military service has included tours of duty in South Korea, the Pentagon, and China, and also serving as Assistant U.S. Army Attaché in Beijing from 2013 to 2016. I don't guess we saw you when we were there?

VICE CHAIRMAN BARTHOLOMEW: I don't know if we crossed paths one of the times that we were there.

MR. LOWSEN: Oh.

HEARING CO-CHAIR TALENT: The Commission goes to China every year that they let us in so--

[Laughter.]

HEARING CO-CHAIR TALENT: Mr. Lowsen will address the impact of China's military reform efforts on ground force modernization.

Next will be Dr. James Holmes, the J.C. Wylie Chair of Maritime Strategy at the Naval War College. A former U.S. Navy surface-warfare officer, he was the last gunnery officer in history to fire a battleship's big guns in anger, during the first Gulf War in 1991, and would that have been the USS Missouri?

DR. HOLMES: Wisconsin, sir.

HEARING CO-CHAIR TALENT: Wisconsin.

DR. HOLMES: Yes.

HEARING CO-CHAIR TALENT: His books include Red Star Over the Pacific, an Atlantic Monthly Best Book of 2010 and a fixture on the Navy Professional Reading List. General Mattis deems him "troublesome."

[Laughter.]

HEARING CO-CHAIR TALENT: I don't know whether that's good or not.

VICE CHAIRMAN BARTHOLOMEW: I was trying to understand if that was "troubling" or "troublesome."

[Laughter.]

HEARING CO-CHAIR TALENT: Dr. Holmes will address the impact of military reform efforts on China's naval force modernization.

Following Dr. Holmes will be Dr. Brendan Mulvaney, the Director of the China Aerospace Studies Institute at the National Defense University.

Dr. Mulvaney served in the Marine Corps for a quarter century, flew more than 2,000 hours as an AH-1W Cobra pilot, and was an Olmsted Scholar in Shanghai, China.

In 2013, he transferred to the U.S. Navy Academy, where he was the Associate Chair for the Languages and Cultures Department and taught Mandarin Chinese, Chinese culture, and

cross-cultural literacy.

Dr. Mulvaney will address the military reform and China's air force modernization efforts.

And finally we'll have Dr. Michael Chase, a senior political scientist at RAND and an adjunct professor in the China Studies and Strategic Studies Department at Johns Hopkins University's School of Advanced International Studies.

A specialist in China and Asia-Pacific security issues, he was previously an associate professor at the U.S. Naval War College where he served as director of the Strategic Deterrence Group in the Warfare Analysis and Research Department.

He is the author of the book Taiwan's Security Policy and numerous chapters and articles on China and Asia-Pacific security issues. Dr. Chase will address the impact of military reform on missile force modernization.

I'll just remind the witnesses to try to keep your opening remarks to seven minutes so we have enough time for questions, and Mr. Lowsen, we'll begin with you.

OPENING STATEMENT OF BEN LOWSEN, CHINA ADVISOR, U.S. AIR FORCE

MR. LOWSEN: Thank you, sir.

Vice Chairman Bartholomew, Senator Talent, esteemed commissioners and colleagues, thank you for inviting me here to speak today.

The Commission asked me to answer questions about the effect of the recent reforms on the modernization of China's People's Liberation Army ground forces, called the PLA Army, or PLAA. There are four points I would like to present:

First, the most important thing to understand about the reform, particularly as it has affected the Army, is that this is Chinese President Xi Jinping's reform, designed to consolidate Xi's hold on the military, which has time and again proven itself the final guarantor of the Chinese Communist Party's power over the country.

For the PLAA, in particular, Xi prescribed a "new type army" concept to augur in what he called a "phoenix nirvana" for the Army, meaning a painful and radical transformation, like that of a phoenix's rebirth. Xi's reform is painful because it has reduced the Army, the root and once-dominant service of the PLA, to a position coequal with its sister services.

The Central Military Commission, previously led by Army officers, now features representatives of all the traditional services. The former General Departments, dominated by the Army and noted for their corruption, have been broken up. The Army's seven Military Regions once anchored China's territorial defense but are now replaced by five joint theater commands with theater armies subordinate to them.

The Army has absorbed the brunt of the force reduction, deactivating five of its former 18 group armies and transferring most leaders away from their home bases. We might even say that Xi has burned down his Army. In short, Xi's consolidation has allowed him a level of control over the PLA not seen since Deng Xiaoping's reforms of the 1980s.

In the short term, these reforms have created some doubt in the leadership as it adjusts to the new structure. Leading PLA researcher Dennis Blasko notes that the number of trans-regional exercises has dropped from a high of 29 in 2015 to only about ten in 2017.

Such disruptions may lead us to believe that Xi's machinations and the environment of pervasive political control are placing a strain on PLA forces and limiting their ability to act effectively. But China sees the exact opposite: political control is the assurance that PLA forces will perform as expected. In the end, I would strongly caution our national leaders not to assume away the impressive capabilities of China's Army and military in the hope that its human fallibilities would hobble it.

Moreover, I believe in the long run they will produce a more capable joint military force, which leads me to my second point:

The reformed PLA structure closely resembles that of our own military in which service commands design and field forces for joint theater commands to employ, with each theater command controlling a subordinate theater army, navy and air force command. We might be forgiven for thinking the PLA had copied our homework. In principle, such a structure allows each service to contribute to national decision-making in its turn--a balanced arrangement combining the domain expertise of the services with the synergy of a joint force.

Third, although the Army is no longer the primary territorial defender, traditional ground forces are still key to China's defense. PLAA's first mission remains reunification of Taiwan, followed by regional contingencies like the Korean peninsula, as well as quelling domestic disturbances. But starting with Hu Jintao's "new historic missions" and accelerating under Xi's

reforms, the PLAA is increasingly concerned with a wide range of operations abroad: everything from peacekeeping to infrastructure protection.

Make no mistake: the PLAA's increasing lethality stands as both threat and deterrent to any nation challenging the extensive areas and domains over which China claims sovereignty. That said, in the near to mid-term, it is far more likely that China's neighbors will meet the PLA Army in neutral or cooperative contexts.

Instead, it is with the PLA Navy and the PLA Air Force that China's neighbors will find themselves confronted--as well as in cyberspace and other domains--as China makes clear its intent to use any means it can get away with, legal or otherwise, to bend the international order to its advantage, which brings me to my final point:

We must wake up to the threat posed by China and the other hostile actors eroding the peaceful, equitable international order, and eating away at the strength and resolve, both ours and our allies, which support that order. China is at once the greatest beneficiary of the open international system and the most prodigious inventor of ways to undermine it.

For example, China's military uses cyber warfare to steal military secrets to profit state-owned enterprises. These enterprises in turn use the open market to buy foreign companies and acquire their intellectual property to fuel China's own weapons development--and erode our advantages.

China obsessively builds military forces not only to drive the U.S. out of East Asia but also to threaten its neighbors, doing all it can short of invasion to frighten and cajole them into abandoning their own claims. And using the largess it has gained through trade, China sets itself up as debt holder to the developing world, buying off local officials and strong arming their nations.

Some have even claimed that China is offering a competing system of values. But I would submit that these so-called "values" are an obvious sham, a facade behind which China bilks its partners. In fact, this is a war on our values, values we share with most of the world. We preserve these values by ensuring America remains strong and that our Army and military maintain their competitive advantage. But to do so, we must first recognize the war we are fighting, shine a light on our opponents' corruptions, and thwart their destructive actions wherever we are able.

Thank you.

PREPARED STATEMENT OF BEN LOWSEN, CHINA ADVISOR, U.S. AIR FORCE

February 15, 2018

Ben Lowsen

China Advisor, U.S. Air Force Checkmate

Testimony before the U.S.-China Economic and Security Review Commission

China's Military Reforms and Modernization: Implications for the United States

The Commission and the Department of Defense annually produce some of the most important products available to China researchers, providing a baseline of reliable information which encourages further research. I intend to enhance this knowledge using key Chinese language sources, consultations with other PLA researchers, and my experience working with the People's Liberation Army (PLA) bureaucracy. In particular, I have answered the Commission's questions with a focus on the Chinese government's own beliefs about and intent for building the PLA Army (PLAA), which is too easily lost in translation.

1. How has China's military reform effort (including the creation of the Strategic Support Force and Joint Logistics Force) affected ground force modernization efforts?

When Chinese president Xi Jinping restructured the People's Liberation Army (PLA) in 2016, we in the West focused on the reorganization of the Central Military Commission (CMC) and PLA as inaugurating a new era for PLA joint operations. While such changes will create a more rational force structure and operational concepts in years to come, Xi's first goal was to consolidate his hold on China's military apparatus, the final guarantor of Chinese Communist Party (CCP) power over the country. His coups de grace came with his abolition of the four General Departments and establishment of Theater Commands. As we shall see, this shifted the ground force from a position of preeminence to one of parity with its sister services.

The former General Departments (Staff, Political, Logistics, and Armaments or GSD, GPD, GLD, and GAD, respectively), all headed by powerful CMC-member Army officers, were noted for their corruption. Most prominent were the selling of rank (GPD) and procurement fraud (GLD and GAD). Xi broke up of the four General Departments into 15 smaller joint departments, consolidated their successor organizations directly under the CMC, and kept their new directors off the CMC, thus creating structural checks on their ability to profit from their power.¹ This combined with a renewed system of discipline inspection and an anti-corruption campaign² mean that PLA officers can no longer run their departments as "independent kingdoms." Making the major departments smaller and preventing CMC members from controlling them leaves Xi in a position of significantly greater control.

Beyond the CMC, the Army's Military Regions (MRs) were another key target of structural reform. The seven former MRs were the Army's geographic commands, responsible for ground forces and missions in

¹ Ben Lowsen, "US Experts Talk Chinese PLA Reform," *The Diplomat*, March 23, 2016 (<https://thediplomat.com/2016/03/us-experts-talk-chinese-pla-reform/>, accessed February 8, 2018).

² Song Shaohui, ed, "郭伯雄、徐才厚贪腐问题不是他们问题的要害 [Guo Boxiong, Xu Caihou: Corruption Is Not the Greatest of Their Problems]" *PLA Daily*, May 27, 2016.

their areas. The MRs were the backbone of the PLA's force structure, with other services' geographic chiefs appointed as deputies to the Army's MR commanders. Although the MR commanders did not habitually command other services' forces, the symbolism was clear: Army came first and Army's ground missions formed the basis for PLA operations, as they had since the foundation of the PRC. Beyond that, I suspect Army's prestige and deep pockets endeared its leaders to the local CCP officials, creating a feedback loop confirming the indispensability of Army largess.

With the reform, the CMC has abolished the seven Army MRs and replaced them with five joint Theater Commands (TCs) as the primary defenders of national territory. PLAA forces have been relegated to being a single service component among the TC forces, commanded from Theater Army headquarters established *de novo* in new cities. Furthermore, China has very publicly ousted a number of officers previously seen as up and coming³ as well as publicizing the suicide of several senior officers caught in its anti-corruption dragnet.⁴ These structural reforms may not have been enough to change the culture of corruption entirely, but they have surely broken the power of "Big Army."

This has in turn speeded implementation of other reforms:

- (1) The most significant reduction in force size of all the services;⁵
- (2) Deactivation of five group armies, reducing the number to 13 from 18;
- (3) Continued conversion of divisions into brigades as the primary unit building block;
- (4) Emphasis on mobility, ensuring a higher proportion of helicopter and special operations units, including the planned expansion of the PLAN Marine Corps to 40 thousand troops from 12 thousand.⁶

Dennis Blasko, a leading PLA researcher who follows the development of ground units closely, characterized the reform as follows:

If judged by the type and complexity of training conducted in 2016 and 2017, ongoing reform has resulted in a short-term reduction in operational readiness in the hope of increased combat effectiveness by 2020 and beyond. The degree of chaos and anxiety in the Army has been unprecedented over the last two years as demonstrated by:⁷

- (1) Assigning new commanders and political commissars to all 13 new group armies; of the 26 new leaders, 22 were transferred from outside the TC's area of responsibility;
- (2) Cutting over 1,000 units at the regiment level or above;

³ "Xi Jinping appoints new man to tackle PLA corruption," *South China Morning Post*, March 2, 2017 (<http://www.scmp.com/news/china/diplomacy-defence/article/2075243/china-replaces-top-general-charge-tackling-military>, accessed February 4, 2018).

⁴ "Military casualties: top Chinese officers to die since the launch of Xi Jinping's anti-graft drive," *South China Morning Post*, November 28, 2017 (<http://www.scmp.com/news/china/diplomacy-defence/article/2121990/military-casualties-top-chinese-officers-die-launch-xi>, accessed February 4, 2018).

⁵ Ya Mei, ed. "Facts and Figures on China's military reform," *Xinhua Net*, December 19, 2017 (http://www.xinhuanet.com/english/2017-12/19/c_136837189.htm, accessed February 8, 2018).

⁶ "Reform of China's army enters a new phase," *The Economist*, August 3, 2017 (<https://www.economist.com/news/china/21725812-overhaul-says-lot-about-xi-jinpings-governing-style-reform-chinas-army-enters-new-phase>, accessed February 4, 2018).

⁷ Email from Dennis Blasko to Ben Lowsen, January 17, 2018.

- (3) Moving over 100 brigade and regiment-level units to new locations;
- (4) Transferring over 90 percent of military officers from the original group armies and 40 percent from combat brigades to different units;⁸
- (5) The number of trans-regional exercises dropped from a peak of 29 in 2015.⁹ before organizational reforms began, to only 15 in 2016.¹⁰ and to about 10 in 2017,¹¹ many of which were not reported in the military media as in prior years.

Although Jiang Zemin's crackdown on PLA business interests achieved some success in the 1990s, Xi's consolidation has gone further, giving him a level of control not seen since Deng Xiaoping's military reforms in the 1980s.¹² Politics notwithstanding, the new organizational structure does appear to be oriented toward a more rational, modern, and truly joint military force. Thus, it is likely that the most salient effects of the reform on modernization have been general disruption in the short term, with a more rational, tightly controlled, and trimmed down Army organization in the future.

2. What are the implications of the establishment of a PLA Army (PLAA) Headquarters for ground force modernization?

Often when we speak of military modernization, we are referring to weapons and equipment. The corresponding People's Liberation Army concept of "military development" (also translated as "army building") includes the development of military theory, weapons and equipment, system and organization, and talent building.¹³ Of these, however, the hardware remains the most expensive to develop, although the "software" components may present problems if not adequately carried out.

In theory, having a headquarters dedicated to developing ground forces, unencumbered by the need to develop joint forces, may allow a new level of PLA specialization in the ground domain. However, even the previous system had ground-focused offices mostly separate from those working on other domains. Most importantly, PLAA's reform leaves it in a place of diminished importance.

The previous Military Region structure made Army forces the principal military units. This accorded with PRC history in which the government repeatedly looked to its land forces to establish and enforce its

⁸ Ya Mei, ed., "Facts and Figures on China's military reform."

⁹ 高清：解放军今年重大实战化演习一场接一场 [Gao Qing: This Year's Massive Realistic PLA Combat Exercises, One After Another]," *Renminwang*, December 30, 2015 (<http://military.people.com.cn/n1/2015/1230/c1011-27995904.html>, accessed February 8, 2018).

¹⁰ Fan Yongqiang, Li Dayong, Fu Xiaohui, "中国陆军怎样走过“军改元年”[How China's Army Celebrates a 'Military Reform New Year]," *Xinhua Net*, January 1, 2017 (http://www.xinhuanet.com/mil/2017-01/05/c_129433633.htm, accessed February 8, 2018).

¹¹ Pan Zidi, ed., "中国军队 2 0 1 7 : 打造实战化训练“升级版”[China Military 2017: Creating a Realistic Training Exercise "Promotion Edition]," *Xinhua Net*, December 27, 2017 (http://www.xinhuanet.com/2017-12/27/c_1122176158.htm, accessed February 8, 2018).

¹² Ben Lowsen, "The 19th Party Congress and Its Implications for the PLA," *East-West Institute*, November 14, 2017 (<https://www.eastwest.ngo/idea/19th-party-congress-and-implications-pla-and-china-us-military-relations>, accessed February 8, 2018).

¹³ Hao Yuqing, Cai Renzhao, eds., *军队建设学 The Science of Military Development* (National Defense University Press, 2003), 273.

governance: first by defeating the Kuomintang Nationalists, then by maintaining order during the Great Leap Forward famine, Cultural Revolution chaos, the Soviet nuclear scare, Deng's coup to oust the Maoist remnant, and finally the battle to maintain power during Tiananmen in 1989.

Against the backdrop of reliance on the ground forces, naval and air forces played second fiddle at best. Since 1989, however, China has upgraded its PAP Force to be able to deal with nearly all civil disturbances, lessening if not eliminating its ultimate reliance on the Army to keep its grasp on governance. Moreover, China's geographically expanding economic interests have given new impetus to its strategic force projection services: PLA Navy (PLAN), PLA Air Force (PLAAF), and even its reorganized PLA Rocket Force (PLARF). Hu Jintao codified their new importance in his 2004 declaration of "Historic Missions of the Armed Forces in the New Period of the New Century," abbreviated "New Historic Missions" in Western sources. Today, China's expanding technological base is pulling the PLA into the cyber age, as embodied in the newly established Strategic Support Force (PLASSF).

To be sure, PLAA is responsible for its own piece of these expanding interests: peacekeeping, humanitarian assistance, and disaster relief in regions newly important to China, as suggested in the movie *Wolf Warrior II*. And of course the old missions of Taiwan conquest and territorial defense are still PLAA's primary missions. But the bottom line is clear: PLAA must now share its pedestal with the other services.

Xi's inclusion of other services' members on the CMC, downsizing, a decreasing share of high profile missions, and increased distance from decision makers mark the PLA Army's lower status. The new organizational structure enforces this by placing Army units on the same level as their sister services' units under the overall control of the joint Theater Commands. While the old Army MRs reported directly to the General Staff Department, headed by a CMC member, the new Theater Armies must first report through their TCs and the Joint Staff Department, both falling below CMC level. Gen. Li Zuocheng, chief of the Joint Staff Department and former Army commander, put it this way: "The size of the ground force has been greatly reduced to account for less than half of the armed forces... The army is getting fit as it turns modern and strong."¹⁴

3. What are the modernization priorities for the ground force as the PLAA pursues the "new-type army" concept?

The "new-type army" concept is Xi's vision for a repurposed PLAA, describing its advent as a "phoenix nirvana," meaning a radical and painful transformation. The painful part for the Army is assuming its less exalted role. The transformational part was best described by two Chinese military theorists in a recent article titled "Realizing the 'New' is Key to Establishing a Strong, Modern New-Type Army."¹⁵ Published on the website of China's Ministry of National Defense, it calls for the PLA to adapt to the

¹⁴Ouyang, ed., "Xi reviews troops in field for first time," *Xinhua Net* (http://eng.mod.gov.cn/news/2017-07/30/content_4787294.htm, accessed February 4, 2018)

¹⁵ Dai Yue and Ye Zheng, "建设强大现代化新型陆军，关键是实现一个“新”字 [Realizing the "New" is Key to Establishing a Strong, Modern New-Type Army]," *PLA Daily*, December 28, 2017 (http://www.xinhuanet.com/mil/2017-12/28/c_129777215.htm, accessed February 4, 2018).

fundamental changes of a period of comprehensive digitization and networking (信息化时代, also translated “informatization”) in the areas of mobility warfare, three-dimensional attack and defense, top-flight design and leadership management, organizational and structural improvement, and the transition from linear to three-dimensional operations and from local defense to regional operations.

This last marks a fundamental change to the former operating concept of “winning informatized local wars.”¹⁶ It implies the capacity to fight battles of a greater scale, more geographically dispersed, and more technically oriented than the small-scale, localized skirmishes previously envisioned.

The treatise then lists four “News” that the PLA must carry out:

(1) New disposition, referring to the tactical positioning of Army forces. The article uses this analogy: “strategic positioning is using the Chinese Go form of attack by encirclement - ‘me within you and you within me’ - making the traditional linear battlefield non-linear.” In more practical terms, this means highly dispersed forces: “making a squad disperse out over a square kilometer, or an artillery battery over several square kilometers, making detection difficult.”

(2) New abilities, particularly in the realms of network and artificial intelligence (AI) warfare. It specifically lists an operational automatic cloud computing control system; AI-enhanced, goal-oriented operations, AI goal testing, AI-assigned tasking, AI organizational operational coordination, AI battle damage assessment, and maximizing our combat ability through the comprehensive “human-in-the-loop” control (i.e. human-machine pairing).

Joint operational capabilities based on network information systems, moving from digitized and networked to AI plus humanization:

Specific capabilities mentioned are digitalization, multi-dimensionality, specialization, autonomous construction; specialized operational forces, multi-dimensional attack Army aviation, combined attack and defense network operational forces, highly effective autonomous forces, highly integrated anti-aircraft and anti-missile forces, joint reconnaissance and warning forces; accurate sensing, command, strike, assessment, and combat support capability; improve three-dimensional attack, quick reaction, long-distance mobility; improve special operations, removal of enemy strongholds and seizure of key terrain, and strategic sabotage.

(3) New posture, meaning the formation of integral combat power on the field of modern warfare. The treatise frames modern warfare in terms of “system vs. system,”¹⁷ two ways of war competing with one another on a single, very broad battlefield in which integration of forces is key. I believe the Chinese concept of such a warfare system is reflected in the movie *Hero*, in which troops are trained to act mechanistically such that their effects become standardized and reliable. However, such a systematized approach actually runs counter to the nonlinear battlefield.

¹⁶ *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2017*, (hereafter “CMPR”) U.S. Department of Defense, 2017, p. 39.

¹⁷ Cf Jeffrey Engstrom, *Systems Confrontation and System Destruction Warfare: How the Chinese People’s Liberation Army Seeks to Wage Modern Warfare* (RAND Corporation: Santa Monica, CA, 2018).

For PLAA, the system for modern warfare means modularity: multiple brigade-based arms able to task organize as needed into multi-functional, ad hoc formations. The goal is to develop a robust, integral, and multi-functional force with “plug and play” adaptability, increasing Army’s contribution to the whole military’s combat power. The suggestion that the Army at present is inadequately contributing to the joint force suggests dissatisfaction with its focus on traditional missions and a push to make it both modernize and take on the full complement of modern missions.

This requires a joint orientation, command information systems, organic fusion of key elements, seamless integration of separate units, and the orderly coordination of separate operations to create an operational system of dispersed deployment, networked convergence, and timely generation of capability.

(4) New method. The treatise quotes Sun Tzu: “Those skilled in defense conceal themselves in the lowest depths of the Earth. Those skilled in attack move in the highest reaches of the Heavens. Therefore, they are able to protect themselves and achieve complete victory.”¹⁸

The treatise calls for revolutionary innovation in operational art to create a new type of army. This innovation is to occur through three-dimensional attack and defense and regional mobilization. The example of this innovation given is developing an integrated air-land noncontact style of fighting based on individual soldiers.

Non contact warfare refers to using technology and autonomous aerial vehicles equipped with sensors and appropriate offensive weapons for ground combat. Individual soldiers are no longer direct combatants but rather high-tech equipment operators.

The example given is of an individual soldier controlling an unmanned aerial vehicle loaded with 20-50 kg of equipment. A squad of these soldiers is no longer limited to controlling a few hundred meters, but can control two to three square kilometers. Such a platoon can control 16 square kilometers.

Within this area, a soldier controlling a UAV can destroy main battle tanks, artillery, and other ground targets. Companies of these platoons formed into brigades or regiments will constitute a great advance in ground warfare.

One question the treatise fails to answer is why a soldier who relies primarily on sensors and remotely piloted vehicles needs to be present on the battlefield at all. The focus seems to be on creating a super ground warrior rather than a modern ground war machine. Thus, although the treatise is forward-looking in emphasizing network and sensor warfares, it still retains the marks of an Army bureaucracy committed to fielding a force.

Blasko saw PLAA priorities as follows:¹⁹

¹⁸ Sun Zi, *The Art of War*, translation by Sonshi Group (<https://www.sonshi.com/original-the-art-of-war-translation-not-giles.html>, accessed February 4, 2018).

¹⁹ Email from Dennis Blasko.

- (1) Create combined arms brigades and battalions which integrate organic armor, artillery, air defense, chemical defense and engineer, and operational/logistics support;
- (2) Standardize the group army structure, giving each group army six combined arms brigades supported by additional Army aviation/air assault and special operations forces;
- (3) Retain the six independent infantry divisions, not subordinate to group armies but rather one to the Central Theater Army, four to Xinjiang MD, and one to Beijing Garrison;
- (4) Make combined arms battalions (合成营) the “basic combat unit” (基础战术单元) capable of independent actions on the battlefield; battalion staffs have been formed in the reforms since April 2017;
- (5) Improve trans-regional and global force projection capabilities with the support of PLAN, PLAAF, and civilian assets;
- (6) Develop air assault capabilities;
- (7) Develop the capability to control close-air-support delivered by Army aviation or PLAAF assets;
- (8) Develop SOF, reconnaissance units, and intelligence, surveillance, and reconnaissance (ISR) capabilities, including use of UAVs, to support tactical and operational missions;
- (9) Integrate electronic warfare (EW) into air defense ops;
- (10) Improve cyber and EW defense in all units;
- (11) Eliminate units and old equipment that do not support priorities above.

4. What kinds of missions and operations are the “new-type army” designed to carry out, and what does this mean for U.S. defense planners, and U.S. allies and partners in the region?

We can divide the PLAA’s missions into those addressing traditional and non-traditional threats. Chief among the traditional campaigns remains reunification of Taiwan,²⁰ followed by mitigation of Korean peninsula emergencies, defense against Russian incursion (much reduced), deterrence and defeat of terrorism and internal unrest in Xinjiang, deterrence of religious extremism and internal unrest in Tibet, preventing spillover of unrest from Southeast Asia, and disaster response (which includes suppressing mass disturbances). Practically speaking, the United States and its allies can expect the presence of peer competitor Chinese ground forces in operations throughout East Asia, although major hostilities are less likely than smaller scale actions, sometimes of a cooperative nature.

Non-traditional threats include a wide range of other contingencies: sea lane protection, cyber warfare, space security, peacekeeping, humanitarian assistance/disaster relief (HA/DR) abroad, noncombatant evacuation operations, critical infrastructure and asset protection, and military diplomacy (a category which likely includes security cooperation and arms sales).²¹ The PLA considers these to be non-combat military operations, many of which came to new prominence with the 2004 concept of “New Historic Missions.” Thus defense planners should expect the presence of some Chinese forces with significant capabilities outside of East Asia as well.

²⁰ CMPR, 52.

²¹ CMPR, 19.

The Chinese ground forces the U.S. and our allies and partners can expect to meet in the region will increasingly look like those described in the answer to question 3, above: stealthy, mobile, modular, and geared towards attacking targets at standoff distance. Make no mistake: PLAA's increasing lethality stands as both threat and deterrent to any nation challenging the extensive areas and domains over which China claims sovereignty. That said, in the near- to mid-term it is far more likely that China's neighbors will meet the PLAA in neutral or cooperative contexts. It is rather with PLAN and PLAAF that China's neighbors will have to contend at times, and in the cyber domain, where we are already at war.

5. How does the PLAA determine ground force modernization requirements and how are the requirements coordinated with the CMC?

In the simplest terms, PLAA (like the other services) has an Equipment Department charged with planning the Army's equipment development and coordinating it through the CMC Joint Equipment Development Department.²² Prof. Tai Ming Cheung, America's chief scholar of the Chinese defense industry, describes the PLA's equipment development process as follows:²³

... the main approach the army would take in determining and formulating its modernization requirements... is through a weapons and equipment development strategy (WEDS) and associated weapons and equipment development plans. There is a PLA-level WEDS, which is tied to its Military Strategic Guidelines, and each of the service arms have their service-specific WEDS. These WEDS are long-term (10 year or longer) documents that provide the requirements, although actual projects and funding allocations are set out in implementation plans. There is discussion of WEDS and other planning and requirements mechanisms in various Chinese open source publications, but the actual WEDS is classified.

To understand some of the factors underlying China's view of equipment development, we can turn to China's National Defense University's *Theory of Military Development*, last published in 2008. At that time, the two areas of greatest innovation were informatization and mechanization.

It identified these trends: informatization (including intel and reconnaissance equipment, space-based networks like GPS, C4ISR systems, digitizing legacy systems, and data synthesis), accuracy improvement, stealth improvement, and the military development of space.

Development should be aimed at the demands of future war, in particular strengthening predictive research and debate on weapons and equipment and coordinating weapons and equipment development with economic development to increase efficiency.

The areas of emphasis should be early warning and detection, data collection (seamlessly integrated throughout the force), precision strike (through detecting, control, strike, and assessment phases), digital defense and denial, strategic force projection (especially at sea and in the air), and space control.

²² <http://news.takungpao.com/mainland/focus/2016-01/3262548.html>, accessed February 7, 2018). ²³ Email from Tai Ming Cheung to Ben Lowson, February 8, 2018.

The underlying principle is to create breakthroughs in key areas. According to Jiang Zemin:

To develop science and technology from a relatively backward material technological base, we must uphold the principle of doing some things and not doing others, developing critical science and technology which creates the greatest effect for the economy and national defense. This is advantageous for buying time, decrease the gap with developed countries, and as quickly as possible gaining for ourselves a leading position in a few key areas of emerging world-class high technology.

This appears to say that China accrues both prestige and advantage by being the first to make key breakthroughs as opposed to the plodding, unseen work of investing heavily to evolve current technologies. Can we count on the PLA ignoring the latter to advance the former, creating a cutting edge, high tech force that lacks the robustness created by long use? I would not count on it, although there is a clear tradition of incentives for “launching a sputnik,” to use the Maoist term for a breakthrough.

China prizes the fusion of military and civil development, from which “the military finds sustenance in the people.” The U.S. is known for spinning off military technologies into civilian projects after a time, and more recently for using commercial off-the-shelf technology in its operations. China’s model seems to be a more contemporaneous fusion of civil and military science such that we see both the military stealing intellectual property for civilian profiteering and the state-capitalist sector transferring other properties for military use to erode U.S. advantages. Such equanimity with stolen property suggests a similar practice with homegrown varieties. The main part of the technological enterprise, military, civilian, private, and public, after all is under the tight control of the state.

China refers to this as “unified leadership.” Deng Xiaoping in 1975 said “the equipping system must have a high level of consolidation, otherwise it becomes a ‘junk stand,’ unable to lay plans, unable to make war, unable to replenish munitions, and command is inconvenient.”

Finally, “Realizing the ‘New’” suggests the PLAA intends to emphasize stealthy, mobile, networked, “plug and play” forces for “system vs. system” warfare using the detect-direct-attack-assess model.²⁴

6. What ground force defense acquisition programs also support national level antiaccess/area denial (A2/AD) capabilities?

In spite of aspirations to become a modern, hi-tech force, PLAA’s traditional missions of Taiwan reunification and area defense still reign supreme, even as the emerging New Historic Missions gain in prominence. None of these missions call on PLAA to prevent or delay regional entry of another great power. These tasks go to PLARF, PLAAF, PLAN, and now PLASSF.

²⁴ “建设强大现代化新型陆军，关键是实现一个“新”字 [Realizing the “New” is Key to Establishing a Strong, Modern New-Type Army]”, *PLA Daily*, December 28, 2017.

That said, PLAA does possess a limited array of weaponry for use at somewhat longer standoff distances. Blasko lists this weaponry as:

- (1) PHL03 Long-range rockets for coastal defense with a range of 150 km using advanced munitions;
- (2) HQ-16 medium-range SAMs;
- (3) Electronic warfare units can be integrated in coastal and air defense operations;
- (4) Army Aviation brigades consisting of attack and transport helicopters can perform attack, transport, recon, EW, SAR, and medevac missions;
- (5) UAV units perform ISR, possibly communications relay and EW, but not yet armed missions.

7. How has the military reform effort and the dismantling of the General Armaments Department affected the military modernization at the service level, particularly for the PLAA?

Blasko points out that the CMC EDD is “mainly responsible for development and planning, R&D, testing and authentication, procurement management and information system construction for the whole military’s equipment.” From this, he reasons that the traditional GAD responsibility for maintenance has devolved to the individual services. From this, I would speculate that the PLAA’s Equipment Department will place much of its attention on maintaining its equipment, perhaps to the detriment of its role as the proponent for ground force equipment development. Considering the ethic of centralized technological planning mentioned above, any lack of Army involvement may be by design.

8. What recommendations do you have for Congress concerning the topic of your testimony?

To provide the Committee with what I believe is the clearest perspective on the reform, my testimony has emphasized the importance of Xi’s efforts to establish the highest possible level of control over the military. Xi and most of China believe this form of loyalty will produce the most effective fighting force, both in terms of reliability and capability. Conversely, we in the West would see such strenuous efforts to ensure loyalty as a waste of time, stifler of innovation, and perhaps as an indicator of underlying weakness.

I would side with those who warn us not to dismiss PLA capabilities and hardware by assuming their “software” will cripple them. In most areas, the PLAA is the most significant competitor to U.S. ground forces. Although a direct ground conflict with China is less likely in the near term than clashes in the air, maritime, space, and cyber domains, we must remember that our ground forces’ missions are quite different from China’s. We in the United States keep our ground forces deployed abroad to a dizzying variety of missions ranging from combat, to civil governance support and HA/DR. China’s ground forces are only beginning to dip their little toe into some of these missions as China’s interests expand. The bottom line is that we need significant amounts of robust, high-quality capabilities. Moreover, the diffusion of technology through both legal and illegal means will ensure that even if we don’t face China’s forces directly, our land warriors must be prepared to defeat threats of comparable caliber if we are to succeed in the modern combat environment.

From a U.S. perspective, the U.S. Army's last posture statement (from 2016) looked to regain readiness lost under the strain of constant combat operations while seeking improvements in rotary wing aviation, network survivability, missile defense, combat vehicles, and cyber warfare.²⁵ This strategy seems aimed at producing an improved version of the current army, perhaps with a more diverse and balanced training regimen.

Army planners may rue the declining effectiveness of bombers and aircraft carriers, but how much longer will tanks and armored vehicles rule the battlefield? In the war of sensor-to-shooter, the bet is not much longer. Even with extremely limited modern technology, Iraqi insurgents were able to hold U.S. armored vehicles at risk. Our Army does not seem poised to leverage some of the most promising new technologies, although there are indications Army is beginning to perceive this deficiency.²⁶

Most salient among the Army's – and our nation's – failures of perception is the cyber war in which we are currently engaged. Our failure to respond adequately to attacks against our networks and theft of intellectual property has blunted our Army's technological edge, mired our Defense Department's scientific enterprise, and is becoming a millstone around the neck of our innovation economy. It is imperative that we shine a bright light on this theft and empower our defenders to take serious action to shape hostile actors like China.

²⁵ *2016 Army Posture Statement*, U.S. Army.

²⁶

https://www.realcleardefense.com/2018/01/18/gen_milley_bets_on_‘tech_promises_no_more_fcs_299690.html

OPENING STATEMENT OF JAMES HOLMES, PH.D., J.C. WYLIE CHAIR OF MARITIME STRATEGY, U.S. NAVAL WAR COLLEGE

HEARING CO-CHAIR TALENT: Thank you.

Dr. Holmes.

DR. HOLMES: Ladies and gentlemen of the Commission, I would like to leave you with a few big points about Chinese sea power and maritime strategy to augment what I said in my written testimony.

First of all, China operates a true national fleet. This is a composite of naval and non-naval, government and non-governmental shipping, including everything from aircraft carriers at the high end to Coast Guard cutters for defending maritime sovereignty to fishing boats manned by maritime militiamen at the low end.

So China takes a genuinely maritime outlook on the sea. Anything that floats is probably an implement of sea power for Chinese leaders. This is an all-encompassing vision and a broader view than our own, which sees the United States Navy and Marine Corps and Coast Guard, i.e., the naval services, as the complements of our national fleet.

This difference in perspectives creates asymmetries and thus problems for American seafarers. How should say a destroyer skipper respond if China Coast Guard cutters or fishing craft impede freedom of the sea in the South or East China Sea? Having had some experiences roughly akin to that in the Persian Gulf, I can tell you this is a thorny problem for any officer of the deck or sea skipper.

Secondly, sea power isn't just about shipping for China. Sea power for China includes not just ships of many kinds but shore-based firepower, including anti-ship cruise and ballistic missiles and missile-armed combat aircraft.

So China's competitors will square off not just against the national fleet but against the PLA Air Force and Strategic Rocket Force. What that means in practice for us is that our Pacific Fleet, a fraction of our Navy, will potentially confront the whole of the PLA Navy backed by the PLA Air Force and Rocket Force on China's home ground and far from seats of American power. This is a difficult operational and strategic problem to say the least.

Thirdly, what does China want out of sea power? Simple. It wants access. It covets commercial, political, and military access to theaters the leadership deems important, including the Indian Ocean. But access starts at home for China. Among the great powers, it is uniquely encumbered by strategic geography, manifest in the offshore island chains.

Chinese strategists liken the first island chain to a metal chain the United States and its allies have hoisted across Chinese access from the west or to the Western Pacific and the Indian Ocean, barricading Chinese aircraft and Chinese shipping within the island chain.

In order to ensure reliable access to waters beyond the first island chain, China's PLA Navy has fielded a modern surface fleet, an array of submarines, and light surface craft suitable for offshore picket duty, and as mentioned a family of land-based aircraft and missiles able to strike out to sea.

The basic idea is this: to isolate U.S. and allied forces already present in the region from U.S. Pacific Fleet reinforcements steaming across from Hawaii or from the American west coast.

Having done that, PLA defenders will inflict heavy losses on each of those forces separately. If the likely costs and dangers of sending reinforcements to the Western Pacific exceed what Washington expects to gain, then U.S. leaders may desist from trying. They may

decline to pay that price. At a minimum, they may hesitate while deliberating and thus grant China time to accomplish its own goals in the region.

That's what we mean by anti-access and area denial and what Chinese officials and strategists refer to as "active defense," or, in more recent parlance, "offshore waters defense."

Fourthly, once Chinese Communist Party leaders are comfortable that access is guaranteed at home, they can devote attention, energy and resources to guaranteeing access to secondary theaters, such as the Indian Ocean. They can build up infrastructure to support a regular, if not standing, presence in those theaters. That's what we see with the base at Djibouti and negotiations over access to ports such as Hambantota.

Once that infrastructure is in place, they can direct the PLA Navy surface fleet to perform what the leadership calls "open seas protection missions," safeguarding vital sea routes or otherwise projecting power into those theaters.

Fifthly, in the ideal case from China's standpoint, subs, patrol craft, and shore-based weaponry would create a thicket of offensive firepower so effective at offshore defense that the PLA Navy surface fleet is no longer needed to ensure access from the mainland to the high seas.

The fleet could become an expeditionary fleet, what Theodore Roosevelt called a "footloose fleet" a century ago. TR saw a symbiosis between ground and naval power whereby coastal artillery, destroyers, and light craft protected American coastlines so that the United States Navy battle fleet could roam free executing such missions as political leaders such as Theodore Roosevelt deemed worthwhile.

And sixthly, but primary theaters take precedence over secondary theaters for China as for any other competitor, and this suggests counter strategies available to the United States and its allies. If we could figure out ways to inhibit Chinese maritime access at home, we could compel Beijing to summon PLA Navy assets home from distant waters. China will have to draw down its overseas presence to defend access from Chinese seaports to the high seas. Commercial, diplomatic and military endeavors in the wider world cannot flourish without access at home. So China's strategic geography is our friend just as it is China's enemy.

In short, by advancing our goal of access to the Western Pacific, we can confound China's maritime strategy, reinforce our alliances in East Asia and ease the pressure on friends and allies such as India and Australia elsewhere in the Indo-Pacific. The PLA Navy's footloose fleet will be a free-range fleet no more.

So that's my general idea of the strategic design that is impelling Chinese force acquisition such as the ones I detail in my written testimony along with a general idea of how we might compete effectively against that strategic design.

Thank you.

**PREPARED STATEMENT OF JAMES HOLMES, PH.D., J.C. WYLIE CHAIR OF
MARITIME STRATEGY, U.S. NAVAL WAR COLLEGE**

Fleet Design with Chinese Characteristics

James R. Holmes¹

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February 15, 2018

China's national fleet is a composite of navy, coast guard, and maritime law-enforcement shipping. These official components of the fleet operate in conjunction with merchantmen that double as minelayers or intelligence-gathering assets, and with a maritime militia embedded within the fishing fleet. If it floats, it is probably an element of Chinese sea power—official or unofficial.

The composition of China's fleet betokens a holistic understanding of what constitutes sea power. Any implement that can shape events at sea could be part of it, whether it be military or non-military, governmental or non-governmental in nature. Such a fleet furnishes Beijing options throughout the spectrum of peacetime and wartime competition. It also introduces asymmetries into U.S.-China encounters in the marine commons. U.S. naval commanders must accustom themselves to the reality that they confront an assortment of platforms that Chinese commanders can combine and recombine depending on the mission.

A Usable Way of Maritime War

Like past aspirants to great sea power, China has consulted sources both domestic and foreign to inform its maritime rise. Steeped in China's sparse maritime tradition, its weakness during the post-World War II years, the legacy of Mao Zedong's guerrilla-warfare strategy, and the influence of Soviet naval doctrine, the PLA Navy embraced a minimalist posture from its founding.² For decades China's navy remained a minor player against foreign invasion. At most it acted as an adjunct to ground forces, deploying submarines, torpedo boats, and frigates that hugged the coast. Not until the late 1970s, amid Deng Xiaoping's reform and opening campaign, did Beijing begin to articulate a more expansive vision of sea power. Urged on by PLA Navy commander Admiral Liu Huaqing, the Chinese leadership directed the navy to develop offensive capabilities to mount a forward defense of the mainland—both within and beyond the first island chain.

Even so, the service's brown-water mentality—that is, its ingrained habit of thinking in terms of defending waters just offshore—and force structure persisted well into the early 1990s. To this day the PLA Navy devotes substantial resources to missile boats useful for coastal defense, albeit in stealthier, more lethal forms than their Maoist forerunners.³ This apparent handicap in strategy in fact constitutes a blessing in disguise. Unlike Imperial Germany, which rushed into building a top-heavy naval force structure that still

¹ James Holmes is the inaugural holder of the J. C. Wylie Chair of Maritime Strategy at the Naval War College. This testimony derives from the second edition of *Red Star over the Pacific*, due out from the Naval Institute Press this fall, and thus he gratefully acknowledges the contributions of long-time coauthor Toshi Yoshihara. The views voiced here, however, are his alone.

² See David G. Muller, *China as a Maritime Power* (Boulder: Westview, 1984), pp. 44-56, 111-116.

³ Ting Yu, "Complete Remake or 'Old Medicine in New Bottle'?: A Brief Discussion of the Role and Application of the Type 022 Stealth Missile Boat," *Xiandai Bingqi* [Modern Weaponry], September 2, 2008, pp. 35-43.

proved no match for its main antagonist, the Chinese have approached sea power in a patient, methodical, sequential manner. Indeed, the defensive-mindedness of early PLA naval doctrine—admittedly a product of necessity rather than choice—applied a catalyst for imaginative thinking about how to beat a technologically superior foe at sea.

Chinese planners long assumed, correctly and realistically, that the PLA Navy would fight from a position of weakness should it be pitted against U.S. forces. Accordingly, they sought to array comparative Chinese strengths against critical American vulnerabilities to even the odds. PLA strategists formulated what the Pentagon terms an “anti-access strategy.” Anti-access strategy combines military with non-military measures in an effort to delay the arrival of U.S. and allied forces in a particular Asian theater of operations; preclude or disrupt the use of regional bases that are critical to sustaining U.S. military operations; and hold off U.S. power-projection assets as far from Chinese shores as possible.⁴

By selectively developing inexpensive, readily available weapon systems like submarines and anti-ship missiles (or purchasing them abroad), and by tailoring operational concepts to China’s local circumstances, the PLA may have already put itself in position to execute an anti-access strategy. If so, Beijing could contest American command of the commons, much as *jeune école* theorists aimed to deny a stronger antagonist maritime command—and thereby frustrate its operations and strategy—a century ago. The weak could make trouble for the strong—even with swarms of light, cheap combatants unable to operate far from shore for extended periods.

In the best case from China’s vantage point, anti-access defenses could in effect erect a no-go zone for U.S. forces along the East Asian seaboard. Disputed command—either real or perceived—softens American political resolve while foreclosing certain U.S. military options. It also frees up maneuver room for the Chinese, improving the likelihood that the PLA can stage a breakout from the first island chain under the protective aegis of anti-access forces. Shackled by geography and relatively short-range weaponry, Imperial Germany had no such strategic option in the North Sea.

Beyond the potential operational advantages, Chinese investments in access denial promise flexibility and efficiency in terms of force structure and costs. Beijing long eschewed an overtly symmetrical buildup of naval forces, including prohibitively expensive big-deck aircraft carriers. Even today the PLAN is taking an unhurried approach to developing carriers, having refitted a Soviet-built flattop, improved the design after taking it to sea, and started constructing an upgraded version at Chinese yards.

The Chinese seem unfazed by lopsided force ratios, since anti-access involves qualitatively different measures of effectiveness. The proper measure for PLA adequacy is the power of the PLA Navy fleet plus the shore-based firepower that air and strategic rocket forces can concentrate at the scene of battle to augment the fleet. Taken in isolation, then, the fleet’s power matters little; what matters is joint PLA combat power at the decisive place and time. If joint PLA combat power equals or exceeds that of U.S. and allied forces at the scene of action, then it is sufficient to meet China’s needs—no matter what symmetrical comparisons between navies might indicate.

Recognizing this, the PLA naval command has wisely refused to run a ship-for-ship arms race. With little pressure to compete numerically, the navy and shipbuilders enjoy the luxury of testing and refining surface and subsurface combatants, producing and field-testing a new ship class every few years before committing to mass production. This leisurely but fruitful process is ideal for fleet experimentation, and it produces a superior end product.

China’s Surface-Warfare “Big Stick”

The Chinese navy’s surface fleet is a force on the march. To conjure up Theodore Roosevelt, the fleet represents Beijing’s “big stick,” just as the U.S. Navy’s Great White Fleet was TR’s. Destroyers, frigates,

⁴ Roger Cliff et. al., *Entering the Dragon’s Lair: Chinese Antiaccess Strategies and Their Implications for the United States* (Santa Monica: RAND, 2007), p. 11.

corvettes, and fast-attack craft comprise the surface fleet, along with—most strikingly—China’s first aircraft carrier, a refurbished Soviet-built flattop dubbed *Liaoning*. Since 2004 the PLA Navy has gone from importing frontline warships to fielding six new classes of indigenously built destroyers, frigates, and corvettes. Notably, the Type 052D *Luyang III* destroyer, the Type 054A *Jiangkai II* frigate, and the Type 056 *Jiangdao* corvette have all gone into serial production, adding mass, balance, and punch to the fleet.

Just over a decade has elapsed since China began to commission these modern fighting ships. Coming so far so quickly constitutes an impressive feat by any standard. The PLA Navy’s metamorphosis from a coastal-defense force composed of largely obsolescent Soviet-era technologies into a modern naval service has riveted attention within the U.S. defense community. In 2009 the Office of Naval Intelligence (ONI)—a body not known for hyperbole—hailed the advances of China’s surface fleet as “remarkable.” According to ONI’s 2015 report on the PLA Navy, “In 2013 and 2014, China launched more naval ships than any other country and is expected to continue this trend through 2015-16.”⁵ (And indeed it did.)

The Pentagon’s 2017 annual report on Chinese military power follows in this vein, observing that the PLAN is “the largest navy in Asia, with more than 300 surface ships, submarines, amphibious ships, and patrol craft.”⁶ Retired rear admiral Michael McDevitt likewise points out that “[w]hen one counts the number and variety of warships that the PLAN is likely to have in commission by around 2020, China will have both the largest navy in the world (by combatant, underway replenishment, and submarine ship count) and the second most capable ‘far seas’ navy in the world.”⁷

While the Chinese surface fleet’s modernization program may not rival the massive buildups witnessed in the years before World War I and World War II, it is nevertheless reshaping the naval balance of power in Asia. To better appreciate the implications of the PLAN’s growth spurt, it is worthwhile to: (1) examine the PLA Navy’s premier destroyer, the Type 052D, as a case study that highlights the durability of China’s maritime challenge; and (2) assess the trajectory of the U.S.-China competition at sea.

Long-held assumptions about American naval superiority are coming under mounting duress as the Chinese navy continues transforming itself into an oceangoing force. There is no reason to suppose China will fare more poorly than past maritime competitors as it takes to the sea. Hubris makes a slipshod guide to maritime strategy. Americans and their Asian allies must refuse to yield to overweening pride—lest pride presage a fall.

Luyang III: The PLAN’s Workhorse

The aircraft carrier *Liaoning* has understandably captured the public imagination since joining the fleet in 2012. But the true vanguard of seaborne Chinese endeavors are the PLAN’s surface combatants—the workhorses of any navy. These are the vessels that will make China’s turn to the seas felt in maritime Asia and beyond. In the coming years, these warships will serve as pickets guarding the carrier, project power on their own as the core of surface action groups, maintain a visible presence in disputed waters, defend good order at sea in distant theaters, and conduct naval diplomacy around the world.

Consider the Type 052D *Luyang III*-class guided-missile destroyer. The PLAN commissioned the first of the class in March 2014 amid much publicity and fanfare. The new vessel is an improved and slightly larger

⁵ Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, p. 15, U.S. Naval Institute Website, <https://news.usni.org/wp-content/uploads/2015/04/2015_PLA_NAVY_PUB_Print.pdf#viewer.action=download>.

⁶ U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2017*, p. 24, U.S. Naval Institute Website, <<https://news.usni.org/2017/06/07/pentagon-report-congress-chinese-military-development>>.

⁷ Michael McDevitt, “Becoming a Great ‘Maritime Power’: A Chinese Dream” (Washington, DC: Center for Naval Analyses, June 2016), p. v.

variant of the Type 052C, itself a man-of-war touted by Chinese naval enthusiasts as “China Aegis.”⁸ In other words, they portray the PLAN DDG as an peer of state-of-the-art U.S. Navy cruisers and destroyers outfitted with the Aegis combat system—a combination radar, computer, and fire-control system capable of autonomously engaging multiple air and missile targets at long range.

Do such comparisons stand up? To a point. The Type 052D is a stealthy, 7,500-ton, gas-turbine-driven ship with a cruising range of 4,500 nautical miles. Its phased-array radar system can reportedly detect, identify, and track hundreds of surface and air targets simultaneously at distances of several hundred miles. The DDG boasts 64 vertical launch cells, or VLS in Western parlance. A VLS cell is essentially a silo embedded in a ship’s hull. Each can disgorge one to four missiles, depending on the types and sizes of the missiles housed within. Outfitting a combatant with VLS permits quick firing of anti-air, anti-ship, or land-attack missiles without the bother, delay, and technical hassles associated with uploading munitions onto launchers from magazines deep within the ship.

On paper, at least, the Type 052D appears to be a humbler cousin to the U.S. Navy’s Aegis-equipped *Arleigh Burke*-class DDGs and *Ticonderoga*-class guided-missile cruisers. The PLAN DDG displaces less than the U.S. Navy warships, which displace 9,600 and 11,000 tons, respectively. Lesser tonnage indicates that it has smaller capacity for fuel, stores, and armaments, and thus shorter cruising range than its American counterparts. On the other hand, it is slightly larger than the Royal Australian Navy’s Aegis-equipped *Hobart*-class “air-warfare destroyers” now entering service. The *Hobarts* displace 6,350 tons fully loaded.

The *Luyang III*’s dimensions, on the other hand, appear more than adequate to discharge the types of regional missions it will likely be assigned in China’s “near seas”—the waters that lap against China’s shores—or the Indian Ocean. Its armament is smaller than that of the *Burkes* or *Ticonderogas*, which carry 96 and 122 VLS cells, respectively. (Just 48 VLS cells are installed in the *Hobart* by comparison, leaving the Australian DDG at a disadvantage on a one-to-one basis.) But again, this Chinese destroyer packs a punch for local conflicts in Asian waters—especially since it will operate within reach of shore fire support in most cases. Geographic proximity lets the fleet summon land-based anti-ship weaponry to scenes of impact, evening the firepower balance.

It is also worth noting that China’s navy did not rest after fielding the *Luyang III*. It moved on to more ambitious designs. In mid-2017 the news broke that the PLA Navy had launched the Type 055 DDG, a destroyer with dimensions exceeding those of American *Burkes* and *Ticonderogas*.⁹ If the Type 055 meets China’s needs, it could go into production alongside the Type 052D. That would open up new horizons for PLA naval operations. The U.S. Navy deploys Aegis cruisers and destroyers with its carrier strike groups and with surface action groups. Doing so lets the navy tailor forces to likely threats while holding down the cost of procuring and maintaining the fleet. The PLA Navy too could adopt a “high/low mix,” combining various ship types as tactical circumstances warrant. It could also designate the more capacious, more heavily armed, longer-range Type 055 for expeditionary duty in, say, the Indian Ocean while reserving Type 052Ds for East and Southeast Asian missions where shore-based fire support is on call.

Since commencing its naval buildup in earnest in the late 1990s, then, Beijing has taken an eminently sensible approach to fleet development. So long as China’s strategic surroundings remained hospitable and the United States was content guaranteeing safe passage through international waters and skies, the PLAN could pursue leisurely “fleet experimentation.” Shipwrights built small classes of ships, identified and kept the best features of each, and discarded the rest. This risk-averse approach made technological sense while the Chinese were attempting a qualitative leap in naval engineering.

⁸ Chi Mo, “Perspective of China’s Formidable Weapons for Attacking Taiwan,” *Sing Tao Jih Pao*, May 6, 2004, FBIS-CPP20040506000084.

⁹ “China Launches New Class of Naval Destroyer,” Reuters, June 28, 2017, <<http://www.reuters.com/article/us-china-defense-destroyer-idUSKBN19J0GX>>.

Until recently, the Chinese surface fleet, which consisted of five relatively new destroyer classes of no more than two hulls apiece, bore out this go-slow approach. Designating these ships as fleet experiments, however, does not mean they must remain close to home or forego regular maritime operations. The PLAN has extracted real value from them, dispatching experimental vessels to distant waters to fine-tune crews' skills, develop doctrine, and smooth out technical kinks. It has doubtless done so during counterpiracy patrols in the Indian Ocean and forays into the China seas and open waters of the Pacific Ocean.

Ultimately, however, the PLAN had to settle on a single design for mass production. Larger force-structure developments have likely prodded Chinese planners to draw the fleet-experimentation phase to a close. The PLAN's first aircraft carrier, the refitted Soviet-built flattop *Varyag*, has undergone a series of sea trials since entering service in 2012. The PLAN has been flight testing the J-15, a reverse-engineered derivative of the Russian Su-33 fighter plane that can operate from the *Liaoning*'s decks. The chief element missing from an initial PLAN carrier group is a versatile picket ship to defend the capital ship against air and missile threats. Unless and until the Type 055 proves its mettle, it appears the PLAN has found its premier surface combatant in the Type 052D.

Admittedly, a new DDG will only complete the strictly material dimension of China's carrier ambitions. Forming a Chinese carrier battle group on par with its American counterparts will remain a formidable challenge. Chinese planners will need to combine the carrier, its air wing, surface combatants, and possibly a nuclear attack submarine screen into a seamless, mutually supporting team. This is no easy feat.

But the destroyer's usefulness will not hinge entirely on the fate of China's carrier program. These are workmanlike ships. A multipurpose DDG could be put to many other uses while the PLAN methodically masters the art of carrier operations. Notably, the Type 052D could join a surface action group or amphibious task force to support and defend high-value ships other than carriers. It could also act as the centerpiece of such a group, depending on the mission. Or it could cruise independently, much as U.S. surface combatants sometimes do.

And it could execute these functions across broad sea areas. Since 2008, surface action groups numbering up to 11 ships have transited the international straits separating the Ryukyu island chain to reach the open Western Pacific. Such naval activism strongly suggests that the surface action group will be a key organizing principle around which surface combatants will be deployed, with the Type 052D leading the way.

What will they do? Specifically, improved *Luyangs* could fend off air attacks against China's Soviet-built *Sovremenny*-class destroyers, which specialize in ship-killing engagements. They could also accompany the small but growing numbers of amphibious assault ships Beijing has constructed to project power ashore. Such expeditionary strike groups easily outmatch those deployed by Southeast Asian navies. They would be particularly well-suited to seize islands in the South China Sea, or to fend off assault on the artificial islands Chinese engineers have manufactured from rocks and atolls. The Type 052D, furthermore, could extend its protective air-defense umbrella over the nimble and stealthy Type 022 *Houbei* catamarans. These craft belie their diminutive size, sporting long-range ship-killing cruise missiles that allow them to assert or deny control of the seas vis-à-vis superior fleets. Type 022s can accomplish a lot if shielded from aerial attack.

In a Taiwan contingency, moreover, cutting-edge DDGs would offer Beijing a sea-based air-defense option that would further threaten the survivability of the embattled Taiwan Air Force. With its long detection and engagement horizon, a single Type 052D could cover wide swathes of airspace near or over the island, beyond the effective firing range of shore-based surface-to-air missile units emplaced on the Chinese mainland. Type 052Ds cruising east of Taiwan could in effect surround the island's air defenders, mounting a threat from all points of the compass when pilots take to the air.

Finally, the PLAN could dispatch these imposing frontline warships overseas, showcasing China's military prowess to foreign audiences while advancing naval diplomacy. They are tokens of political commitment,

helping coerce or deter foes or support allies and friends. The bottom line is that more—and more capable—large-displacement destroyers will allow China to combine different elements of its naval power imaginatively for a multitude of missions.

It is worth speculating whether the regional naval balance of power will shift as a result of China's DDG buildup. The short answer: yes. A casual calculation based on reports from the Pentagon and the U.S. Office of Naval Intelligence is telling. Such sources estimate that the PLAN will put to sea at least ten Type 052Ds. If so, then China will boast a fleet of sixteen or more Aegis-equivalent warships—even in the unlikely case that it builds no more combatant ships of this type. (The Type 055's debut appears to settle the question of whether it intends to keep manufacturing capital ships.)

By comparison, Japan and South Korea are the only Asian powers with similar Aegis-equipped naval heavyweights in their inventories. Southeast Asian powers that buck China's will would be utterly outmatched in surface engagements against the PLAN. They have nothing remotely comparable. On paper, at least, the Type 052D's debut makes China's the leading indigenous Asian navy. Once the full 052D contingent joins the fleet, the PLAN can expect to take on any regional fleet—excluding the U.S. Navy, of course—with better-than-average prospects of success.

Will the prospect of a tilt in China's favor spur a new round of naval construction across the region in the coming years? Much depends on the United States' staying power in the region, and on Asian countries' capacity and willingness to bear the costs of an arms race.

The Challenge to the U.S. Navy

Despite compelling evidence that Chinese naval power is growing in quantity and quality, debate persists over this metamorphosis. Skeptics doubt the PLA Navy will translate its material heft into real combat effectiveness. One sanguine view holds that the U.S. Navy surface fleet is more than a match for any rival in the contest for sea control—the arbiter of any naval war—and will remain so for the foreseeable future. The implication is that while Beijing may be able to exact a price from the U.S. Navy for attempting to use the seas and airspace in China's environs, the United States will still command the seas when the chips are down.

At the tactical level, this comforting narrative holds that U.S. naval forces remain able to land a devastating blow before opposing warships get close enough to fire their first shot. In a fleet-on-fleet engagement, for example, carrier-based warplanes would unleash missiles at enemy surface combatants from standoff distances, meaning beyond the engagement range of the opponent's anti-ship arsenal. This scenario conforms to the longstanding American doctrinal preference for shooting the “archer,” an enemy warship or warplane, before the archer can let fly his “arrow,” or anti-ship weapon. This tactical and technological margin of superiority will endure and perhaps even widen, so goes this storyline, letting the U.S. Navy perpetuate its dominant position in maritime Asia.

Such a soothing narrative is quickly losing cogency as the PLAN's surface fleet catches up across the board. For one thing, China's mariners are cementing core competencies while closing the capability gap. For years, Chinese ships' lack of sophisticated area-wide air defenses exposed them to air and missile attacks. This shortcoming reaffirmed U.S. commanders' conviction that carrier aviators would handily defeat the PLA Navy in a fight. Now, however, near-state-of-the-art systems on board some Chinese combatants outrange the anti-ship weaponry sported by U.S. aircraft. ONI reports that the Type 052D carries a new variant of the HHQ-99 surface-to-air missile with a range of 80 nautical miles, comparable in reach to the U.S. Navy's premier air-defense missile, the Standard Missile-2. The *Luyang*-class guided-missile destroyers are apparently equipped with phased-array radars similar in appearance—and, according to Chinese pundits, in capability—to the American Aegis combat system, a combination radar, computer, and fire-control system that can detect and target multiple aircraft simultaneously at long range.

At the same time, the PLA Navy has armed its warships to the teeth with a family of Russian- and Chinese-made anti-ship cruise missiles (ASCMs) boasting ranges of 120-130 nautical miles. Worse from the

American standpoint, the Pentagon pegs the range of the supersonic YJ-18 ASCM now entering service aboard PLAN combatants at an impressive 290 nautical miles. The only comparable weapon currently in the U.S. inventory is the subsonic, four-decade-old Harpoon anti-ship missile, whose advertised striking range is around 70 nautical miles. In other words, major Chinese combatants can not only keep U.S. aircraft at bay, but can also unleash volleys of ASCMs at the U.S. fleet from beyond American weapons range. Even if PLAN vessels remain inferior to their U.S. Navy counterparts on a ship-for-ship basis, getting in several missile engagements before a U.S. fleet can return fire could provide the PLAN its great equalizer against a stronger foe. Not American but Chinese archers may now hold the initiative.

Both the defensive and offensive sides of sea combat, then, are stacking up in China's favor—and progressively eroding or nullifying altogether some of the U.S. Navy's tactical advantages. In short, the U.S. Navy's surface battle capacity has fallen behind the times. Since the Cold War, the navy has grown accustomed to operating in uncontested waters. Indeed, directives from on high stated that no one was likely to dispute American command of the sea, and thus that the fleet could and should devote its energies exclusively to projecting power ashore from this safe nautical sanctuary. Having taken such strong bureaucratic signals to heart, the surface fleet let the skills and hardware for striking at sea atrophy. Why practice fighting for something no one can dispute?

Other missions have preoccupied the service since the Cold War. Naval aviators have spent the past decade supporting ground forces rather than girding to duel enemy armadas. Dropping smart bombs on insurgents and terrorists in Iraq and Afghanistan demands different skills from evading enemy defenses and pummeling enemy men-of-war. Meanwhile, guided-missile destroyers have been burdened with an ever wider array of missions, including ballistic-missile defense (BMD). Competing missions—some of which, like BMD, command national-level scrutiny—siphon finite resources, crew attention, and, equally important, physical space aboard ship away from the combat function.

In effect, then, the service has demoted war at sea, the *raison d'être* for any navy, to secondary status. Both the hardware (weaponry, sensors, and hulls) and the software (training and exercises) for sea control have doubtless suffered as a result. In an era of tight budgetary constraints, reversing two decades of steady decline in surface warfare will be neither easy nor quick. In short, prevailing assumptions about American naval supremacy have come under strain. U.S. naval officials have conceded this—and have initiated, for instance, a crash program to develop and field new long-range shipboard ASCMs. They have instructed the fleet to experiment with “distributed lethality,” arming more and more surface vessels more heavily to cause trouble for antagonists.

It would be a grievous mistake, nonetheless, to concentrate wholly on the technical and operational progress the PLA Navy surface fleet has made or the tactical travails that could hold back the U.S. Navy surface fleet. Competition is about more than just gee-whiz weaponry or comparing entries in *Jane's Fighting Ships*. It is about politics. It is about how much of the nation's naval power the political leadership is prepared to hazard in combat, considering the political stakes and competing requirements elsewhere around the world.

The only meaningful standard for gauging a seagoing force's adequacy, that is, is its ability to mass superior combat power at the decisive time, at the decisive place on the nautical chart, to overpower the strongest probable adversary. This is a tough standard to meet when operating across intercontinental distances. An Asian power fighting close to home can fling most or all of its forces into battle. A faraway global power may have no such luxury. Unless it diverts forces from pressing commitments in other theaters, placing those commitments in jeopardy, Washington can commit only a fraction of U.S. naval forces to action. And it ranges from hard to impossible for a fraction of one force to defeat the whole of a peer competitor's force.

It is far from clear that the United States retains its accustomed supremacy by this unforgiving standard, any more than it retains peerless technological supremacy. Budgetary factors are also at work. It costs the United States far more than China to stage a unit of combat power at a given scene of action in maritime Asia. Distance from the theater demands more capacious ships able to carry more fuel, arms, and stores.

Forward bases and a sizable logistics fleet are a must. The U.S. armed forces pay generous salaries and pensions. And on and on: whether the Pentagon can afford to mount superior strength in a rival great power's backyard, whether the sea services are investing in the right people and hardware to constitute that strength, and whether American seafarers have the requisite skills to prevail when battle is joined are questions worth pondering.

Doubts about U.S. maritime mastery cast U.S.-China competition in a whole new light. And to further compound the strategic and operational dilemma, a purely fleet-on-fleet engagement is improbable within the China seas or the western reaches of the Pacific Ocean. In those expanses, Beijing has the luxury of throwing the combined weight of Chinese sea power into a sea fight. It can dispatch not just the PLAN surface fleet but missile-toting submarines and swarms of missile-armed patrol craft to trouble spots.

Furthermore, land-based implements of sea power can strike a blow in any fleet action that takes place within their combat radii. PLA Air Force warplanes can join the fray, making land-based airfields into de facto aircraft carriers to supplement the fleet's combat power. So can anti-ship ballistic missiles fielded by the PLA Rocket Force. Lord Horatio Nelson, who knew a thing or two about operating fleets under the shadow of shore-based weaponry, counseled that "a ship's a fool to fight a fort." Nelson, Britain's sage of sea warfare, would blanch at a Fortress China that can strike hundreds of miles out to sea without even ordering fleets to get underway.

Because the U.S. sea services are dispersed throughout Asia and the world, one part of the U.S. Navy and Marine Corps could conceivably confront the whole of Chinese maritime might. To estimate the outcome of a fleet action, we thus have to determine how whatever contingent the U.S. Navy is likely to commit to battle—including its aerial and subsurface components, along with any assets supplied by allies like the Japan Maritime Self-Defense Force—stacks up to the massed power of the PLA Navy fleet, backed by the array of anti-access weaponry at PLA commanders' disposal. (This assumes Chinese commanders do the smart thing in wartime and combine their three regionally based fleets for action.) If China's navy outmatches the U.S. or allied fleet contingent under such conditions, it is adequate to the tasks entrusted to it by political leaders in Beijing. If not, the advantage resides with the United States and its allies.

The unenviable task before Washington, then, is to regain, preserve, or extend the margin of superiority of a fraction of its naval force deployed to Asia over the entire maritime force, sea and land, that Beijing can use to shape events on the high seas. It's tough to pull off such a feat, especially under present circumstances. Finances are straitened. Overall numbers are under stress as a result, as is the military's capacity to innovate. To make ends meet, the U.S. Navy is substituting light combatants such as its new littoral combat ships for multi-mission warships bristling with heavier firepower. To aggravate these problems, the fleet finds itself outranged by its most likely antagonist—and could well take a pummeling while trying to close to missile range. This problem will persist for some time, until new anti-ship missiles restore long-range hitting power to the fleet, or until exotic armaments such as electromagnetic railguns or shipboard lasers augment combatants' main battery.

From a grand-strategic standpoint, the lag in U.S. weapons development could open a danger zone in which Beijing is tempted to strike before its range advantage evanesces. Imperial Japan made a similar now-or-never calculation in 1904, realizing that rival Russia was constructing new battlewagons for its Pacific Squadron. Its navy struck before St. Petersburg could amass insuperable strength in Far Eastern waters. In 1941, likewise, Tokyo hit the U.S. Pacific Fleet before the entirely new fleet being built under the Two-Ocean Navy Act of 1940 could arrive in the theater to shift the naval balance against Japan. U.S. and allied leaders must remain watchful, lest Beijing too succumb to the temptation to settle disputes around its nautical periphery by force. It would be far from the first combatant to act before a window of opportunity slams shut.

Are submarines the remedy for the surface navy's shortcomings? Do they constitute a U.S. Navy game-changer akin to the "assassin's mace" that so beguiles Chinese strategists? (A weaker opponent armed with an assassin's mace strikes down a stronger opponent by assailing that opponent's fatal weaknesses.) Many

Westerners appear to think so. They consider undersea warfare a talisman, assuming that the U.S. Navy can simply dive beneath the waves and pummel the PLA Navy from below. Submariners voice confidence in the superiority of American and allied boats over anything China has put to sea. There is little reason to question the allies' qualitative superiority in this sphere, and indeed the subsurface fleet remains a core competitive advantage for the United States.

But while quality remains on the allies' side, numbers are more problematic. Under the Obama administration's "pivot" to Asia—a strategy evidently adopted by the Trump administration—60 percent of the U.S. Navy's 69-vessel submarine force now calls the Pacific Ocean home.¹⁰ But 18 of those 69 are *Ohio*-class ballistic- or cruise-missile boats (14 SSBNs, 4 SSGNs) meant for shore bombardment. That leaves 51 attack submarines (SSNs) suitable for a tilt against the PLA Navy. Sixty percent of that figure, or 30-31 SSNs, will be in the Pacific theater.

That may sound like ample strength, but bear in mind that no ship or plane is ready for service all of the time. Routine upkeep, extended overhauls and refueling, crew rest, and training lodge inexorable claims on a vessel's schedule. A hoary U.S. Navy axiom holds that it takes three U.S.-based ships to keep one on foreign station. One is in the shipyards and completely out of service; another is preparing for deployment; and the third is actually on cruise. (If anything, according to Congressional Research Service naval experts, the 3:1 ratio overstates the proportion of ships available for combat duty.¹¹) Using this ratio for the sake of discussion, U.S. naval commanders can expect to have 11 fully combat-ready subs at their disposal at any time. Assuming the rhythm from overhaul to deployment holds up, another 11 may be available in varying states of readiness. (Permanently basing ships overseas improves the readiness ratio, but a safe thumb rule is that it takes two hulls to assure one is battleworthy.¹²)

Twenty-two SSNs, no matter how good individually, constitutes a slender force to cover the vasty China seas and Western Pacific in wartime. Theorist Julian S. Corbett advises commanders to post vessels at the origin of an enemy fleet's voyage; at its destination, if known; or at focal points such as straits where shipping has to congregate as it passes from point A to point B. Otherwise it may be hard to make contact. Monitoring Chinese seaports, along with narrow seas such as the Luzon Strait and the passages through the Ryukyu Islands, will stretch the tactically proficient but lean U.S. submarine fleet. That in turn will leave broad operating grounds open to the PLA Navy.

This is doubly true since American SSNs are armed only with torpedoes for anti-ship missions. Unlike Chinese boats, they do not carry ASCMs to multiply their striking range. Indeed, the range of the U.S. submarine force's standard Mk-48 heavyweight torpedo is 10 nautical miles at the outside—compared to well over 100 nautical miles for PLAN submarines. Depending on short-range weaponry sharply limits the area on the map covered by any individual SSN's weaponry, leaving sizable expanses uncovered. Trying to get the job done under these conditions stresses the undersea fleet's numbers even more.

Undersea warfare, then, remains an advantage, owing not just to American skill but to the PLA Navy's neglect of antisubmarine warfare. But it is not the silver bullet the hype implies. The U.S. Navy needs more mass—meaning more boats, preferably with extended-range armament—if it is to vanquish China's navy from the depths. Practitioners and pundits err if they view the silent service as currently configured as a cure-all for what ails the surface navy. Indeed, doubling the navy's submarine inventory would represent a prudent move for Washington in its strategic competition with Beijing. The service might accelerate SSN acquisitions, or it might even consider fielding a diesel-submarine contingent. It could procure several

¹⁰ Figures as of June 26, 2017. See Naval Vessel Register, <<http://www.nvr.navy.mil/NVRSHIPS/FLEETSIZESIZE.HTML>>.

¹¹ Ronald O'Rourke, *Naval Force Structure Planning: Breaking Old Habits of Thought* (Washington, DC: Congressional Research Service, March 19, 1993).

¹² Ronald O'Rourke, *Naval Force Structure and the Size of the Navy* (Washington, DC: Congressional Research Service, November 13, 1992).

conventional boats to the price of one SSN—stretching finite shipbuilding dollars. Fielding a submarine-launched anti-ship cruise missile, furthermore, would extend American subs' combat reach.

Where does all of this leave us? It's commonplace among China-watchers to make the U.S. Navy the benchmark by which to judge the PLA Navy's size and composition. This misleads. As noted here, the proper yardstick is the navy's capacity to fulfill the goals assigned to it by political leaders, in the expanses that matter, against the strongest likely opponent. Beijing's immediate goals and its likely opponents fall within reach of the abundant shore-based armaments festooning Fortress China. Combining land- with sea-based implements of marine combat yields a force far more formidable than side-by-side comparisons of surface fleets would indicate. The PLA Navy, then, may not need a surface fleet symmetrical with the U.S. Navy's—in terms of flattops, air wings, destroyers, and so forth—to get its job done.

Observers must apply standards unique to China to determine whether China's navy has struck the right balance of capabilities. Comparing it to a globe-spanning navy like America's reveals little.

It is worth observing that China's growing surface fleet is just one expression of Beijing's larger, longer-term challenge to stability in maritime Asia. China's "comprehensive national power," to use a term coined by Chinese strategists, furnishes the foundations for developing durable sea power. Despite slackening GDP growth, the Chinese economy is already roughly half the size of America's. Beijing is also one of the largest shipbuilding powers in the world, while its naval yards are riveting together warships of every kind at breakneck speed.

Such sinews of national power will not only help the Chinese navy catch up more quickly, but they will also keep Beijing competitive at sea over the long haul. China's current economic, financial, and industrial position relative to the United States is enviable compared to Japan's on the eve of Pearl Harbor or the Soviet Union's during the late Cold War era. (Japan's economy was about one-tenth the size of America's in 1941.) Even so, as noted at the outset, both the Japanese and the Soviet navies posed a formidable threat to the United States.

At the same time, the inputs of naval power are inherently long-lasting. High-end vessels such as the Type 052Ds are built to stay in service for twenty to thirty years. (The U.S. Navy tries to wring even more service out of its surface combatants.) A ship commissioned in 2016, in other words, could in theory ride the waves until mid-century. Provided that the PLAN is a good steward of its capital-intensive assets, undertaking regular maintenance and repairs, China promises to maintain a decades-long presence in Asian waters. Moreover, the warships that entered serial production over the past decade were almost certainly designed, developed, and procured years in advance.

Thus there is a built-in time lag between the initial Chinese decision to launch a new ship type and the physical construction of that vessel at a shipyard. The new developments we are observing today are products of much earlier plans. It is therefore anybody's guess what additional new classes of warships—and in what volume—the PLAN has in store for the region. The Type 055 remained mostly in the realm of rumor until it debuted publicly in June 2017. As noted before, the vessel reportedly displaces more than U.S. Navy DDGs or cruisers—suggesting increased capacity for fuel, munitions, and armaments. Once it joins the fleet, consequently, the Type 055 will extend the PLAN fleet's operating radius while amplifying its combat punch.

The changes afoot may be a sign of things to come. These structural factors suggest that the United States need to think beyond the technical, tactical, and operational implications of the PLAN's burgeoning surface fleet. A balanced regional fleet is now in the making. Such a new entry will no doubt alter the geometry of the naval balance in maritime Asia. Even if Beijing's economic growth rates slow further in the coming years, China will have laid the basis for a competition that will be measured in decades. The United States and its allies must accustom themselves to the notion that they face a long-term rivalry at sea.

A National Fleet Executes a “Cabbage Strategy”

Nor, it bears noting, is China’s naval buildup solely about high-seas combat. In peacetime China deploys non-military shipping as an arm of sea power, holding naval and military force in reserve to supply a backstop should things go wrong. By asserting physical control of the waters within the “nine-dashed line” inscribed on the map of the South China Sea, and by policing those waters, Beijing has sought to impose a monopoly of force there. And a monopoly of force is what qualifies a would-be sovereign to exercise sovereignty with boundaries sketched on the map.¹³

While the Permanent Court of Arbitration ruling (2016) striking down China’s territorial claims sent its hybrid civil/military maritime strategy into overdrive, it has been visible at least since the 2012 encounter between Philippine and Chinese vessels at Scarborough Shoal. In May 2013, for instance, the State Oceanic Administration published a commentary proclaiming:

We should claim our nation’s legitimate rights and interests in our territorial waters through normal fishing production and through the routine patrol of fishery administration ships, marine surveillance ships, and other law enforcement ships, and should also safeguard our nation’s maritime rights and interests with the *backup of our Navy and Air Force*.¹⁴ (our italics).

In other words, fishing craft ply their trade in disputed fishing grounds. Law-enforcement agencies protect the fishing fleet from low-level resistance from rival coast guards. The PLA Navy and Air Force remain watchful in case Beijing decides to rush heavier firepower to the scene—creating a power mismatch in its favor and, if all goes well, cowing the opponent into retreat.

At the risk of mixing metaphors, then, Beijing deploys its small and big sticks to prosecute what some Chinese commentators dub a “cabbage strategy,” encasing dispute objects with concentric layers of unarmed or lightly armed hulls while hardening the outer layer with military force. In May 2013 the Xinhua Domestic Service carried an unattributed editorial explaining how the cabbage strategy advanced China’s grand strategy of consolidating its territorial claims.

Precipitating the article was a clash between Manila and Beijing over Second Thomas Shoal, a feature around one hundred nautical miles west of the Philippine island of Palawan and deep within the Philippine exclusive economic zone. The Xinhua editorialist restated the legal groundwork, insisting that China held indisputable sovereignty over South China Sea land features and the adjacent waters. It framed China’s actions in moral terms, claiming they were “beyond reproach” while denying China was bullying a weaker neighbor. It implored rival claimants to comply with the 2002 Declaration of Conduct of Parties in the South China Sea, refraining from “actions that expand and complicate disputes, and that influence the peace and stability of the South China Sea.” And it applied a historical patina to Beijing’s case, insisting that Chinese fishermen had “always” used the shoal as a fishing ground.¹⁵

In short, the editorialist reiterated China’s brief for sovereignty, conjuring up the full range of political and legal arguments. Chinese emissaries grasp an elemental truth about diplomatic persuasion: it is not enough to say something once. A message must be broadcast early, often, and consistently in order to persuade. Having done so, the Xinhua editorial turned to “noted military expert” Zhang Zhaozhong to explain how a cabbage strategy works. Such a strategy, says Zhang, can be encapsulated in “just one word, which is squeezing.” His explanation is worth quoting at length:

¹³ Max Weber, “Politics as a Vocation” (New York: Oxford University Press, 1946), <https://archive.org/details/weber_max_1864_1920_politics_as_a_vocation>.

¹⁴ “PRC SOA Commentary Calls for Strengthening Maritime Sovereignty Protection,” Beijing *Zhongguo Haiyang Bao Online*, May 8, 2013.

¹⁵ “PRC Commentator Suggests ‘Cabbage’ Strategy on the Second Thomas Shoal,” Beijing Xinhua Domestic Service, May 30, 2013, OSC-CPP20130620671001.

For every measure there is a counter-measure. You send fishing ships If you send fishing vessels to resupply, then we will use fishing vessels to keep them out; if your coast guard sends supplies, then we will send marine surveillance to keep them out. If your Philippine Navy ships hurry over, we will use naval vessels to keep them out. There is nothing to be afraid of, and we must stick it out to the end. The cabbage strategy of which I have spoken many times is to

surround them layer by layer, and make them unable to enter [Second Thomas Shoal].¹⁶ (our italics).

Zhang's summary is rich in content. In strategic terms, the approach he espouses evokes an axiom from German general Helmuth Moltke the Elder, who maintained that the "tactical defense is the stronger" form of war, while "the strategic offensive" constitutes "the more effective form."¹⁷ Julian Corbett interprets Moltke's idea of combining strategic offense with tactical defense thus:

. . . this form of war presupposes that we are able by superior readiness or mobility or by being more conveniently situated to establish ourselves in the territorial object before our opponent can gather strength to prevent us. This done, we have the initiative, and the enemy being unable by hypothesis to attack us at home, must conform to our opening by endeavoring to turn us out. We are in a position to meet his attack on ground of our own choice and to avail ourselves of such opportunities of counter-attack as his distant and therefore exhausting offensive movements are likely to offer.¹⁸

In other words, says Corbett, if the combatant waging a strategic offensive can seize ground it covets, it can then defy its antagonist to reverse its occupation of that ground. From a military standpoint, defending something is easier than taking it away. Tactical defense is stronger, after all. And from a diplomatic standpoint, the combatant trying to retake turf from rival forces could brand itself the aggressor—even though its rival committed aggression first. China can create the new normal of Chinese ownership of some disputed feature, then plead with challengers not to disturb the peace—and play the aggrieved party if they do.

This is a particularly effective approach in the "gray zone," that shadowland between peacetime diplomacy and outright warfare.¹⁹ As Zhang notes, China's national fleet so outclasses any individual Southeast Asian claimant that China will control escalation in any one-on-one confrontation. If Manila or Hanoi sends fishing boats to uphold its claims, Beijing can probably send more. If Manila or Hanoi escalates, dispatching coast-guard white hulls, Beijing can probably send more, bigger, and more capable white hulls. Indeed, the China Coast Guard could outpunch the Philippine Navy. And if any opponent escalated to military force, it would do so in full knowledge that the PLA Navy was ready to steam into action—building up an insuperable edge in physical might for Beijing. Cabbage strategy is hard to beat.

It bears mentioning that Zhang neglects one aspect of the cabbage strategy. He seems to imply that his approach is entirely outward-facing. Chinese maritime forces encircle a disputed object first with fishing craft, then law-enforcement craft, then military vessels if need be. This is how Chinese mariners "surround them layer by layer, and make them unable to enter"—waging tactical defense against an external opponent. But there is also an inward-facing component to the cabbage strategy, implicit in Zhang's depiction of his strategy as an exercise in squeezing adversaries into submission.

If Chinese forces can mount a layered defense against outward opponents, in other words, they can also lay siege to an opponent holding the disputed island or atoll. They can squeeze that opponent into submission,

¹⁶ "PRC Commentator Suggests 'Cabbage' Strategy," May 30, 2013.

¹⁷ Helmuth von Moltke, in *Moltke on the Art of War: Selected Writings* (Novato: Presidio, 1993), pp. 68-69.

¹⁸ Corbett, *Some Principles of Maritime Strategy*, p. 73.

¹⁹ James R. Holmes and Toshi Yoshihara, "Deterring China in the 'Gray Zone': Lessons of the South China Sea for U.S. Alliances," *Orbis* 61, no. 3 (summer 2017), <<https://www.fpri.org/article/2017/06/deterring-china-gray-zone-lessons-south-china-sea-u-s-alliances/>>.

constricting its supply lines and fending off outside relief until the occupants must abandon their redoubt or starve. This is the approach China has taken at Reed Bank, where the Philippine government has marooned a rusty amphibious transport, *Sierra Madre*, in an effort to preserve sovereignty over the feature. The handful of marines clinging to *Sierra Madre* are lonely defenders of Philippine claims to Reed Bank.²⁰ That tactical defense represents the stronger form of war must come as cold comfort, encircled as they are by vastly stronger forces and facing scant prospect of relief.

Fleet-Building Is About More Than the PLAN

Chinese maritime strategy is a grand strategy of a type B. H. Liddell Hart and Alfred Thayer Mahan would instantly recognize: it aims at securing a “better state of peace” for China, guaranteeing commercial, political, and military access to seas and theaters Beijing deems important.²¹ For China, sea power is about more than the PLA Navy. It encompasses any implement able to mold events out at sea, whether that implement is a navy warship or a PLA Air Force stealth fighter/attack plane or a ballistic missile fired by the PLA Rocket Force. It encompasses law-enforcement vessels from the China Coast Guard or sister maritime surveillance or enforcement agencies. And it encompasses unofficial implements such as fishing boats crewed by militiamen or trawlers packed with electronic snooping equipment.

Clearly, then, Americans and their allies confront a multifaceted Chinese challenge. Recent history suggests the allies must fashion a likewise all-encompassing maritime counterstrategy for the China seas—or surrender their nautical rights and privileges to China by default. They must band together while harnessing every resource available to them.

²⁰ Jeff Himmelman, “A Game of Shark and Minnow,” *New York Times Magazine*, October 27, 2013, <<http://www.nytimes.com/newsgraphics/2013/10/27/south-china-sea/>>.

²¹ B. H. Liddell Hart, *Strategy*, 2d ed., rev. (1954; reprint, New York: Meridian, 1991), p. 353; Alfred Thayer Mahan, *Retrospect & Prospect* (Boston: Little, Brown, 1902), p. 246.

OPENING STATEMENT OF BRENDAN MULVANEY, PH.D., DIRECTOR, CHINA AEROSPACE STUDIES INSTITUTE

HEARING CO-CHAIR TALENT: Thank you.

Dr. Mulvaney.

DR. MULVANEY: Thank you very much for having me.

I'm truly humbled to be part of this distinguished panel and all day really. So I think the timing for this is fantastic, following on the heels of National Security Strategy, the Posture Review, and Defense Strategy, which focus a lot more on China than they ever have before. So I think this is a great time for the Commission to hold these hearings.

I'll give the caveat the views here are my own, don't necessarily represent the United States Air Force or anybody else.

So what I'd like to do is the China Aerospace Studies Institute looks at aerospace writ large. So it's not just Air Force, but its naval aviation, its rockets and missiles and space and cyber and all that we heard about today. So I want to try to take a holistic view and look at what we're talking about for modernization, which you asked about earlier.

Modernization for the Chinese term is a very specific term. Modernization for us just kind of means, hey, how are we becoming modern? And the answer to your previous question in the short snippet is they want to catch up to everybody else because they started so far behind.

It's a continual process, but once they feel like they're on par with the United States, England and France, Germany, that will be their realization of modernization.

To highlight what Xi Jinping has in mind, we only need to look at his report to the 19th Party Congress. The whole report is in the written testimony but upgrade our military capabilities, strategic capabilities have seen a big improvement, modernize our military across the board, and see that by 2035 the modernization of our national defense and our forces is basically completed, which means equal to all the other leading militaries of the world, and that by the mid-21st century, i.e., 2049, our People's Armed Forces have been fully transformed into a world-class force.

So for the commissioner's first question about how is this affecting the Air Force, Air Force modernization has been going on for decades--right--so this is nothing new. It is nothing. Directly from the 2016 reorg, they realized after Tiananmen when we cut off ties with them, that they were going to have to do it on their own. So they have done it by a variety of means, but this has been going on for 20 years, and it's nothing new.

We've seen over that span an increase in the bureaucratic heft of the PLA Air Force, especially when compared to the Army, as Ben talked about. We've seen now for the first time ever the Senior Vice Chairman is an Air Force officer, and he is a no-kidding Air Force officer. He was an Air Force commander--General Xu Qiliang. I would disagree that the CMC is now joint. Their sole naval officer is actually an army guy who joined the navy over the last couple of years to become their political commissar and now wears a navy uniform, but spent his entire career.

Xu Qiliang is a no-kidding Air Force officer, and this is the first time that they've ever had the Senior Vice Chairman as an Air Force officer.

Despite that, they've lost the battle to control space, as we heard about earlier in the panel. So there is kind of an ongoing bureaucratic battle, if you will, that the Air Force lost some of the bureaucratic heft they were looking for to maintain that space portfolio. Still overall the

Air Force in specific continues to get higher budgets and more attention from the PRC leadership, especially with the downgrading, if you will, of the Army.

They continue to get advanced equipment from Russia, from some of our partners and allies, and through their civil-military, military-civil fusion efforts.

They continue to advance--going to a previous question--far faster than we continue to anticipate. We say by next year, they will have accomplished that, and usually they beat all of our estimates. By hook or by crook, this is what they're doing. And I want to make sure that we emphasize this is not just the air force, meaning airplanes, but it is all branches. So it's SAMs, AAA radar and airborne forces in addition to the aircraft, which of course are the shiny objects that we all get to see and get a loss of press.

In fact, just last month, the PLAAF took delivery of S-400 systems, the SA-21 Growler, from the Russians, which is a definite improvement to the systems that the PLA had prior.

Progress in advanced aircraft, the J-20, their recent acquisition of the Russian Su-35s, gets the headlines, but they're also making other advances in power projection and warfighting capabilities, air launched cruise missiles and air-to-air refueling, and I have to emphasize the air-to-air refueling is one of the keys that makes the U.S. Air Force an expeditionary air power for the nation.

If the Chinese can develop that beyond just a niche capability, that will have a serious impact with second and third-order effects for U.S. planners in any kind of contingency that we can see in the future. Combined with that and the air-launch cruise missiles, I think that is something that U.S. planners need to start to reconsider, especially against the cruise missiles.

Organizationally, the PLAAF has drawn down in size and increased in its capabilities. This has been going on since the '80s when they had 50 air divisions. They've shifted to a brigade structure, which for the PLA Air Force and the PLA writ large is one of the biggest organizational changes which is focused, forcing them to become, or allowing them to work toward being more expeditionary, more flexible and more capable.

And we can see clearly their model for that is the United States Air Force. And this has enhanced their warfighting capability.

On the technology side, PLA aerospace forces are increasingly more active. They have continuing interest in artificial intelligence, which we talked a little bit earlier, especially with the advent of AlphaGO, which the Chinese saw Ke Jie as their version of, way far beyond chess, and there was no way that anybody could ever master it, and now we have computers that have mastered that. That was a big wakeup, and the PLA has written articles about using artificial intelligence because it obviously has reached such a level.

There are reports of Blue Team, which for them is the adversary, using AI in wargaming and actually defeating their Red Team forces, and they've written about this in the open press, which is largely what CASI studies. It's their own writings.

And they've used it to attempt to help the Red Forces to make up for a lack of real world experience, which you know is kind of one of their main, main impediments at this point. So focusing on more high-tech weapons at a longer range to engage enemy forces, if necessary, over land, but preferably over maritime. The PLA continues to expand its use of actual combat conditions for training and exercises and write about this extensively as how they shift from a very scripted training regimen to a more free play.

Now it's not nearly what we've achieved with Red Flag and U.S. capabilities, but it is a step up that ladder that they know where they're going, and we have been nice enough to point that out for them, and they have been copying what we have been doing.

So they have different models, more than just one-on-one. They have formation to formation, freestyle aerial dogfights that continue to move the PLA Air Force and their pilots up that ladder.

The command structure, shifting to a brigade has not only allowed them to be more flexible, it has also forced them to become more active in taking part because it is forcing brigade officers to take a vested interest in developing the training and then to be able to carry it out, not just simply going and executing the script.

Taking a holistic approach. We also look at aerospace, the industrial base, as they seek to build their version of Boeing or Airbus in COMAC, launching their first civilian indigenous aircraft. We feel strongly that this, the military-civil fusion, as the Chinese call it, is going to be where they're going to be able to crack some of these things that force, that up until this point have been their major detriments. So aerospace engines, advanced materials, et cetera, that's where really where we think they're going to be able to get that.

The Air Force, as we've already heard about, is looking to integrate space, air and space, and to be prepared to do offensive and defensive missions, both near and abroad.

I want to borrow from Mike Chase for a minute. He found a great quote that says from the PLA when we talk about strategic air forces and strengthening the air force it includes three things: bright eyes; strong fists; and long arms, which is essentially the U.S. global vigilance--right--bright eyes, global vigilance, global reach, long arms, global power, strong fists.

So thank you, Mike, for that.

DR. CHASE: Welcome.

DR. MULVANEY: But I think it's very clear, they see us--we call them our pacing threat. That's exactly what we are to them. They are modeling off of our air force, trying to learn everything that we put out. We recently stopped publishing Air Space Power Journal in Chinese.

But we were kind enough to do that for a number of years to try to inform them how they could--and they've been--

VICE CHAIRMAN BARTHOLOMEW: Get better.

DR. MULVANEY: Exactly. How they could get better and they've been listening.

I want to emphasize, however, that while the PLA is not ready to challenge the United States in any way, shape or form in active combat, that doesn't mean that the advances that they are concluding right now in aerospace forces aren't already having consequences for the U.S. and its allies.

Our colleagues at RAND have helped us with a study looking at the increased air operations in the East China Sea, Japan, Taiwan. We could go into that in detail. We have a report forthcoming from RAND, which we hope to publish at our May conference, that will talk about that.

But they are having real world effects. They can't fight us in combat, but they're having actual effects on our partners and allies now.

Strategic air force we've heard and talked about. I'm already out of time so I want to wrap up real quick. But the strategic air force concept is looking to have long-range bomber fleets, high- tech and integrating that, led by building a strategic air force.

There's a rundown of all the things that they've been purchasing and developing and acquiring in my written testimony, but the bottom line is they've been deliberately and methodically transforming their air forces from a dated, bloated territorial defense system to a modern air force with strategic ambitions.

So there are some recommendations in my written testimony that I won't go over. There were some commissioners who had questions about the dismantling of the Armaments Department. But long story short is that the PLAAF Equipment Department in conjunction with the newly elevated Air Force Research, Air Force Equipment Research Academy are really the driving force, but there is still a lot of what we would say perhaps innovation that goes on at the local factory levels that then tries to feed back.

The long story, the takeaway from all that, is that it's shifted from a top-down bureaucratic this is the thing we're going to build, and you're going to figure out how to use it, to a much more customer-driven, if you will, aerospace forces, we need something, please go produce this for us, which is a significant shift.

And with that, I will conclude the testimony and look forward to your questions.

**PREPARED STATEMENT OF BRENDAN MULVANEY, PH.D., DIRECTOR, CHINA
AEROSPACE STUDIES INSTITUTE**



Testimony of Dr. Brendan S. Mulvaney before the U.S.-China Economic and Security Review Commission, Hearing on “China’s Military Reforms and Modernization: Implications for the United States”, Topic: (PLA) “*Air Force Modernization*”

Thursday, February 15, 2018

Vice Chairman Bartholomew, Senator Talent, and distinguished members of the Commission, thank you for your invitation to appear before you today to participate in the ongoing discussion about China’s military modernization. I am truly humbled to be part of this set of panels with such accomplished participants. My remarks today are my own opinions and do not represent the U.S. Air Force, Department of Defense, or any other governmental organization.

As evidenced by the number of participants, and the number of hearings this, and other commissions and committees, have held on this topic, it is of great and growing importance. And given the recent release of the National Security Strategy, Nuclear Posture Review, and the National Defense Strategy, the timing seems to be a good fit to help congress better understand the issues involved so they can help direct time and resources toward the most important lines of effort.

As we have already heard from the first panel about the overall modernization effort, and the establishment of the Strategic Support Force, and the Joint Logistics Support Force, I won’t dwell on them directly, but we will use that testimony to better understand and contextualize the modernization efforts of the PLA’s Aerospace Forces.

The China Aerospace Studies Institute (CASI) serves as the Department of Defense’s premier center for open-source native-language focused research on the PLA’s Aerospace forces and issues. I say ‘aerospace’ because we take a very broad view at CASI and look not just at the PLA Air Force (PLAAF), but also PLA Naval Aviation, Army aviation, rockets and missiles, space and satellites, and the civilian infrastructure, including cyber, that supports it. CASI’s mission is to advance understanding of the capabilities, development, operating concepts, strategy, doctrine, personnel, organization, and limitations. So it is an attempt to take a holistic view by looking not just at the advances in technology and weapons that make the PLA appear ten feet tall, but also the challenges they face, the way they approach warfighting and challenges, and the PLA cultural drivers that underpin the endeavor.

With that as a background, I’d like to quickly cover some of the most significant reforms and modernization efforts, and then I can respond to any specific questions in the Q&A session when we get to it. I’d also like to caveat that while the PLA uses three separate terms for what we usually refer to as “modernization” – modernization (weapons and equipment), regularization (organization and personnel), and revolutionization (anything to do with Party issues), I’ll use the U.S. version of ‘modernization’ for the discussion here, because I think that is really what the Commission is interested in.

To highlight what Xi Jinping has in mind, we need only look to his report from the 19th Party Congress,

“We will adapt to the trend of a new global military revolution and to national security needs; we will upgrade our military capabilities, and see that, by the year 2020, mechanization is basically achieved, IT application has come a long way, and strategic capabilities have seen a big improvement. In step with our country's modernization process, we will modernize our military across the board in terms of theory, organizational structure, service personnel, and weaponry. We will make it our mission to see that by 2035, the modernization of our national defense and our forces is basically completed; and that by the mid-21st century our people's armed forces have been fully transformed into world-class forces.”¹

1. How has China’s military reform effort (including the creation of the Strategic Support Force and Joint Logistics Force) affected air force modernization efforts?

PLA aerospace forces modernization has been underway in earnest for at least two decades. The latest round of PLA reforms has only served to codify and reinforce many of the changes that were already underway. Over the last two decades, we have seen a steady increase in the bureaucratic heft of the PLAAF, including the elevation of PLA Air Force General, and former PLA Air Force Commander, General Xu Qiliang as the senior vice-chairman of the Chinese Communist Party’s Central Military Commission (CMC) and previous inclusion of the PLAAF commander on the CMC (since re-organized to no longer include any service chiefs after the 19th Party Congress). However, the establishment of the Strategic Support Force seems to indicate that the PLAAF lost its bid to continue to have the leading role for space, and other advanced technologies like cyber. However, as we heard earlier, the establishment of the SSF clearly shows the importance the PLA leadership puts on the space and cyber domains, and that they intend to rapidly develop their aerospace capabilities, both within and outside of the PLA Air Force proper. Despite this bureaucratic setback as part of the current round of reorganization, the PLA aerospace forces, and Air Force in specific, continue to garner larger budgets and more attention from PRC national leadership.

Otherwise, PLA Air Force modernization efforts proceed apace. From continuing to acquire advanced technology and systems from Russia, and others, to attempts to indigenously develop new capabilities and technologies, the PLAAF is at the leading edge of modernization in several advanced fields, and they continue to close the capability gap with the United States faster than anticipated. This includes all branches of the PLA Air Force- Aircraft, SAMs, AAA, Radar, and Airborne forces. In fact, just last month the PLAAF just took delivery of S-400 systems, otherwise known as the SA-21 Growler, from the Russians. This is a definite improvement for the SAM branch of the PLAAF.¹

Progress in advanced aircraft, like the J-20 and the recent acquisition of Russian Su-35s, continues to grab headlines and attention in the Pentagon, and it certainly merits attention. But the PLAAF is also making progress in other areas, not quite as flashy but equally important for power projection and warfighting capabilities. Two such advances are 1) Air-launched Cruise Missiles (ALCMs) (likely CJ-20s on H-6Ks) that are dual (conventional and nuclear)-capable; 2) air-air refueling.

Tankers, acting as an “air-bridge”, provide mobility to get forces to the theater. Once in theater, tankers can act as force multipliers, making air assets more capable by enhancing their

¹ While it is still unclear exactly which version was delivered, the longest-range version can reach up to 400 km, which can threaten airspace over Taiwan.

range and persistence. USAF air refueling is one of the keys that makes the USAF an expeditionary air power for our nation. If an air force, like the PLAAF, can develop more than just a small niche tanker capability, it can have a strategic impact with other positive 2nd and 3rd order impacts.ⁱⁱ In 2017, an H-6K bomber was photographedⁱⁱⁱ with a refueling probe mounted on its nose.² When combined with the ability to mid-air refuel, the addition of ALCMs can make for a serious consideration for U.S. war planners, particularly as the U.S. Air Force's Global Strike Command believes China's CJ-20 long-range cruise missiles can deliver nuclear warheads as well as conventional payloads.^{iv} The combination of a more effective air refuellable bomber with ALCMs means that the U.S. must continue serious work on cruise missile defense (CMD) against ALCMs and develop strategies to eliminate the aircraft before they can launch these missiles. As Andrew Erickson and his colleagues put it, "Cruise missile threats, historically, have not earned the respect they genuinely deserve from the U.S., its allies, and partners, nor have these threats engendered much action on U.S. or its allies and partners' cruise missile defenses (CMD)".^v

Organizationally, as part of the modernizations and the recent reorganization the PLAAF has gone from 50 air divisions in the 1980s to largely a brigade structure today, as has PLA Naval Aviation.³ This allows the PLAAF to shed some of its institutional and organizational impediments, and work its way up the ladder toward being a more agile, flexible force, that at some point in the not too distant future may be capable of task-organized expeditionary activities. The shift to brigades is one of the most significant changes the PLA Air Force, and PLA in general, has undergone, and is focused directly on improving the PLA's war-fighting capability.

On the high-technology side, the PLA aerospace forces are increasingly more active. "We must keep it firm in our minds that technology is the core combat capability, encourage innovations in major technologies, and conduct innovations independently."^{vi} The PLA's continuing and increased interest in artificial intelligence (AI) is one example where the PRC's capabilities have rapidly closed the gap with the United States, and where the military-civil fusion doctrine is being fully implemented. We have seen evidence of increased use of AI at both the tactical level, with the use of AI to assist with swarm technologies and techniques, and at the strategic level for assisted decision making. This seems to have taken on an even greater interest with the advent and success of AlphaGO.⁴ There were reports of a "Blue team" (aka adversary for the PLA) using AI in a wargame and defeating the "Red team" (aka the PLA forces undergoing training). The PLA Air Force is also using AI as a training enhancer in both virtual and augmented training and simulation, to help attempt to make up for lack of real-world experience.⁵

² At the same time, the PLAAF recently began refueling the same fighter twice during a single sortie, which could also be extended to refueling bombers more than once. PLA Air Force News, 22 May 2017, p. 2.

³ Overall, the PLAAF has gone from 50 air divisions in the 1980s to about 20-25 today. As a result, the number of aircraft has been cut by at least one half and the organizational structure for fighter and attack units has been changed from a division and regiment structure to a brigade structure, while the primary 3 bomber and 3 transport divisions have not shifted to a brigade structure, at least yet; however the PLAAF has begun to create some transport and search and rescue (SAR) air brigades (one directly under PLAAF HQ and one in each of the 5 TCAFs).

⁴ AlphaGo is a computer program that plays the board game Go. It was developed by Alphabet Inc.'s Google DeepMind in London. In October 2015, AlphaGo became the first computer Go program to beat a human professional Go player without handicaps on a full-sized 19x19 board. At the 2017 Future of Go Summit, AlphaGo beat Ke Jie, the world No.1 ranked player at the time. Research Blog: AlphaGo: Mastering the ancient game of Go with Machine Learning". Google Research Blog. 27 January 2016.

⁵ CASI has forthcoming papers on PLA use of AI by CASI Associate Elsa Kania.

While the PLAAF has definitely been acquiring more high-tech weapons and equipment, it has also focused on actual-combat training with that equipment to be able to engage enemy forces if necessary over China's land and maritime areas. One example of this is the PLAAF's focus on the "four key training brands" competitions and exercises—Golden Helmet, Golden Dart, Blue Shield (Golden Shield), and Red Sword. CASI has a forthcoming report on this topic. The main take away is that the PLA continues to expand its use of actual-combat conditions, training and exercises, and is moving away from the traditionally scripted actions of the past. It was reported in the PLA Air Force News that in recent training events, "To make training more reflective of actual-combat real air battles, the rules of the Golden Helmet competition have expanded to include not only air battles between aircraft of the same model but also those between aircraft of different models; "one-on-one" airplane confrontation as well as formation-to-formation confrontation; and scorekeeping competition as well as "hit-to-bring-down fight." In 2011, the first competition incorporated "freestyle aerial dogfights" and eliminated the difference in altitude for horizontal maneuvers in aerial combat."

A recent article examined an Eastern Theater Command Air Force air brigade's efforts in improving training organization capabilities independently under the PLAAF's new "base-brigade"⁶ command structure. A staff officer from the brigade's Staff Department's Operations and Training Office, explained that the "base-brigade" command structure allowed the brigade level to organize training independently, in turn, it also demanded training organization personnel be proficient in not just executing specific duties, but also in formulating flight plans and organizing tactical subjects training. A navigation staff officer said that in the past his job was just to feed flight route data to commanders, but now his duties included assisting commanders in decision-making and providing tactical guidance to aircraft in training. He admitted to often experiencing panic due to his [lack of] abilities. Another deputy chief of staff pointed to the shift from a nanny style command concept to a more open approach.^{vii} This shows that the PLA has heard the repeated criticism that the U.S. was so kind to point out,⁷ and is taking steps to remedy the shortcomings.^{viii}

Taking the holistic approach, CASI is also examining the aerospace industrial base, including the military, 'commercial', and 'civilian' sectors. We believe that as China continues to try to develop its indigenous capabilities and its own commercial aircraft, like the C919 from the Commercial Aircraft Corporation of China, it will be the "military-civil fusion" that allows the PRC to overcome its remaining impediments to advanced systems, namely aero-engines (currently all of the J-10s that entered service in the last ten years are equipped with Russian engines^{ix}), advanced materials, and systems integration. As the PRC continues to pursue foreign partnerships (including some joint-ventures), and suppliers for its civil/commercial aerospace industry, it is important to continue to monitor the progress and expansion of this part of the PRC aerospace 'ecosphere', because it carries implications for both military and civil applications.

Finally, lest we think everything runs smoothly for the PLA, there have been notable issues in morale, training, and family issues, related to the massive reorganization. The government in Beijing has stated that they believe the PRC is in a "period of strategic opportunity", and thus has assumed the risk associated with the reorganization and its attendant decline in morale and readiness, in order to complete the changes before the 'period' ends, and meet their self-imposed timelines of 2035 and transforming the PLA into a "world class" force by 2049. CASI has a

⁶ PLA Air Force News 5 July 2017, The new base-brigade system (基地-旅体制) integrates battle, training, management and support (战训管保), and is essential to the development of system-of-systems operational capabilities (体系作战能力).

⁷ For example: regarding the limitations of centralized command and control / scripted training, etc.

forthcoming paper looking at some of the challenges and detrimental effects that the reorganization is causing.

2. What kinds of missions and operations is the “strategic air force” concept designed for, and what does this mean for U.S. defense planners, and U.S. allies and partners in the region?

In 2004, the Party’s Central Military Commission (CMC) approved the PLA Air Force’s first-ever service-specific strategic concept.⁸ This concept clearly suggested a much broader mission than in the past, with a greater emphasis on offense. The Air Force was to, ‘Integrate air and space; be simultaneously prepared for offensive and defensive operations’.

Then, the 2008 PRC defense white paper went on to describe the PLAAF as “a strategic service of the PLA.....To meet the requirements of informationized warfare, the Air Force is working to accelerate its transition from territorial air defense to both offensive and defensive operations, and increase its capabilities for carrying out reconnaissance and early warning, air strikes, air and missile defense, and strategic projection, in an effort to build itself into a modernized strategic air force.”^x So I think that pretty clearly spelled out, a decade ago, where the PLA wanted their Air Force to go.

I’m going to borrow from Mike Chase for a minute and use a quote he found that says, from the PLA, “When we talk about strategic air force and strengthening the air force it includes 3 things: bright eyes, strong fists, and long arms.”^{xi} This can be seen as roughly analogous to the U.S. Air Force’s Global Vigilance (bright eyes), Global reach (long arms), and Global power (strong fists). So, it is clear that the PLA has their sights set on becoming a strategic air force, and their model/ pacing threat is the U.S. Air Force. While their culture and organization will prevent them from actually duplicating USAF agility and adaptability, the PLA has clearly learned some of the lessons we have been telling people they need to learn.

The 2 June 2017 edition of the PLA Air Force News was a special edition reporting on the “2017 Air Force Concentrated Training for Principal Officers at the Division, Brigade and Regiment levels” that took place from 20 to 26 May 2017. PLAAF Commander Ma Xiaotian and PLAAF Political Commissar Yu Zhongfu both delivered lectures in person. Participants reached two important conclusions. First, the PLAAF was historically close to the threshold of becoming a strategic air force and to the frontier of the air and space domain. Second, [the PLAAF should] speed up the process to become a world-class, strategic air force. According to this article, a world-class force entailed the following elements: world-class weapons and equipment, organizational structure, operational systems, talented professionals, training performance, and military theoretical (foundations). According to Air Force senior leaders, a world-class strategic air force must have strong strategic capabilities, must integrate air and space and have both offensive and defensive capabilities, must integrate operational system-of-systems, and must have very strong “soft powers”. In terms of operational capabilities, the core demand is to be able to prevail in combats (to win fights), i.e., to possess strong operational capabilities in air and in space, effectively safeguard national sovereignty, security, and developmental interests.

The implications for U.S. interests, allies, and partners are fairly significant. No longer can the U.S. and its allies plan for and count on being able to achieve air superiority, much less air supremacy as rapidly as we do now.^{xii} While I will emphasize that the PLA has yet to

⁸ Almost 20 years after the CMC authorized the PLA Navy’s first strategy known as “off shore defense”

achieve the capability to challenge American and allied forces in the air, this is clearly a goal they are working hard to achieve, toward which they are making great strides. For planners, the fight is not tonight, but some point in the future; and the inability to immediately establish and maintain air superiority (as we have been able to do in every case for the last half century) needs to be a major consideration, and topic of frequent discussion with our allies and partners, as well as within our own planning staffs.

Furthermore, the fact that the PLA isn't ready to challenge the U.S. in combat, does not mean that the advances the PLA aerospace forces are making don't already have consequences for the U.S., its allies and partners. CASI sponsored two studies through Headquarters U.S. Air Force (HAF A5) conducted by Rand's Project Air Force which directly get at the heart of this matter. The first focused on how increased PLA air operations in the East China Sea are affecting U.S. interests, allies, and partners- primarily Japan, but with implications for Taiwan, the Philippines, Vietnam, and others; and second looked at how the PRC is beginning to use bombers for strategic messaging and deterrence. This is having a real and dramatic affect today, and we would be happy to share those studies once they are complete and ready for release at the time of our annual conference in May.

3. What are the PLAAF force building and acquisition priorities and how do they align with the PLAAFs "strategic air force" concept?

On the topic of force building, the PLA Air Force is well ahead of the other services. In a November 2017 article in the PLA Air Force News it was announced that for the first time, more than half (53.6%) of incoming enlisted members had some college education (either current students or graduates)^{xiii}, this compares to approximately 35% of the overall PLA enlisted force having college experience. This directly goes to the heart of their drive to "win informationized local wars."^{xiv} Additionally, although the PLA is undergoing a 300,000-man downsizing, of which one-half are officers, the PLAAF actually increased from 378,000 in 2012 to 420,000 in 2017.^{xv}

As for the hardware, today's PLA Air Force is a mix of export model Russian fourth generation fighters, "indigenously" designed fighters (which are largely a result of aggressive reverse-engineering), larger support aircraft, and a significant and growing bomber fleet.⁹ In November 2017, PLAAF Commander Ding Laihang, while visiting the newly-reorganized Air Force Research Academy in Beijing, noted that " thanks to its high-tech nature, the (development of the) Air Force needs to strive to be ahead of other services."^{xvi} During the same visit, Ding also emphasized that the development of the PLAAF should be "led by [building] a Strategic Air Force."^{xvii}

A quick rundown shows that the J-10, manufactured by the Chengdu Aircraft Industry Group, along with all its variants, gives the PLA a rough-equivalent to western 4th generation fighters, think along the lines of the F-16.

The J-11A is the Russian Su-27 *Flanker* produced by China under license.

Just last month, January 2018, the PLA Air Force confirmed that they had taken delivery of a second batch of ten Sukhoi Su-35 fighters from Russia. These are essentially improved derivatives of the Su-27. The Su-35s have already flown over the South China Sea.^{xviii}

⁹ "Information available to Jane's from Asian government sources largely confirms the broad trends of the Pentagon report, though estimated numbers are at variance. For 2014, Asian government sources note that China has 946 modern combat aircraft, more than 300 above the US estimate for 2013; the same sources report that by 2020 this number could grow to 1,562." <https://janes.ihs.com/Janes/Display/1319011>

The J-20 represents China's first indigenously developed stealth aircraft. In November 2016, China openly demonstrated the J-20 stealth fighter in public for the first time by performing a 60-second flyby at the Zhuhai air show.

The Y-20, is a four-engine heavy transport, based at Yanliang airbase near Xi'an. It made its first public flight on January 26, 2013.

The PLA's airborne early warning and control aircraft is the KJ-200, which is based on the Russian Yak-8, and the KJ-2000, which is based on the Russian Il-76. It also has a new KJ-500 airborne early warning and control aircraft.

The H-6U is the PLA's "indigenous" tanker, but appears to have significant limitations due to the amount of transferable fuel it can carry.¹⁰ In addition, only a few aircraft variants can be air refueled.

The PLA Navy is increasingly using the H-6K fleet for long range flights, pushing boundaries, and gaining intelligence about U.S. assets, allies, and partners in the region¹¹. And of course, carrier-based aviation assets like the J-15 fighters, Z-18F anti-submarine warfare (ASW) helicopters, Z-18J airborne early warning helicopters, and Z-9C rescue helicopters, will continue to train and exercise more with the PLA Air Force, and likely the PLA Rocket Force, in the future, as the PLA continues to build out its vision for "Joint" Theater Commands. Our 'big brother' organization, the China Maritime Studies Institute (CMSI) at the Naval War college continues to produce noteworthy research on these topics as well.

The bottom line is that the PLA has deliberately and methodically transformed its air force from a dated, bloated territorial defense-based force, to a modern force with strategic ambitions. We should expect nothing different in the future decades. The PLA will continue to focus on gaining and improving their access to stealth technology, and stealth defeating technologies lest we forget the defensive aspects of PLA modernization; advanced and more secure means of command and control, be it through quantum communications breakthroughs, or more traditional means; hypersonic delivery vehicles, arguably a field in which the PRC is a, if not 'the', leading nation; integration of artificial intelligence, better use of 'big data' and advanced analytics; all of which will be supported through a more robust military-civil fusion network of academic and research facilities which can draw on the length and breadth of the PRC's aerospace experts, not just those in the PLA.

We should expect to see the PLA undertake more ambitious and longer-range flights, and likely deployments, probably under the name of international cooperation or exchanges initially, and increasingly 'joint' training, exercises, and operations, between their Air Force, their naval aviation, and other PLA forces. CASI has a research report forthcoming on this very topic.

4. How does the PLAAF determine its service-specific weapons acquisition and weapons development priorities?

5. How has the military reform effort and the dismantling of the General Armament Department affected the military modernization at the service level, particularly for the PLAAF?

¹⁰ It holds only 37,000 pounds of transferable fuel (PLAAF analysis calls for a platform capable of holding 80,000–100,000 pounds). Buy, Build, or Steal: China's Quest for Advanced Military Aviation Technologies. Phillip C. Saunders and Joshua K. Wiseman, China Strategic Perspectives 4, INSS, National Defense University.

¹¹ See CASI's forthcoming studies sponsored via HAF A-5 by Rand's Project Air Force for more information.

Weapons acquisition serves as a means to achieve an overarching national strategic objective and it needs to be understood as part of the Great Chinese national Rejuvenation scheme, as, more specifically, part of President Xi Jinping's building a strong nation with a strong army strategy. Given the nature of the PLA as a party-army, its weapons acquisition is of course about gaining military advantages, but it is also about the national pride and advancing the Comprehensive National Power (综合国力) to compete with the best, the United States.

The GAD (General Armament Department) was never in charge of the PLAAF's R&D process. It was primarily the Army's Equipment/Armament department. Unlike the GSD, GPD, and GLD, the GAD never even once had a deputy from any of the other services. It was responsible for overseeing, but not managing, the equipment R&D for the Navy, Air Force, and Second Artillery. The new Equipment Development Department is much smaller and appears to merely oversee all of the service (PLAA, PLAN, PLAAF, and PLARF) equipment development departments, but not manage them. The PLAAF Equipment Department, in conjunction with the Air Force Equipment Research Academy, which was created in 2004, has responsibility for Air Force weapons and equipment development and maintenance. And since the 1998 reforms to the RDA¹² system, which gave military considerations more weight in the RDA process,^{xix} strategy and doctrine appear to be driving PLAAF acquisitions rather than technologic advances pushing from the aviation industry. As an example of this shift, the PLAAF Commander has publicly confirmed development of a new bomber, likely to be known as the H-20, for long-range strike missions.^{xx} This indicates that the aerospace forces are focusing on missions and capabilities to drive technology and innovation.

The PRC's civilian leadership has clearly put great emphasis on indigenous innovation, which, when combined with military-civil fusion, is intended to yield greater technological advances, which will more quickly be adapted and integrated by the PLA. Similarly, in 2000, the PLAAF established a program named the "Air Force Academician". Through this program, the Air Force invited academicians from China's two most prestigious science and engineering institutions, the so-called "two academies"- the Chinese Academy of Sciences and the Chinese Academy of Engineering to become Air Force consultants, overseeing the development of China's new combat systems and the R&D process of indigenous design and development of weapons and equipment. It has been acknowledged by various PLAAF leaders that over the past 17 years, a total of 156 academicians worked as advisors for the Air Force and they provided important intellectual support for the strategic transition of the PLAAF.¹³ On 14 September 2017, the PLAAF Commander Ding Laihang and Political Commissar Yu Zhongfu both participated an annual meeting with these Air Force Academicians.¹⁴

Of particular note, based on recent CASI research, it appears that the PLAAF's Equipment Research Academy,¹⁵ may have been reformed and possibly upgraded to be the Air Force Research Academy. This potential upgrading represents increased bureaucratic

¹² Research, Development, and Acquisition

¹³ Liu Shuang (刘爽), Liu Pengyue (刘鹏越), Zhu Zhanghu (朱章虎), "The 6th Meeting with the Academicians on Air Force Construction and Development" *Air Force News*, 15 September 2017.

¹⁴ http://www.thepaper.cn/newsDetail_forward_1794897

¹⁵ The research academy is responsible for consolidating the strengths of the PLAAF's scientific research, implementing S&T strategy for a strong military, and speeding up the informatization of the PLAAF's equipment and weapons. The academy was created in 2004

importance and power, and could indicate a greater role in the development of new military systems.

One thing to keep in mind is that, although the PLAAF has a 4-5 step process for acquisition,¹⁶ the different aircraft factories each have their own research institute, which are always coming up with new ideas independently. As a result, it is not necessarily the Equipment Research Academy who comes up with the idea for a new weapon system or piece of equipment. It is then the responsibility of the PLAAF's military representatives at that research institute or their regional military representatives to coordinate this with the PLAAF. Interestingly, it appears that PLAAF military representatives continue to spend most of their career in the same office rather than rotating to new assignments.^{xxi}

6. What recommendations do you have for Congress concerning the topic of your testimony?

a. Maintain vigilance. Continued hearings on this and related topics, keep up interest in Congress, in think tanks, in academia, in policy circles, and in the national security establishment.

b. Continue to ask the Department of Defense to dedicate and prioritize time and resources to both the classified and unclassified study of the PLA and the PRC more broadly. CMSI, CASI,

¹⁶ The PLAAF Headquarters' Equipment Department is responsible for overseeing all of the PLAAF's weapon system and equipment development. For more sophisticated systems, the development process discussed below generally lasts for about ten years and is gradually taking longer for each new generation of equipment. For example, the China Air Force Encyclopedia states that the development time lasted 3-5 years for first-generation, 5-7 years for second-generation, and 7-12 years for third-generation combat aircraft, and currently takes about 20 years for fourth-generation combat aircraft. The development cycle consists of the following four primary phases: Demonstration (论证); Proposal (方案); Engineering Development (工程研制); Design Finalization (设计定型) and Production Finalization (生产定型).

Once preparatory research is completed, the first phase of Chinese RDA, called "demonstration," begins. This phase is sometimes translated as the theoretical evaluation, verification, or weapon system concept research phase. In this phase, the idea for a system is examined to ensure the feasibility of translating the technology into a system that the military can use.

In the second phase, called "proposal," the main performance characteristics of the conceptual system are defined and then tested to see whether they will be acceptable to the military. This phase may also be referred to as the project planning, design, or prototype phase. During this phase, the best technologies from the demonstration phase are selected to be developed.

PLAAF research institutes and military representatives at the production facility conduct a joint evaluation along with the contractor and a prototype/mockup (样机) is developed. This phase can now involve competitive development of prototypes by different factories, with the PLAAF choosing which proposal to accept.

During the third phase, called "engineering development," the factory and associated research institutes responsible for full-scale development of the system design, produce and test it. This phase can often be the longest, taking several years.

Designing, producing, and testing the aircraft. This phase can be the longest, and timelines have lengthened as China develops more ambitious aircraft. The Air Force Equipment Research Academy, its associated research institutes, and Air Force military representatives are all involved in the engineering development phase.

The fourth and final phase combines design finalization and production finalization. The design finalization component involves a comprehensive review and inspection of the new weapon system or equipment throughout the process, including systematic testing of each component of the prototype or prototypes. During the production finalization component, the new system is produced for delivery to the operational force. Once the new system or equipment enters the operational force, it can still take a long time, possibly years, before the system and its personnel are considered combat capable. Ken Allen, and People's Liberation Army Air Force 2010, National Air and Space Intelligence Center: Wright-Patterson Air Force Base, Ohio, 1 August 2010.

and other military research organizations provide the U.S. government the cost-effective ability to draw from in-house experts, and to conduct dedicated research on these relevant topics, which can help Congress in its decision-making process as well.

c. Consider requesting or commissioning dedicated research reports focused on PLA modernization (in U.S. terms) efforts across the spectrum of capabilities, with continued emphasis on the implications for U.S. planners and American research, development, and acquisition efforts.

ⁱ Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era,” Delivered at the 19th National Congress of the Communist Party of China, October 18, 2017.

http://www.chinadaily.com.cn/china/19thcpcnationalcongress/2017-11/04/content_34115212.htm, accessed on February 6, 2018.

ⁱⁱ Credit to Dr. Carl Rehberg, currently at CSBA, for his work in this area. For more details on China related to nuclear issues, please see the forthcoming CSBA publication: *Sustaining the Nuclear Deterrent: The LRSO and GBSD*, by Mark Gunzinger, Carl Rehberg and Gillian Evans. That publication is expected to be available late February or early March 2018.

ⁱⁱⁱ Richard D. Fischer, Jr., “Chinese Xian H-6K With Refueling Probe Suggests New Missions,” *Jane’s Defence Weekly*, August 18, 2017, available at <http://www.janes.com/article/73182/chinese-xian-h-6k-with-refuelling-probe-suggests-new-missions>.

^{iv} “Strategic Weapon Systems,” *IHS Jane’s Sentinel Security Assessment - China and Northeast Asia*, April 7, 2017, available at <https://janes.ihs.com/Janes/Display/cnaa015-cna>.

^v Dennis M. Gormley, Andrew S. Erickson, and Jingdong Yuan, *A Low Visibility Force Multiplier: Assessing China’s Cruise Missile Ambitions* (Washington DC: NDU Press, 2014).

^{vi} Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era,” Delivered at the 19th National Congress of the Communist Party of China, October 18, 2017.

http://www.chinadaily.com.cn/china/19thcpcnationalcongress/2017-11/04/content_34115212.htm, accessed on February 6, 2018.

^{vii} PLA Air Force News, 24 July 2017

^{viii} PLA Air Force News

^{ix} Yefim Gordon and Dmitry Komissarov, *Chinese Air Power: Current Organisation and Aircraft of All Chinese Air Forces* (Surrey: Ian Allan Publishing Ltd., 2010)

^x Information Office of the State Council, People’s Republic of China, *China’s National Defense in 2008*, Beijing, China, Jan. 2009, http://english.gov.cn/official/2009-01/20/content_1210227.htm

^{xi} Du Wenlong, CCTV interview, July 2016: http://kj.81.cn/content/2016-07/22/content_7169667.htm

^{xii} The PLAAF never uses these terms. They command of the air (制空权), which means control of a certain air space for a certain period of time, not 24-7. Air superiority — That degree of dominance in the air battle by one force that permits the conduct of its operations at a given time and place without prohibitive interference from air and missile threats. (JP 3-01). Air supremacy — That degree of air superiority wherein the opposing force is incapable of effective interference within the operational area using air and missile threats. (JP 3-01)

^{xiii} PLA Air Force News, 24 Nov 2017

^{xiv} 2015 Defense White Paper, The State Council Information Office of the People’s Republic of China, http://www.chinadaily.com.cn/china/2015-05/26/content_20820628.htm

^{xv} 2012 PRC Defense White Paper. “China’s new air force chief lays out long-range mission” *South China Morning Post*, 23 August 2017, <http://www.scmp.com/news/china/diplomacy-defence/article/2108010/china-appoint-new-air-force-commander-sources-say>.

^{xvi} Qiao Songbai, Xu Tongxuan, “Commander Ding Laihang visits Air Force organizations stationed in Beijing,” *Air Force News*, 14 November 2017, p.1.

^{xvii} *Ibid*,

^{xviii} “China sends advanced jet fighters to South China Sea for joint combat missions,” 7 February 2018, http://eng.mod.gov.cn/news/2018-02/07/content_4804400.htm.

^{xix} Philip Saunders, Joshua Wiseman, *The People’s Liberation Army Air Force and the Chinese Aviation Industry*, UC San Diego, SITC Research Briefs, 2013(Research Brief 2013-12)

^{xx} An article published by the China Military Online website in December 2016 provided further insights into the requirements for China's new strategic bomber. Remarks made in the media report by Rear Admiral Yin Zhuo, director of the PLAN's Expert Consultation Committee, reiterated that China is developing a new long-range strategic bomber, referred to in the article as the H-20. Although no concrete details have been given, the public acknowledgement by the head of the PLAAF and the subsequent discussion in official media channels suggest that the project has been under way for some time. <https://janes.ihs.com/Janes/Display/1319011>

^{xxi} Kevin Pollpeter and Ken Allen, “PLA Air Force Organizational Reforms: 2000-2012.”, 2015

OPENING STATEMENT OF MICHAEL S. CHASE, PH.D., SENIOR POLITICAL SCIENTIST, RAND CORPORATION

HEARING CO-CHAIR TALENT: Thank you.

Dr. Chase.

DR. CHASE: Thank you very much for inviting me, and I have to make one brief correction. I didn't find the quote that Dr. Mulvaney mentioned. It was actually my very diligent and talented RAND colleague, Cristina Garafola, who dug that up, so I'll give her credit where credit is due, and then shift gears to talk about PLA Rocket Force modernization and China's military reforms.

So on December 31, 2015, as part of the major reorganization of the PLA that was described in greater detail during this morning's panel, China renamed what was previously called the PLA Second Artillery Force as the PLA Rocket Force and upgraded it from its earlier status as an independent branch to the level of a full service.

This reflected the importance China attaches to its strategic missile force, which is responsible for the PLA's land-based ballistic and cruise missiles and is really the Chinese military's kind of cornerstone of its strategic deterrence and conventional precision strike capabilities.

Nonetheless, I would say that in certain areas the reorganization and the kind of general trajectory of PLA modernization might actually present some challenges for the Rocket Force as well, two in particular that I mentioned in the written testimony.

The first is that two other services, the PLA Air Force and the PLA Navy, are increasing their prominence in the two key areas that traditionally have really been the preserve of the strategic missile force. That's nuclear deterrence and conventional strike capabilities.

And the second I would mention is that like the PLA Air Force prior to the reforms, the PLA Rocket Force appeared to be quite interested in expanding its role in the space mission area and possibly in cyber as well. Instead, of course, what we saw was the creation of the PLA Strategic Support Force.

So in certain areas I would say that although the Rocket Force, its formal status has been elevated, it may also face some kind of a new environment that it's operating in because of the increasing prominence of those other services in its traditional areas.

But kind of underscoring its formally elevated status and its importance to China's national security, Xi Jinping has described the PLA Rocket Force as "China's core force for strategic deterrence, a strategic buttress for China's position as a major power, and an important cornerstone for defending national security."

And this formulation I think really reflects the PLA Rocket Force's importance to China not only as a key provider of the strategic weapons capabilities but also as kind of source of coercive leverage and a symbol of China's great power status. I think it's quite important to China in all three of those respects.

And indeed, as China has modernized its strategic missile force, Beijing has used a variety of channels, such as military parades, official media reports, Chinese and English social media, and even a music video to highlight the growing strategic deterrence capabilities of the Rocket Force.

And so China's Rocket Force modernization really has focused on a couple of key trends over the years. The first is on the nuclear side: increasing the size and sophistication of the missile force, moving from what was a quite small and very kind of outdated silo-based missile

force around 15 years ago or so to a larger, more modern, more mobile force, emphasizing their survivability, their capabilities for countering missile defense developments.

And then on the conventional side, the overall trends have been to try to increase not just the size of the missile force, but the range, the accuracy, and the sophistication of the missiles that comprise the conventional missile force.

At the same time, Chinese media also highlights the Rocket Force's use of an extensive network of underground facilities that actually support the entire PLA but highlights using those to improve the ability of the Rocket Force to conceal itself and to be more survivable. And these reports also highlight improvements in Rocket Force training to make it more realistic and highlight changes in readiness to make the Rocket Force achieve a higher level of readiness.

So three key developments I'd like to highlight in particular. During the PLA's 90th anniversary parade last year, China highlighted this transition to a more modern, more survivable nuclear deterrent when it unveiled the Rocket Force's new DF-31AG ICBMs, which feature improved launchers that are clearly designed to enable greater mobility.

A second: Beijing underscored the growing flexibility and sophistication of its regional nuclear and conventional strike options by revealing the deployment of the DF-26 intermediate range ballistic missile, which the official parade narrator explained has nuclear and conventional precision strike capabilities as well as a conventional anti-ship ballistic missile version.

And third, I want to highlight the fact that China is continuing to modernize the Rocket Force with several new systems under development, including the DF-41 mobilized ICBM capable of carrying multiple independently targetable reentry vehicles, as well as a hypersonic glide vehicle program that appears to have both strategic deterrence and regional strike missions.

So, in all, I'd say that the further strengthening of the already formidable capabilities of the Rocket Force is going to pose some serious strategic and operational challenges for the U.S. and for its allies and partners in Asia. It could have implications for U.S. extended deterrence and assurance of our allies, first of all.

Second, the growing conventional strike capabilities, I think, in particular, will pose a real threat to U.S. forces and again those of our allies and partners, and not just to fixed facilities like air bases but also to surface ships like U.S. aircraft carriers.

And so in conclusion, I outline in the written testimony some ways in which I would suggest that the United States should respond to these challenges, and I'll just briefly mention them here.

Four ways. First, I think the U.S. will need to continue investing in maintaining and modernizing its own nuclear deterrence capabilities, not just for strategic deterrence but also, of course, for the important mission of reassuring our allies and partners.

Second, I think we are going to need to take an increasingly multi-dimensional approach to the way we think about extended deterrence and assurance. We're going to need to highlight maybe in some new ways our commitment to our allies and partners, and when I say multi-dimensional, I mean really that these discussions have to incorporate space and cyber and electronic warfare in addition to the kind of traditional focus on nuclear issues in the context of assurance and extended deterrence.

Third, I think because of the advances that the Rocket Force and other services are making in their conventional strike capabilities, we have to really focus even more attention on the survivability and the resilience of our own forces in the region. So that means investments in things like undersea warfare, dispersal and hardenings I believe was mentioned on the first panel, as well as integrated air and missile defense capabilities. And I would highlight also denial and

deception and other means of countering China's own command and control and intelligence surveillance and reconnaissance capabilities.

And then finally, you know, a big mission for the Rocket Force is really kind of strategic signaling and messaging. And I think in response to what they're able to do in that area, we're going to probably also have to adjust our approach to sending those deterrence and assurance messages in the region to being prepared to respond to Chinese coercive signaling or other attempts at intimidation of our allies and partners, and I would suggest that some of the ways that we might wish to do that would be by continuing to demonstrate capabilities that make things more difficult for Chinese planners and for Chinese decision-makers, such as being able to operate from numerous, dispersed and unexpected locations, and also to emphasize our denial and deception and other types of counter C4ISR capabilities.

So I'll conclude there and look forward to your questions.

**PREPARED STATEMENT OF MICHAEL S. CHASE, PH.D., SENIOR POLITICAL
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PLA Rocket Force Modernization and China's Military Reforms

Michael S. Chase

CT-489

Testimony presented before the U.S.-China Economic and Security Review Commission on February 15, 2018.



For more information on this publication, visit www.rand.org/pubs/testimonies/CT489.html

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PLA Rocket Force Modernization and China's Military Reforms

Testimony of Michael S. Chase¹
The RAND Corporation²

Before the U.S.-China Economic and Security Review Commission

February 15, 2018

On December 31, 2015, as part of a major reorganization of the People's Liberation Army (PLA), China renamed the PLA Second Artillery Force the PLA Rocket Force and upgraded it from its previous status as an independent branch to the level of a full service.³ This reflected the importance China attaches to its strategic missile force, which is responsible for the PLA's land-based ballistic and cruise missiles and serves as the cornerstone of the Chinese military's strategic deterrence and conventional precision strike capabilities.

Chinese leader Xi Jinping, who serves concurrently as Chinese Communist Party General Secretary, Central Military Commission (CMC) Chair, and President, has described the PLA Rocket Force as "China's core force for strategic deterrence, a strategic buttress for China's position as a major power, and an important cornerstone for defending national security."⁴ This formulation reflects the PLA Rocket Force's importance not only as a provider of key military capabilities and as a potential source of coercive leverage for Beijing but also as a highly visible symbol of China's great-power status. Indeed, as China has modernized its strategic missile force, Beijing has used a variety of channels—including military parades, official media reports, social media, and even a music video—to highlight its growing strategic deterrence and

¹ The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

² The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

³ See "China Inaugurates PLA Rocket Force as Military Reform Deepens," *Xinhua*, January 1, 2016, http://news.xinhuanet.com/english/2016-01/01/c_134970418.htm; and Kenneth Allen, Dennis J. Blasko, and John F. Corbett, "The PLA's New Organizational Structure: What Is Known, Unknown and Speculation (Part I)" *China Brief*, February 4, 2016, <https://jamestown.org/program/the-plas-new-organizational-structure-what-is-known-unknown-and-speculation-part-1/>.

⁴ See, for example, "President Xi Expects Strong, Modern Rocket Force," *Xinhua*, September 26, 2016, http://news.xinhuanet.com/english/2016-09/26/c_135715273.htm.

conventional precision strike capabilities.⁵ Key recent developments include the following:

- During the PLA's 90th anniversary parade in 2017, China highlighted its transition to a more modern and survivable nuclear deterrent by unveiling the Rocket Force's new DF-31AG intercontinental ballistic missiles (ICBMs), which feature improved launchers and greater mobility.
- Beijing underscored the growing flexibility and sophistication of its regional nuclear and conventional strike options by revealing the deployment of the DF-26 intermediate-range ballistic missile (IRBM), which has nuclear and conventional precision strike capabilities, as well a conventional anti-ship version.
- China is continuing to modernize the Rocket Force by developing the DF-41, a road-mobile ICBM capable of carrying multiple independently targetable reentry vehicles (MIRVs), and hypersonic glide vehicles (HGVs) for strategic deterrence and regional strike missions.

The further strengthening of the Rocket Force's already formidable capabilities will pose serious strategic and operational challenges for the United States and its allies and partners. First, the PLA Rocket Force's growing nuclear capabilities could have implications for U.S. extended deterrence and assurance of allies and partners. Second, the Rocket Force's growing conventional ballistic and cruise missile capabilities could pose a serious threat to U.S. forces and those of its allies and partners, including not only fixed facilities such as air bases but also surface ships, such as U.S. aircraft carriers. The United States should consider responding in the following ways:

- The United States should invest in maintaining and modernizing its own nuclear deterrence capabilities for purposes of strategic deterrence and assurance of allies and partners.
- The United States should take an increasingly multidimensional approach to extended deterrence and assurance and should highlight military and diplomatic actions—such as bilateral and multilateral training and exercises, high-level visits and exchanges, and other working-level initiatives—to underscore the determination of the United States to protect its security interests and support its allies and partners.
- The United States should continue to enhance the survivability and resilience of its forces and to encourage its allies and partners to do the same. Potential areas of investment could include undersea warfare, dispersal and hardening of forward-deployed assets, integrated air and missile defense, denial and deception, and other means of countering People's Republic of China (PRC) command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities.
- The United States should adapt its traditional approach to deterrence and assurance and be prepared to respond to Chinese coercive signaling or other attempts at intimidation, such as by demonstrating the ability to operate from numerous, dispersed, and unexpected locations; emphasizing U.S. denial and deception capabilities; and

⁵ Andrew Erickson, "Must Watch, Don't Be Deterred! The Official PLA Rocket Force Music Video," AndrewErickson.com, February 15, 2016, <http://www.andrewerickson.com/2016/02/must-watch-dont-be-deterred-the-official-pla-rocket-force-music-video/>.

highlighting capabilities that enable the United States to interfere with Chinese military operations from longer distances.

This testimony draws substantially from multiple lines of research being conducted at the RAND Corporation, including two significant recent efforts cited below that focused on the creation of the PLA's Strategic Support Force and on China's evolving nuclear deterrent. It is organized in five sections. The first section analyzes the PLA reorganization's implications for the Rocket Force. The second section provides an overview of PLA Rocket Force missions. The third section reviews PLA Rocket Force modernization trends. The fourth section assesses PLA Rocket Force future capabilities. The final section considers implications and recommendations for the United States.

PLA Reorganization and Its Implications for the PLA Rocket Force

As noted, as part of a major military reorganization announced at the end of 2015, China renamed and upgraded the PLA Rocket Force, formally giving it service-level status.⁶ On the whole, the modernization of the Rocket Force's nuclear and conventional missile capabilities and its elevation to the level of a full service as part of the reorganization are likely to further strengthen its position as the cornerstone of China's nuclear deterrent and the leading edge of its regional conventional strike capabilities. Nevertheless, the modernization and the reorganization of the PLA could also present the Rocket Force with some challenges. The continuing modernization of other components of the PLA—most notably the PLA Air Force (PLAAF) and PLA Navy (PLAN)—will increase the prominence of other services in the two key areas that the Rocket Force has traditionally dominated: strategic deterrence and short-, medium-, and long-range conventional strike capabilities. Along with these improvements in capabilities, PLAAF and PLAN modernization will present Beijing with new strategic signaling options. Indeed, China already appears to be using long-range bomber flights and aircraft carrier operations to send messages. As China's air and naval capabilities continue to grow, it will have an increasing number of strategic signaling options in addition to relying on the PLA Rocket Force to display its capabilities or launch missiles.

Moreover, prior to the PLA reorganization, the strategic missile force appears to have aspired to play a larger role in space and cyber warfare, a desire that seems to have resulted in competition with the PLAAF, because it also desired to play the leading role in these areas. For example, the chapter on missile force strategy in the 2013 edition of the PLA's *Science of Military Strategy* highlights the missile force's role in enabling the PLA to expand its operations into other domains and suggests that the missile force should play an increasingly important role

⁶ See "China Inaugurates PLA Rocket Force as Military Reform Deepens," *Xinhua*, January 1, 2016, http://news.xinhuanet.com/english/2016-01/01/c_134970418.htm; and Kenneth Allen, Dennis J. Blasko, and John F. Corbett, "The PLA's New Organizational Structure: What Is Known, Unknown and Speculation (Part I)" *China Brief*, February 4, 2016, <https://jamestown.org/program/the-plas-new-organizational-structure-what-is-known-unknown-and-speculation-part-1/>.

in space and cyberspace.⁷ As part of the reorganization, however, the PLA Strategic Support Force was established to take charge of the space, cyber, and electronic warfare mission areas.⁸

Nonetheless, looking ahead, the PLA Rocket Force will likely retain its status as China's core force for strategic deterrence and continue to play a central role in the conventional short-, medium-, and long-range strike mission area for the PLA. The PLA Rocket Force will continue to develop and deploy new capabilities (such as HGVs), many of which will pose serious strategic and operational challenges for the United States and its allies and partners.⁹

PLA Rocket Force Missions

The main tasks of the recently renamed PLA Rocket Force are the same as those of the PLA Second Artillery Force, but the Rocket Force's upgraded status within the PLA makes it all the more critical to appreciate its mission and responsibilities. The PLA Rocket Force is currently charged with nuclear and conventional deterrence and strike missions. These missions include "detering other countries from using nuclear weapons against China" and "conducting nuclear counterattacks and precision strikes with conventional missiles."¹⁰ And, of course, China's defense white papers never miss an opportunity to remind the world that the PLA Rocket Force "sticks to China's policy of no first use (NFU) of nuclear weapons, implements a self-defensive nuclear strategy, strictly follows the orders of the CMC, and takes as its fundamental mission the protection of China from any nuclear attack."¹¹ The conventional missile capabilities of the Rocket Force are characterized as being intended to fulfill the mission of conducting conventional precision strikes "against key strategic and operational targets of the enemy."¹²

In practice, this means that the Rocket Force has two main types of missions: strategic deterrence and warfighting missions.¹³ As for strategic deterrence, the Rocket Force must be prepared to conduct deterrence operations, both on a day-to-day basis and in the event of a crisis

⁷ Michael S. Chase, "Nuclear Policy Issues in the 2013 Edition of The Science of Military Strategy: Part 2 on PLA Second Artillery Force (PLASAF) Strategy and Capabilities," *China Brief*, July 2, 2015, <https://jamestown.org/program/nuclear-policy-issues-in-the-2013-edition-of-the-science-of-military-strategy-part-2-on-pla-second-artillery-force-plasaf-strategy-and-capabilities/>.

⁸ Kevin Pollpeter, Eric Heginbotham, and Michael S. Chase, *The Creation of the PLA Strategic Support Force and Its Implications for Chinese Military Space Operations*, Santa Monica, Calif.: RAND Corporation, RR-2058-AF, 2017, https://www.rand.org/pubs/research_reports/RR2058.html.

⁹ Lora Saalman, "China's Calculus on Hypersonic Glide," Stockholm International Peace Research Institute, August 15, 2017, <https://www.sipri.org/commentary/topical-backgrounder/2017/chinas-calculus-hypersonic-glide>; Joshua H. Pollack, "Boost-Glide Weapons and U.S.-China Strategic Stability," *Nonproliferation Review*, Vol. 22, No. 2, February 2016, pp. 155–164.

¹⁰ State Council Information Office of the People's Republic of China, *China's National Defense in 2008*, Beijing, January 2009, http://eng.mod.gov.cn/publications/2017-04/11/content_4778231.htm.

¹¹ Ibid.

¹² Ibid.

¹³ The Rocket Force can also play a role in military operations other than war (MOOTW), such as earthquake relief operations. See, for example, "Frequent Disaster Relief Operations Temper PLA's Combat Capability," *China Military Online*, August 11, 2014, http://eng.chinamil.com.cn/news-channels/china-military-news/2014-08/11/content_6089285.htm.

or conflict. In terms of its warfighting missions, the Rocket Force must be prepared to conduct nuclear or conventional missile strikes, either independently or as part of a joint campaign.

PLA Rocket Force Deterrence Operations

Conducting deterrence operations is a core function of China's strategic missile force. In this context, it is important to understand Chinese strategic deterrence concepts. The Chinese term usually translated as *deterrence*, *weishe*, possesses a broader meaning than what most of the policy and scholarly communities in the West have come to associate with deterrence. The Chinese concept of *weishe* is closer to what Thomas Schelling referred to as "coercion," as it encompasses both deterrence and compellence. Chinese military publications reflect this important difference, and noted Chinese scholars, such as Li Bin, have reached similar conclusions. Similarly, China's concept of strategic deterrence should be understood more broadly in that it entails not only nuclear deterrence, which PLA strategists believe is essential for responding to the most-severe threats to Chinese national security interests, but also conventional deterrence, which they believe provides China's leaders more flexibility. Notably, these strategists also maintain that China's conventional deterrence is becoming more effective and credible as a consequence of China's growing conventional military power, especially its long-range strike capabilities. Finally, China's conception of strategic deterrence also includes deterrence in the space and information domains.

Chinese strategists stress the importance of linking deterrence actions to political objectives, seeing deterrence, like war, as a continuation of politics and thus as a tool for achieving policy objectives and supporting China's overall national strategy. In this context, Chinese military strategists see the Rocket Force's nuclear and conventional missiles as ideal instruments for strategic deterrence operations because of their ability to launch rapidly, penetrate enemy missile defense systems, and destroy key targets.

In peacetime, the PLA Rocket Force supports strategic deterrence objectives in several ways, including displaying new missiles in military parades, participating in military exercises, or revealing missiles when an adversary's satellites are passing overhead. For example, Beijing undoubtedly intended to signal the growing capability and credibility of its nuclear deterrent when it used the military parade marking the PLA's 90th anniversary to reveal the existence of the newly developed DF-31AG ICBM, which is equipped with an improved mobile launcher to enhance its mobility and survivability.¹⁴ In a crisis or conflict situation, the Rocket Force can conduct higher-intensity deterrence operations, such as raising the readiness level of missile units, conducting exercise launches, or carrying out warning strikes. Significantly, even though China officially maintains a strict nuclear NFU policy, some PLA publications suggest that "lowering the nuclear threshold" could deter an enemy from launching conventional attacks against certain types of strategic targets, and Chinese strategists clearly see nuclear deterrence as relevant in any crisis or conflict involving a nuclear-armed adversary.

¹⁴ See "New Chinese Missile a More Mobile Deterrent: PLA," *The Straits Times*, August 5, 2017, <http://www.straitstimes.com/asia/east-asia/new-chinese-missile-df-31ag-a-more-mobile-deterrent>; Jeremy Page, "China Parades New Missile System in Warning to Rivals Abroad—and at Home," *Wall Street Journal*, July 30, 2017, <https://www.wsj.com/articles/chinas-new-missile-a-warning-to-rivals-abroadand-at-home-1501409739>.

PLA Rocket Force Nuclear and Conventional Missile Strike Campaigns

The PLA Rocket Force prepares for two major types of warfighting campaigns: the nuclear counterattack campaign and the conventional missile strike campaign. In keeping with China's NFU policy, the nuclear counterattack campaign is the only type of nuclear strike campaign discussed in Chinese military publications. They also state that such a campaign could be carried out independently by the Rocket Force or as a major part of a "joint nuclear counterattack campaign" involving the other services—as of early 2018, that means the PLAN, which currently deploys four out of a total projected number of eight Type 094 *Jin*-class ballistic missile submarines (SSBNs). But, according to Chinese officials, the PLAAF appears poised to regain a nuclear role for its bomber force, which would provide China with a credible nuclear triad.¹⁵ In any case, the nuclear counterattack campaign requires the survivability of the missile force and the ability to strike key enemy targets, and it would be executed strictly under the authority of the highest level of China's leadership. Chinese military publications also indicate that the nuclear counterattack campaign could be a large-scale or small-scale nuclear counterattack campaign and could consist of both initial nuclear strikes and follow-on nuclear strikes. This requires a nuclear force that enables China to hold some portion of its nuclear weapons in reserve after an initial nuclear exchange, so that it can deter further escalation or launch follow-on strikes if required.¹⁶

The PLA has also developed concepts for the employment of the Rocket Force's conventional missiles, either as an independent conventional missile strike campaign or as a key part of joint campaigns involving the other services, such as the PLA's joint blockade, amphibious landing, and anti-air raid campaigns. In particular, PLA publications underscore the centrality of conventional missile attacks in joint operations aimed at achieving information dominance, air superiority, and sea control, as well as countering third-party intervention. Chinese military publications on campaigns envision coordinated missile and air strikes against critical enemy targets, such as command and control facilities, communications and transportation nodes, air and missile defenses, and air bases.¹⁷ These campaigns require the Rocket Force to have a variety of modern and accurate missiles capable of conducting precision strikes against land- and sea-based targets.

¹⁵ Michael S. Chase, "Nuclear Bomber Could Boost PLAF Strategic Role, Create Credible Triad," *China Brief*, Vol. 17, No. 9, July 6, 2017.

¹⁶ Eric Heginbotham, Michael S. Chase, Jacob Heim, Bonny Lin, Mark R. Cozad, Lyle J. Morris, Christopher P. Twomey, Forrest E. Morgan, Michael Nixon, Cristina L. Garafola, and Samuel K. Berkowitz, *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States*, Santa Monica, Calif.: RAND Corporation, RR-1628-AF, 2017, https://www.rand.org/pubs/research_reports/RR1628.html.

¹⁷ See Ron Christman, "Conventional Missions for China's Second Artillery Corps: Doctrine, Training, and Escalation Control Issues," in Andrew S. Erickson and Lyle J. Goldstein, eds., *Chinese Aerospace Power: Evolving Maritime Roles*, Annapolis, Md.: Naval Institute Press, 2011, pp. 307–327; and Michael S. Chase and Andrew S. Erickson, "The Conventional Missile Capabilities of China's Second Artillery Force: Cornerstone of Deterrence and Warfighting," *Asian Security*, July 2012, pp. 115–137.

PLA Rocket Force Modernization Trends

Over approximately the past two decades, China has modernized and expanded the size of its nuclear and conventional missile forces. This has greatly improved the Rocket Force's ability to conduct the deterrence operations and missile strike campaigns outlined earlier.

Nuclear Missile Force Modernization

With respect to the nuclear missile force in particular, key drivers of these changes have included Chinese assessments of threats posed by advances in U.S. ISR, precision strike, and missile defense capabilities.¹⁸ China describes its desired force structure as a “lean and effective” nuclear deterrent, one that is capable of ensuring retaliation following an enemy attack against China.¹⁹ China's focus on the effectiveness of its nuclear missile force can be traced to concerns expressed in PLA publications dating to the late 1980s, which outlined plans to improve China's nuclear counterattack capability by moving toward mobile launchers, improving survivability, increasing the ability to penetrate missile defenses, increasing the numbers of missiles and launch units, and improving command and control and support systems.

Chinese nuclear force modernization continues to focus on making progress in all of these areas. The U.S. Department of Defense reports that China is “developing and testing several new variants of missiles, forming additional missile units, retiring or upgrading older missile systems; and developing methods to counter ballistic missile defenses.”²⁰ According to the U.S. Department of Defense, “China's ICBM arsenal to date consists of approximately 75–100 ICBMs.”²¹ This includes the silo-based DF-5A, the silo-based DF-5B, which is equipped with MIRVs, the road-mobile DF-31 and DF-31A, and the older, shorter-range DF-4. PLA Rocket Force nuclear missile force modernization continues to focus on enhancing survivability and countering missile defense developments.²² Recent examples of this continuing effort include the new DF-31AG ICBMs referred to earlier, which feature improved launchers and greater

¹⁸ Eric Heginbotham, Michael S. Chase, Jacob Heim, Bonny Lin, Mark R. Cozad, Lyle J. Morris, Christopher P. Twomey, Forrest E. Morgan, Michael Nixon, Cristina L. Garafola, and Samuel K. Berkowitz, *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States*, Santa Monica, Calif.: RAND Corporation, RR-1628-AF, 2017, https://www.rand.org/pubs/research_reports/RR1628.html.

¹⁹ See Fiona S. Cunningham and M. Taylor Fravel, “Assuring Assured Retaliation: China's Nuclear Posture and U.S.–China Strategic Stability,” *International Security*, Fall 2015, pp. 7–50; Jeffrey Lewis, “China's Nuclear Modernization: Surprise, Restraint, and Uncertainty,” in Ashley J. Tellis, Abraham M. Denmark, and Travis Tanner, eds., *Strategic Asia 2013–14*, Seattle, Wash.: National Bureau of Asian Research, October 2013, pp. 67–96; Michael S. Chase, “China's Transition to a More Credible Nuclear Deterrent: Implications and Challenges for the United States,” *Asia Policy*, July 2013, pp. 69–101; and M. Taylor Fravel and Evan S. Medeiros, “China's Search for Assured Retaliation,” *International Security*, Fall 2010, pp. 48–87.

²⁰ U.S. Department of Defense, *Military and Security Developments Involving the People's Republic of China 2017*, Washington, D.C., May 2017, p. 31,

https://www.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

²¹ *Ibid.*

²² Eric Heginbotham, Michael S. Chase, Jacob Heim, Bonny Lin, Mark R. Cozad, Lyle J. Morris, Christopher P. Twomey, Forrest E. Morgan, Michael Nixon, Cristina L. Garafola, and Samuel K. Berkowitz, *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States*, Santa Monica, Calif.: RAND Corporation, RR-1628-AF, 2017, https://www.rand.org/pubs/research_reports/RR1628.html.

mobility.²³

The PLA Rocket Force also deploys nuclear medium-range ballistic missiles (MRBMs) and IRBMs for regional deterrence and strike missions.²⁴ The deployment of the DF-26 IRBM, which has nuclear and conventional precision strike capabilities, as well as a conventional anti-ship version, is another very important development in PLA Rocket Force modernization.²⁵

China has also developed an extensive network of tunnels and underground facilities to support many parts of the PLA. Official media reports emphasize how these facilities contribute to the Rocket Force's efforts to conceal its operations and enhance its survivability. For example, a June 2017 Chinese media report highlighted the release of a PLA Rocket Force video depicting an ICBM brigade's participation in a "month-long underground survival exercise in an unidentified facility 'beneath mountains.'"²⁶

Conventional Missile Force Modernization

Meanwhile, modernization of the Rocket Force's conventional missiles has focused on expanding the range of conventional missiles, enhancing their accuracy and ability to overcome enemy missile defense systems, and improving the rapid-response capabilities of missile units. According to the U.S. Department of Defense, the Rocket Force deploys DF-16 missiles with a range of about 800–1,000 km, conventional DF-21 MRBMs, and the DF-21D anti-ship ballistic missile.²⁷ In addition, the Rocket Force has about 1,200 short-range ballistic missiles and a number of CJ-10 ground-launched cruise missiles with a range of about 1,500 km.²⁸

Improved C4ISR, Training, and Readiness

Importantly, improvements in PLA Rocket Force capabilities have not been limited to the development and deployment of new types of nuclear and conventional missiles. China's strategic missile force has also improved its C4ISR and command automation capabilities. Highlights mentioned in PLA publications include laying thousands of miles of fiber optic cable,

²³ "New Chinese Missile a More Mobile Deterrent: PLA," *The Straits Times*, August 5, 2017, <http://www.straitstimes.com/asia/east-asia/new-chinese-missile-df-31-ag-a-more-mobile-deterrent>; Jeremy Page, "China Parades New Missile System in Warning to Rivals Abroad—and at Home," *Wall Street Journal*, July 30, 2017, <https://www.wsj.com/articles/chinas-new-missile-a-warning-to-rivals-abroadand-at-home-1501409739>.

²⁴ U.S. Department of Defense, *Military and Security Developments Involving the People's Republic of China 2017*, Washington, D.C., May 2017, https://www.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

²⁵ Eric Heginbotham, Michael S. Chase, Jacob Heim, Bonny Lin, Mark R. Cozad, Lyle J. Morris, Christopher P. Twomey, Forrest E. Morgan, Michael Nixon, Cristina L. Garafola, and Samuel K. Berkowitz, *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States*, Santa Monica, Calif.: RAND Corporation, RR-1628-AF, 2017, https://www.rand.org/pubs/research_reports/RR1628.html.

²⁶ Zhao Lei, "Rocket Force More Versatile," *China Daily*, June 21, 2017, http://www.chinadaily.com.cn/china/2017-06/21/content_29825134.htm.

²⁷ U.S. Department of Defense, *Military and Security Developments Involving the People's Republic of China 2017*, Washington, D.C., May 2017, p. 31, https://www.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

²⁸ Ibid.

along with the deployment of mobile command systems and the “integrated command platform.”²⁹ These advances, along with the restructuring of the PLA, are intended to yield improvements in joint campaign command and control and operations. Additionally, Rocket Force training is becoming more realistic and complex, in line with PLA-wide directives aimed at improving the quality of military training. For the Rocket Force, this is a long-running project, one that includes such improvements as training in a “complex electromagnetic environment,” incorporation of opposing forces, cross-region mobility training, counter-ISR training, and more-rigorous examination and evaluation of missile force units. Finally, the Rocket Force appears to be focused on improving the readiness of its missile launch units. As a result, according to a recent official media report, “on-duty cells are ready to fire missiles immediately when ordered.”³⁰

PLA Rocket Force Future Capabilities

China’s 2015 defense white paper on military strategy highlights the importance of continuing to modernize the PLA Rocket Force’s capabilities in support of its nuclear and conventional deterrence and strike missions.³¹ The white paper states that the Rocket Force will “strengthen its capabilities for strategic deterrence and nuclear counterattack,” as well as improve its conventional precision strike capabilities. Additionally, the white paper indicates that, going forward, “in line with the strategic requirement of being lean and effective and possessing both nuclear and conventional missiles,” the Rocket Force “will strive to transform itself in the direction of informationization,³² press forward with independent innovations in weaponry and equipment by reliance on science and technology, enhance the safety, reliability and effectiveness of missile systems, and improve the force structure featuring a combination of both nuclear and conventional capabilities.”³³

²⁹ The “integrated command platform” is intended to strengthen joint command and control and improve the PLA’s ability to conduct networked operations. See Joel Wuthnow, “A Brave New World for Chinese Joint Operations,” *Journal of Strategic Studies*, Vol. 40, Nos. 1–2, February 2017, pp. 169–195; and Kevin Pollpeter, Eric Anderson, Joe McReynolds, Leigh Ann Ragland, and Gary L. Thomas, “Enabling Information-Based System-of-System Operations: The Research, Development and Acquisition Process for the Integrated Command Platform,” University of California, San Diego, Study of Innovation and Technology in China Policy Brief, January 2014, <https://escholarship.org/uc/item/6f26w11m>.

³⁰ Zhao Lei, “Rocket Force More Versatile,” *China Daily*, June 21, 2017, http://www.chinadaily.com.cn/china/2017-06/21/content_29825134.htm.

³¹ State Council Information Office of the People’s Republic of China, *China’s Military Strategy*, Beijing, May 2015, http://english.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm.

³² For the PLA, according to Elsa Kania and John Costello, *informationization* (which is sometimes translated as *informatization*) is a concept that encompasses “the comprehensive integration of information technology into the PLA and the improvement of its ability to utilize information.” Elsa Kania and John Costello, “China Quest for Informatization Drives PLA Reforms,” *The Diplomat*, March 4, 2017, <https://thediplomat.com/2017/03/chinas-quest-for-informatization-drives-pla-reforms/>.

³³ State Council Information Office of the People’s Republic of China, *China’s Military Strategy*, Beijing, May 2015, http://english.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm.

Looking ahead, the PLA Rocket Force has a number of new capabilities under development to support the modernization objectives outlined in official documents and other military publications. For example, China is developing the DF-41, a new road-mobile ICBM capable of carrying MIRVs. Some reports indicate that China might also deploy a rail-mobile version of the DF-41 ICBM.³⁴ And, as noted, China is developing HGVs for the PLA Rocket Force. The development of HGVs appears to be a high priority for China and is most likely aimed at countering missile defenses to enhance the Rocket Force's strategic deterrence and conventional precision strike capabilities.³⁵

Implications and Recommendations for the United States

The PLA Rocket Force has made impressive strides in the modernization of its nuclear and conventional missile force capabilities. It has moved from a nuclear missile force composed of outdated silo-based ICBMs and older regional nuclear strike capabilities to an upgraded force that features more-survivable road-mobile ICBMs and more-modern regional capabilities, such as the DF-26 IRBM. The PLA Rocket Force has also developed an imposing conventional ballistic and cruise missile force and elaborated concepts for its employment to conduct precision strikes and for deterrence and coercive diplomacy.

The PLA Rocket Force's growing nuclear capabilities raise important implications for U.S. extended deterrence and assurance of allies and partners. U.S. allies and partners will likely be concerned about the possibility they will become targets of Chinese threats. They are also likely to worry that China could wield the Rocket Force's growing capabilities in ways that are intended to undermine U.S. willingness or ability to intervene militarily to support allies and partners in the event of a crisis or conflict in the region.

As for the Rocket Force's growing conventional ballistic and cruise missile capabilities, they could pose serious challenges for the United States and its allies and partners in the region. In particular, these capabilities could pose an extremely grave threat to Taiwan in various cross-strait conflict scenarios. China's conventional missile force capabilities could also present serious challenges to the U.S. forces in the region if the United States intervened militarily in a conflict involving China. In particular, in a conflict around China's periphery, China's development of advanced conventional missiles highlights the potential vulnerability of fixed facilities, such as air bases, as well as surface ships, such as U.S. aircraft carriers.

In response, U.S. policymakers should consider the following recommendations. First, the United States will need to invest in maintaining and modernizing its own nuclear deterrence capabilities. Modern, survivable, reliable, and flexible nuclear forces are required for strategic deterrence and for assurance of U.S. allies and partners. Congress, through the appropriations

³⁴ Sun Wenyu, "China's Latest Intercontinental Missile Expected to Be Deployed Next Year," *People's Daily Online*, November 28, 2017, <http://en.people.cn/n3/2017/1128/c90000-9297997.html>.

³⁵ Lora Saalman, "China's Calculus on Hypersonic Glide," Stockholm International Peace Research Institute, August 15, 2017, <https://www.sipri.org/commentary/topical-backgrounder/2017/chinas-calculus-hypersonic-glide>; Joshua H. Pollack, "Boost-Glide Weapons and U.S.-China Strategic Stability," *Nonproliferation Review*, Vol. 22, No. 2, February 2016, pp. 155–164.

process and its oversight responsibilities, will continue to play a vital role in shaping the modernization of U.S. nuclear forces.

Second, the United States will also likely have to take an increasingly multidimensional approach to assuring its allies that it will continue to maintain the capability and the resolve to support them in a crisis. The United States should also take military and diplomatic actions—such as bilateral and multilateral training and exercises, high-level visits and exchanges, and other working-level initiatives—that help underscore its determination to protect U.S. security interests and support U.S. allies and partners in the region. Members of Congress, particularly those with an interest in national security issues, may also wish to show the United States’ commitment to its allies and partners through congressional delegation visits.

Third, the United States should enhance the survivability and resilience of its forces in the region, and Washington should encourage its allies and partners to do the same. The United States must also continue to develop new operational concepts and capabilities. Potential areas of investment could include undersea warfare, the dispersal and hardening of forward-deployed assets, integrated air and missile defense, and capabilities that would make it more difficult for China to locate and strike key platforms, such as by complicating PRC targeting through denial and deception and other means.

Fourth, the United States should study ways to adapt its traditional approach to deterrence and assurance of allies and partners. In particular, it will need to be able to demonstrate its willingness and ability to employ combat power that is both sufficient to influence the calculations of decisionmakers in Beijing and less vulnerable to preemptive missile strikes. The United States should be prepared to respond to Chinese coercive signaling or other attempts at intimidation by employing the Rocket Force’s formidable capabilities. For example, the United States should be prepared to respond by

- conducting exercises and demonstrating the ability to operate from numerous, dispersed, and potentially unexpected locations
- emphasizing U.S. denial and deception capabilities to generate uncertainty about China’s ability to observe and assess U.S. actions
- highlighting capabilities that enable the United States to interfere with Chinese military operations from longer distances, beyond the reach of the Rocket Force’s long-range conventional strike capabilities or at least at ranges where they are more limited.

In conclusion, the continuing modernization of the PLA Rocket Force will likely pose increasingly serious strategic and operational challenges to the United States and its allies and partners. As China’s sweeping military reforms continue to unfold, the United States will need to continue to closely monitor the development of China’s strategic missile force and to modernize and adapt in response to ensure its ability to protect its regional security interests.

PANEL II QUESTION AND ANSWER

HEARING CO-CHAIR TALENT: All right. Thank you all.

So I have Commissioner Shea and then Wortzel, Tobin, Stivers, and then our co-chair. That's the list as of now. Commissioner Shea.

COMMISSIONER SHEA: Okay. Thank you, Senator Talent, and thanks to our witnesses.

I'm just going to direct my fire at Dr. Holmes exclusively, but others can join in, I guess.

You have a statement in here which is very simple, and I think it's important for people to hear, and I don't think as many people in Washington have heard this or know this. You say "by around 2020, China will have both the largest navy in the world by combatant, underway replenishment, and submarine ship count, and the second-most capable far seas navy in the world."

I think that's a really important statement to make and to make clear.

Then your written testimony says that our qualitative advantages may be overwhelmed by the quantitative advantages of the Chinese, particularly since we have, our Navy has a global responsibility. Then you suggest that the U.S. is kind of getting it. We're engaged in new funding in Congress, and you suggest we might need to upgrade our platforms with new anti-ship missiles, with electromagnetic rail guns, on-board lasers.

And then you throw a curve ball, and you say, you know, the Chinese will see this, might see this, and recognize that they have a window of opportunity that might be closing. You say "from a grand strategic standpoint, the lag in U.S. weapons development could open a danger zone in which Beijing is tempted to strike before its range advantage evanesces."

You say "U.S. and allied leaders must remain watchful, lest Beijing too succumb to the temptation to settle disputes around its nautical periphery by force."

I assume it's not disputes with the United States but disputes with countries with less capable navies and militaries.

So could you explain what you're getting at there?

DR. HOLMES: Well, thanks a lot.

Actually the opening quotation that you listed actually comes from Rear Admiral Mike McDevitt, our friend down at the Center for Naval Analyses. I mean that's one of those questions that we oftentimes get into how often do you run across somebody who will say the United States Navy is three times the size of China's Navy or something like that? That's purely a tonnage figure.

So Mike is actually calling attention to the fact that the numerical, the raw numbers of hull numbers are starting to balance out, and that is as Chinese seafarers gain technical capability and warfighting prowess, that's ultimately going to start canceling out even the tonnage advantage. So if you want to get into that more, I'd be glad to.

I think what you were actually getting at was the very last point that you made.

COMMISSIONER SHEA: The window of opportunity.

DR. HOLMES: Yeah, the window, it's, I mean if you think about it, if China thinks that it has an advantage, and it does, a range advantage, over the United States Navy and our fellow services right now, and if it thinks that that's going to go away because we're getting better because we've done things like considered or we're considering repurposing the Tomahawk anti-ship missile, which was actually an anti-ship missile in my day, but was unwisely let go back in the 1990s, talking about repurposing land attack to anti-ship missiles, that will cancel out that

Chinese advantage as well such expedience as repurposing the SM-6 for anti-surface missile missions and so forth.

If they were to see that advantage going away, that could add up to a pressure to act while they still do hold the advantage. This is not a new thing at all in history. In fact, it seems to be sort of a Japanese way of doing things leading up to the Second World War. In 1904, they understood that if they wanted to strike at the Russian fleet in the Far East, they had to do it, they had to do it pretty fast because the Russian fleet was building battleships back in the Baltic. They were surely going to come to the Far East. Ultimately Japan was going to be outmatched in its own home waters.

Much the same logic takes hold in 1940 and 1941 vis-a-vis the U.S. Pacific Fleet as well. So again, you see a short-term advantage. You don't want to let that advantage slip away, and therefore you act while you can act. That's just sort of a dark note to strike, but that's how I see it.

COMMISSIONER SHEA: Yeah. It's pretty dark. Well, I mean Dr. Mulvaney talked about one of the weaknesses. The Chinese have spent 25 years modernizing their military, tens of billions of dollars, but they have no real world experience, right, over this past 25 years. We don't really know whether--they don't really know whether it works; right?

So how much is that into the equation? Is there a pressure point do you think in the Chinese military--we want to try our stuff out, see if it works?

DR. HOLMES: It could be. I mean sort of, I guess sort of two points. Yes, China's military does not have combat experience, but focusing, since you all asked me to talk about naval stuff, when was the last time the United States Navy fought a sea battle? 1944 off Leyte in Leyte Gulf. I mean that's--so in a sense, our databank of historical cases to draw on is rather thin as well, and obviously technology has moved. That was before the missile, the guided missile age that Mike detailed so well and so on and so forth.

So that's, I mean I'm not sure, I'm not sure that that's actually as big an advantage for ourselves as we think it is. Yes, we've been operating around the world doing power projection constantly since September 11. But dropping ammunition on somebody in a cave in Afghanistan is far different from going up against a peer fleet out at sea, especially when you're operating in that fleet's own home waters, which we will be in any conceivable contingency vis-a-vis China.

And before I stop--I won't monologue here, but I was just going to point out that until recent years, it was pretty commonplace to say it would take China's Navy decades. I mean sort of untold numbers of decades to build a modern fleet. Scoping back through the last 150 years of history, that is simply not the case. If you look at our own history, it took us about 15 years to start building a modern battle fleet till the time that we vanquished Spain during the Spanish American War.

We were, thought of ourselves as a navy second to none by 1918 under President--or 1916 under President Wilson's program. The Soviet Union gets it done in about ten years after the Cuban missile crisis. The Imperial German Navy takes about 15, 16 years to pose a serious threat. And on and on. Japan does the same thing, actually thrashes China and Russia within a ten-year phase, 20 years after they decide to build a serious navy.

So again I guess my overall lesson is let's not assume that China is not going to get it done. I see no reason why they would perform more poorly than any of those other competitors from the past.

COMMISSIONER SHEA: Thank you.

HEARING CO-CHAIR TALENT: And besides, as you also said, "a ship's a fool to fight a fort," or I guess Nelson said that first; right? And operating in their waters we're in essence going up against all their shore-based capabilities.

DR. HOLMES: Yeah, yes, sir. I mean I haven't mentioned Mahan yet. I have to mention Mahan in every appearance. Mahan. Mahan actually--I mentioned the Russo-Japanese War. Mahan reprimanded the Russian commanders for keeping the fleet underneath the guns of Port Arthur to protect that fleet. But I mean what if, what if the fortress, what if the guns at Port Arthur had had ranges of hundreds of miles offshore and precision guidance and the ability to put those rounds on target against moving fleets at sea? I mean that's not even a game changer. That totally transforms the whole situation.

HEARING CO-CHAIR TALENT: Commissioner Wortzel.

COMMISSIONER WORTZEL: First, thank you all for really very good testimony, very thoughtful writing. Ben, I have a question for you, which you do not touch on. How does the PLA airborne group army fit into the PLA Army, if it does? I mean it's still essentially a land force. And can standard commanders use it and employ it in their war plans?

And secondly, does this chaos and disruption you mentioned in your testimony, your written testimony, give some breathing time to Taiwan?

Jim, I was struck by your discussion of the problems with the PLA Navy in staging a breakout from the first island chain. How can the U.S. and Japan make that even more difficult? Do things like archipelagic defense, which the Japanese Armed Forces are now thinking very seriously about, give us a chance to block them in and destroy the Chinese fleet and beat them?

Brendan, I want to go back to what I asked in the first panel--I think you were here--about have you seen any training of reserve units for establishing expeditionary airfields?

And then Mike, what, you have a very good discussion of the nuclear side of the Rocket Forces, but in cross-mobility training, how is the integration of the Rocket Force assets going for the theater commander's plans? Can they employ them without going all the way back to Beijing?

MR. LOWSEN: Thank you, Commissioner.

To answer your second question first, I think the chaos generated by reforms will give Taiwan a very limited amount of breathing space. Part of the Chinese conception of success is doing more and more so even though they've had to regroup in this past couple of years and do a little bit less, they're going to be doing more year-on-year and presumably more effectively.

I will attempt to answer your first question. The airborne corps I'm familiar with is the PLAAF, the PLA Air Force Airborne Corps.

COMMISSIONER WORTZEL: Yes. That's the PLA Air Force.

MR. LOWSEN: So maybe this is--I played kind of a technical game here. I did not look at that airborne corps specifically. Presumably, it too will be a more effective part of joint operations, but perhaps Dr. Mulvaney can shed more light on that.

DR. MULVANEY: Yes.

DR. HOLMES: Hey, Larry. Thanks.

I love to hear your accent, by the way. You make me feel homesick. Yeah, I mean I am very proud that I've been on sort of the leading edge of this idea of archipelagic defense. Toshi Yoshihara and I back in 2012 published an article in the Naval Institute Proceedings called "Asymmetric Warfare American Style," in which we confined our attentions more or less to the Ryukyu Islands thinking about the East China Sea and so forth.

And then happily, Andy Krepinevich and others have picked up on that and stretched it out all along the first island chain. So, yes, I am certainly glad to associate myself with that.

I mean if you think about it, if China thinks that the first island chain manned by American allies, as it is, is their worst nightmare, then perhaps our best strategy is to make that nightmare come true. So that is something that will totally resonate with people in Beijing.

There is a downside as there is to any strategy though. The downside is that how is it going to be viewed? It's going to be viewed as neo-containment. Chinese commentators day in and day out think that the United States is still stuck back in the 1950s with Secretary Acheson's and General MacArthur's speeches about the offshore defense perimeter and so forth.

And so I think they're able to take a bit of diplomatic--I think trying to put it in--put this whole strategy in context diplomatically will be a serious challenge for us. I don't think we do a great job as a country explaining ourselves and telling our story very well, and I think that would be really where I see the, I guess the downsides and the drawbacks coming.

DR. MULVANEY: So quickly just on the airborne forces, what we've seen is they've dropped the number, and now they're just called the PLA Air Force Airborne Corps, which seems to indicate that they've been moved up hierarchically, and they're now going to be controlled from a higher level, and which would kind of go along with the whole theater. They're a national asset that can now be deployed to different theaters as opposed to directly coming under somebody.

So there is some discussion in the open press about that, and that seems to be exactly what that is there for. But to me that also suggests that it's going to gain in influence and importance so that it's going to be more agile and they're going to use it for more missions than perhaps they had previously.

I wanted to touch just real quickly on this whole idea of one of the things I didn't get to mention is that so Beijing thinks they're in a period of strategic opportunity, right? So they're taking risks. They know that this reorganization, this huge downsizing, 300,000 men downsizing, 50 percent of which are officers; right? I mean this is a huge thing that we're talking about.

They are willing to accept the risks associated with that, the risks associated with some of these other modernization things, because they're in this period that they don't think they're likely to come up against anyone who's going to stop them, and in my estimation they don't think they're going to invade Taiwan anytime in this period; right?

So does that give Taiwan--I think that also gives Taiwan a little time to maybe adjust what they're doing, for the U.S. Congress to maybe have a better influence on some of those relationships there, some of the things we transfer to them and whatnot.

But once that period ends, then I would say that that will definitely be a shift. It's kind of undetermined as to when that's going to end. But I think that will be a significant shift once they stop saying they're in a period of strategic opportunity because that means that they've then moved on.

To your last question about expeditionary airfields and the reserves, they don't talk a lot in their open source. Part of the problem is because the reorganization has been huge. I mean it's been a massive undertaking although I will say that in the 300,000 man downsizing, the Air Force is actually gaining personnel, and so you could see the relative importance of that.

But they haven't incorporated the reserves too much that we've talked--that they've talked about in open press. And the use of expeditionary airfields, they talked about that in their

training to real combat conditions but not directly linked to the reserves as far as we've seen. So-

DR. CHASE: Okay. It's a terrific question. I think my answer is probably going to disappoint a little bit in that I think that the kinds of places where that information might be openly available in terms of reports on joint exercises and the like that appear in the official media, I think they're just not--or at least I haven't seen enough information to really provide, you know, a particularly detailed and meaningful answer to that.

But I mean in terms of what they write about the Rocket Force's participation in joint campaigns in kind of the literature on joint campaigns, it's obviously something that would be critical that they really have to be able to do, and even if you're--even when you were talking about the nuclear or the conventional missile force when they went to use it as kind of a display of, you know, kind of strategic signaling, that also has to be integrated, and not just with maybe a theater command to say it's oriented toward Taiwan, in a sense, but probably also with PLA Strategic Support Force, particularly given the role that they play in space and cyber, and those were seen as kind of critical components of an overall approach to strategic deterrence for the PLA.

There are a whole bunch of areas in which--whether we're talking about actually going out and executing a joint campaign or kind of sending a more sort of integrated deterrence or coercive diplomacy type signal. They really do have to be able to do that, and I'm just--I think that basically they have focused on that and can do it.

But I mean that's, you know, a judgment with not a very high degree of confidence because of the kind of information that they put out or at least what I looked at as kind of too general to I think really provide a very granular answer to that.

COMMISSIONER WORTZEL: Thank you.

HEARING CO-CHAIR TALENT: Commissioner Tobin is next.

COMMISSIONER TOBIN: Thank you all.

I have specific questions, too, and I think my first one is for Dr. Chase, possibly Dr. Mulvaney, and it has to do with modernization and the hypersonic development, and how do you see where they are compared to us at this point? We've looked at that every couple of years, and I'd like to hear that from you.

And, then, Ben, I'd be curious. You outlined the various PLAA missions, two of which are the deterrence and the defeat of terrorism in internal and western Xinjiang, and you also spoke about Tibet. How is with this military modernization, how are they separating the military role from the police's role as they look forward? So that would be--

And then, finally, Dr. Holmes, the cabbage strategy, which you outlined, and you talked briefly about how we defend against it. When I read that, I was thinking about Indonesia last summer which had somewhat, to my mind, of a success at standing up to the Chinese vessels. I'd like to hear your perspective on that.

So why don't we start with hypersonics, please?

DR. CHASE: Okay. Thank you, Commissioner Tobin.

So this is an area that I think we can say that China really has identified as a high priority. If you just look at the number of tests that have been publicly reported since they began the program, it's pretty evident that it's something where the pace of the activity suggests that it's something that's very important to them.

As for how it compares with the U.S., I guess I don't have the technical knowledge of current status of all the U.S. programs. I don't have enough command of that to really make a

very good comparison in terms of the net assessment of where the U.S. and China stand relative to each other.

But I would say that I think it's, my general impression is that it's an area in which rather than kind of focusing on how to catch up with the U.S., which I think has had--as we've heard from the other panelists this morning is something that's been a focus of a lot of China's efforts. I think they appear to see this as one in which they may be able to get ahead so rather than being behind, this might be an area in which others are trying to catch up with them. I think that's at least what they aspire to in the hypersonics area.

COMMISSIONER TOBIN: And they're getting money into it--a lot.

DR. MULVANEY: I'll just quickly dovetail on that and emphasize the point, money is the key.

COMMISSIONER TOBIN: Yes.

DR. MULVANEY: So publicly available sources, both English and Chinese, they are at least equal to, if not ahead of, the United States. Now, again, I don't want to go into classified as DARPA and things like that, but openly available, research money, dollars, papers, they are at least equal to the United States in hypersonics, and that's one of the things I touched on in the paper. CASI is looking at. We have a forthcoming research paper in the next couple of months coming out about that.

It is certainly one of the areas that we should pay a lot more attention to, just to kind of see where they're going to go with it, and because they are not trying to catch up with us, so we don't really know where it's going to lead; right? So at least, at least if they're trying to catch us, we know kind of the path they're going to go and what those capabilities will be able to do and where they're going to lie.

Will they create something out of whole cloth? It's kind of, you know, the world is their oyster in this particular case, and it kind of goes a little bit along with AI and quantum, but certainly something to keep our eye on.

COMMISSIONER TOBIN: One of the values of this Commission is we are presenting that which can be public to alert people. So thank you both.

MR. LOWSEN: Thank you, commissioner.

So as to civil unrest and terrorism in Xinjiang and Tibet, I think we should realize that China sees the two problems as intertwined, in that they both come down to the roots of religious extremism, terrorism and separatism. And of course, that sounds very strange to us. We don't think of Tibet and Buddhists as being religious extremists, but in the Chinese mind, they are, and of course the same in Chinese mind goes for the Muslim Uighurs of Xinjiang.

The way that they have dealt with this is actually quite elaborate and effective so far. We saw in Tiananmen in 1989 that the People's Armed Police, which existed at that time, was not able to quell the unrest, and so they had to call in the PLA and very violently put that down, not only very violently but also at a great cost to themselves as far as being cut off from the rest of the world.

Since that time, they've done a lot to improve the People's Armed Police Force. It's an extremely effective force these days, such that anything that the local police, which are actually basically nationalized under the Ministry of Public Security, anything that those police can't quell, they have PAPF on the scene quickly to do so.

If there's something that PAPF are having trouble with, then they will bring in the military still to quell it. And so the military is still the final guarantor of Party power, but

nowadays they don't have to use it, and the outside world is prevented really from seeing any of this.

And I should also note that the Ministry of State Security we usually think of being equivalent to our CIA. It's not necessarily foreign. It's not all foreign for the Chinese. It's also looking at domestic threats very closely. So I think less divide there.

COMMISSIONER TOBIN: So, okay. Is there any extent to which they are distinguishing between people speaking up and what we, say the United States, might think of as really terrorist cells?

MR. LOWSEN: I would say so to some degree. If you want to say something in China, you're free to do so. The only time that the government really cares is if more than a few people start saying it. There's freedom of speech.

VICE CHAIRMAN BARTHOLOMEW: Well, unless you're Uighur or Tibetan, and then one person saying something can end up having pretty serious repercussions.

MR. LOWSEN: Yes, because they're considered to be part of that group, that bad group.

COMMISSIONER TOBIN: So there's no set--yes. Okay. Thank you.

DR. HOLMES: Yes, ma'am. The German General Helmuth Moltke the Elder had a very famous statement or at least it's something that resonated with me a lot in the late 19th century. He said the strongest form of warfare is strategic offense coupled with tactical defense. Strategic offense is decisive. Tactical defense is the stronger form of tactical warfare.

In practical terms, what that means is if I can grab something and then dare somebody to come and get it back, I hold the advantage. I make that. I make my adversary look like the bad guy. And if you think about it, what the cabbage strategy refers to is the--I mean--and it's become something that has been common in the South China Sea since 2012 at Scarborough Shoal. The idea that you could substitute physical bulk, surround something with Chinese Coast Guard cutters, with fishing, whatever the case may be, and then dare somebody like the Philippines or somebody or whoever the competitor happens to be to come and take it back.

I think you mentioned Indonesia. I was actually, I actually had the good fortune in the courses that we were just wrapping up moving into finals this coming week, I had the Indonesian officer, and we actually talked to him about that quite a bit, quite a bit. He's a very pleasant guy. He smiles a lot, but I think that the answer to your question is that they have made it very--they are the local actor. They have made their position very clear. And they're willing to pull the trigger, and we've seen this happen, and we've seen this happen time and time again off of the Natuna Islands or whatever the clash of the day may be.

Now I think the down side for that from the United States from a strategic perspective is it's one thing for the local actors, for the Vietnams, Indonesias, Philippines, or whatever the case may be, they can actually frame their actions to where they actually hold the moral high ground.

The Philippines just doesn't have the physical wherewithal to do much about it because its military is trivial. And that's something that the United States will have a very time ever seizing simply because we are the outside actor. We're coming into, we're coming into these waters and so on and so forth. It would take a lot of--it will really take a lot of diplomatic framing, explaining our purposes and why we are doing what we are doing in order to make that palatable to the local players.

How do we get skin in the game? How does the United States actually get skin in the game to try to work on counter strategies like that? I would say that one way we think about creative, we should think about creative ways to use the United States Coast Guard. The Coast Guard is an expeditionary force. Ask any Coast Guardsman and they will tell you that.

I don't know. I mean we could explore doing things like forming combined Coast Guard detachments with our regional friends, regional friends. At that point, when you start putting American bodies in harm's way, American vessels, I think at that point, you start seeing, you start to chip away at that problem and perhaps come up with something that's workable. But I never get very far with that recommendation. But--

[Laughter.]

DR. HOLMES: Well, I mean just partly because the Coast Guard is--we think we have budget problems in the Department of Defense. The Coast Guard is, the Coast Guard always seems to be replacing 12 ships with eight or whatever the case may be. It's just a force that is very strapped.

COMMISSIONER TOBIN: And it is very strapped. But there may be aspects that could be pursued if we think about the opioid crisis and fentanyl and, you know--

DR. HOLMES: Yes, ma'am.

COMMISSIONER TOBIN: --that maybe we need to up that with given where things are coming from.

Thank you.

HEARING CO-CHAIR TALENT: Commissioner Stivers.

COMMISSIONER STIVERS: Thank you. Thank you.

I'm trying to get a better sense of China's capability to project power far from its shores, and I think most of the people that we've heard and what I've read is that that's limited. But in the last few days, for example, there's been this dispute between China and India over the political instability in the Maldives, and there's been speculation that India could intervene there. China has warned against it.

And I guess my question would be to what extent does China have the air and naval capabilities to conduct operations that far? And what would that look like in terms of force movement? And is--or is it just bluster on China's part?

DR. MULVANEY: So I'll say, and again it's one of the reasons I kind of hit on the air tanking, right, so right now it is just a niche capability. They have no real expeditionary air force. They deployed a couple of airplanes a couple years ago to Turkey and had to set it up weeks in advance. They had to send all the parts, all the mechanics, all the fuel, because they didn't trust their partners' fuel, to get all of them out there and then to get all of them back.

So there is no expeditionary capability at this point. Now that's not to say that they can't do something to the Indians to prevent them from intervening in the Maldives, but it probably isn't going to be air related. It will be something on the ground. It would be diplomatic, economic, something like that.

So they're certainly a big forceful actor that has other means, but as far as long-range air goes, they are making more and more use of long-range bombers for strategic messaging, for impact, for collection, and just for general pilot proficiency. But, again, that is still very, very limited when compared to the United States or their territorial aspirations where you know you look at things that they would be interested in, for example, the Indian Ocean.

There is just no real way for them to get there at this point. That is probably going to change in the next decade, but right now I would say that much like the recent deployment of their new combat aircraft to the South China Sea. So in CASI's opinion, or in my opinion based on what we're doing in CASI, this is a one-off.

This was a showmanship, go show the flag, because every other time the PLA has taken on a new aircraft, it takes them a year or two to write the manuals, to go through. Most of the

airplanes they get still have Russian written on the gauges, still have the audible warnings are still in Russian. They have to transfer all that.

So this is a great show the flag, not saying that they--I mean they're able to show the flag now, but in real kind of interdiction scenario, I don't see anything from the air side.

DR. HOLMES: That's a great question. I mean just sort of from the general perspective, from a strategic standpoint, a lot depends on how comfortable China is in the Western Pacific vis-a-vis United States, Japan and so forth. So I mean that's basically the point I made in my oral remarks was if China is not comfortable with its defense in the Western Pacific, it's going to be less and less willing to detach forces in bulk to go off and do something in the Indian Ocean.

Whereas, the logic that I sketched from China's standpoint vis-a-vis the United States, it's going to act on India's standpoint vis-a-vis China coming into its own backyard. The Indians are mostly concerned with the Indian Ocean. That's what they care about managing. And that's where they're going to concentrate their assets.

And I agree entirely with you. I just don't see them actually coming in bulk to the Indian Ocean. But I didn't--I hate to sound upbeat. So let me close on a down beat.

[Laughter.]

DR. HOLMES: I did an event with Heritage over in Jaipur a couple years ago talking about the Quadrilateral--United States, Japan, India and Australia. I was stunned how blasé the Indian participants were about China's efforts to cultivate basing agreements, port access, all of this kind of stuff that goes under the name "string of pearls."

They said, yeah, you know, give it ten, 15 years, you know, maybe we got a problem, but I'm not--you know, they just seemed not too worried about it.

I think we were premature with the "string of pearls." Certainly Robert Kaplan was in his books and articles back in the 2005 and 2007 time frame, but I think that the Chinese military has certainly been doing something really wise, which is creating options for the political leaders should it--political leadership should it see the need to exercise those options at some point.

I think certainly in the last couple years with the standing up of the base in Djibouti and all the other inroads they've made at places like Colombo and places like that, I think that Beijing is actually starting to exercise that option. So as China grows up, as it becomes stronger in the Western Pacific, I think this sort of thing could actually become a real problem for India. But again that's probably not today.

MR. LOWSEN: Can I just add briefly that it might be possible for China to send anti-access SAMs, anti-ship cruise missiles to the Maldives, which could be a real problem for India?

DR. HOLMES: Yeah. And add some boots. You put, you trace that envelope around the port at Gwadar or something like that, you got a problem.

HEARING CO-CHAIR TALENT: Commissioner Bartholomew.

VICE CHAIRMAN BARTHOLOMEW: Thank you.

I'm just thinking, I'm not sure that in anybody's calculus, the Maldives would have ended up being the hotspot that triggers something, but you never know.

Dr. Holmes, just a quick question just to follow up, and then I've got real bigger questions. When was that meeting in Jaipur that you had that you just mentioned?

DR. HOLMES: I think it was almost exactly two years ago.

VICE CHAIRMAN BARTHOLOMEW: Uh-huh. Because I would say it was probably five years between the first time we went to India and the second time that we went to India, and it was two years ago I think we were in India, and the tone had changed completely.

I mean the first time it was all about hedging, and the second time it was all about we have a real problem, and we all need to work together in addressing this problem. So.

DR. HOLMES: Yeah, I guess I mean the point that I would make it would be sort of a cultural point that I would make as a reply to that. Once you've formed ingrained habits--I mean I think the United States, we have suffered from this deeply, looking at the PLA and especially the PLA Navy. I think we formed our impressions of the PLA Navy back in the days of Mao when the PLA was or the PLA Navy was simply a brown water fleet and so forth.

It's taken us a long time to outgrow those attitudes, and I mean it hasn't been that long ago that you would find distinguished commentators at distinguished universities, you know, even three, four years ago, saying, well, China has stopped building submarines, it's not building destroyers, it can't build a carrier, I mean, or it can't refit a carrier, all that kind of stuff.

And I think you're right. I think the Indians are, they are at the point where their attitudes are turning around--belatedly--but it takes awhile for the force structure and the strategies and operations to catch up with that.

VICE CHAIRMAN BARTHOLOMEW: Yeah, it's also interesting, you were mentioning how quickly people can move, but certainly I would say through the late '90s up until even about five years ago, we would have witnesses come in and say how surprised they were at the progress the Chinese had made, submarines, whatever, and I just kept saying the only thing that should be surprising us is that we continue to be surprised about how quickly that they're moving forward.

They are. They have been. They are, and they have the capacity to do that so people just need to remember that as we're thinking about all of this.

But then to the questions that I wanted to ask. First is corruption. I think somebody has been writing about this recently, but how successful can these reforms be with people who have still been buying their promotions? So I'm not just thinking about logistical corruption of people selling equipment or taking kickbacks or something like that, but the corruption sort of within the officer corps that got people into the positions that they got in.

Can these reforms work successfully or is corruption going to really undermine them in each of the forces that you've been talking about?

DR. MULVANEY: So we like to look at a lot of personnel and soft touchy-feely kind of things and let the professionals do the "beeps and squeaks;" right? So this is one of the things we look closely at.

I would say that he, Xi Jinping, has done, if you don't like corruption, an admirable job trying to root out corruption from big to small. The one thing I would emphasize is that the leadership of the PLA, specifically in the Air Force, but throughout the PLA, is nowhere, in any way, shape or form similar to ours; right?

So Xu Qiliang joined the Air Force when he was 15, has no high school education, has no college education, and worked his way, started as an enlisted guy, got a commission, kind of worked his way up. Obviously very loyal to the Party, very loyal to the ruling cadre. So he in no way, shape or form is like General Goldfein or any of the Americans.

And so when you need to look at this corruption issue, a lot of it is I don't want to say cultural, but a lot of it is ingrained in the PLA, but it doesn't necessarily mean that the people that are getting promoted aren't qualified within their system; right?

So, again, they don't have any practical experience. They're trying to make up for some of that, but I would say corruption certainly was endemic. It was really, really bad in the logistical side, and that may or may not have actually affected their capabilities to do it.

But my feeling is on the operational side, it wasn't nearly as bad as on the logistics and equipment branches, and what was there was simply kind of a continuation of the system that was but were still promoting reasonably proficient people. And this is certainly true in the last 10 or 15 years, maybe not quite so much before.

So I would say it's changing--the people that are there now and in power have seen that change and have kind of accepted the fact. Whether they like it or not, you know, they're no longer given and getting Rolexes. But everyone there seems to be kind of on board with this because they see that it has been a prolonged effort by Xi Jinping. He's serious about it. It wasn't just a flash in the pan to make a six-month campaign out of it.

And so I don't know that I would look at them and say they are a corrupt officer corps and they have no idea what they're doing; they're not capable. That is not my impression at this point, not nearly as capable as trained, especially when we talked about joint, and there was a question earlier about joint training. The first time they ever do any joint training is at the National Defense University at essentially their general level.

For the most part, the vast majority of people in the PLA stay within their own organization their entire career; right. So there's no--so I was a Marine, you move east coast, west coast, over to Okinawa, back, you change units. The PLA doesn't do any of that, you know. You're in the same company, then you go up to your own battalion, then you go up to your own regiment, and you stay in there, and all those promotions are local, and so there's a lot of don't-rock-the-boat as you go along.

So we have to keep that in mind when we look at the PLA that we can't say, well, they're not like us, and therefore, they're not better or not worse; right? It's just very different.

So within their system, they still want to promote the most technically and tactically proficient people, which is what the training and education changes point to I think.

MR. LOWSEN: That's a great question, Vice Chairman. I think it really speaks to Commissioner Stivers' question as to why, why Xi Jinping had this big loyalty campaign for the military. I think it's about power and it's cyclical. So Deng Xiaoping had an anti-corruption campaign or the equivalent of it in the '80s where he took back some of the power from the PLA.

Jiang Zemin did that in the '90s by taking back some of the power from the business interests of the PLA. Hu Jintao looks like he kind of failed in that regard. Xi Jinping has succeeded with flying colors by breaking up the General Departments, which, as you mentioned, were selling promotions and had the sort of acquisitions fraud and property fraud happening within them again.

So what I think it is, the way to look at it is as a graph. On one axis you have your closeness to Xi, and the other axis you have how corrupt you are. The closer you are to Xi, the more corrupt you can be.

VICE CHAIRMAN BARTHOLOMEW: Yeah.

MR. LOWSEN: But once you cross that line, then you're probably on the wrong side, and you're purged.

VICE CHAIRMAN BARTHOLOMEW: Dr. Holmes, anything on--

DR. HOLMES: Well, we all know that we have no corruption in our Navy.

[Laughter.]

DR. HOLMES: I mean "Fat Leonard"--

VICE CHAIRMAN BARTHOLOMEW: No, right.

DR. HOLMES: I was really shocked when that whole thing--that's literally what I said--that just doesn't happen in our Navy. So I mean--so I would--I mean I certainly would not rule

out the prospect of corruption in any big institution. I mean I think it's just something that can make inroads in even the best institution.

Having said that, one thing that we did in the second edition of our book this time is to actually retrace the leadership of the PLA Navy and look at some of the senior leaders all the way back to 1949 with the founding of the PRC. And I was struck, I was struck while doing that at just how--just how they were gifted with a series of good leaders, including in the 1980s their founding father, Admiral Liu Huaqing, very, I mean very committed Party people but also really effective thinkers and strategists and operational people.

And I think that actually has put its imprint on the PLA Navy. It's certainly my sense--obviously they don't tell me, but my sense is that corruption is not a huge problem. The fact that sea power is such a major thing for President Xi and even for President Hu Jintao before him with his speeches about the maritime strategy.

Clearly sea power, clearly the "Chinese dream" that President Xi is always talking about is a maritime concept as well as a commercial concept. So I think it's--maybe I've gone native a little bit in relating to the PLA Navy, but my sense is that it's, aside from the things that might infest even our own Navy, I don't get a sense that it's a huge problem for them.

VICE CHAIRMAN BARTHOLOMEW: Dr. Chase, anything?

DR. CHASE: I guess I would say, I mean I haven't, you know, seen any unusually outrageous cases of corruption in the Rocket Force or anything that would indicate that it's a particular concern in terms of their ability to achieve their objectives. I mean obviously I think the other panelists have made the point that really, well, first of all, that the anti-corruption campaign is also about loyalty to the Party, it's about Xi Jinping's political control, it's about more than just trying to root out corruption.

And at the same time, I mean the kind of critical question is if everyone is offering a bribe to get promoted, but the person who gets promoted is tactically, you know, is a good commander and has the appropriate skills for the position they're being promoted to, it's not necessarily going to be that detrimental to their performance.

But I think, again, it's hard to imagine completely rooting out corruption when the kind of underlying conditions of, you know, sort of secrecy and lack of oversight and other things that I think allow it to, you know, to kind of emerge on the scale that it has are, you're not going to kind of change those fundamental underlying conditions.

Presumably even if you go after it really hard, you're kind of deterring people from taking advantage of those opportunities, but the opportunities will still be there, and presumably some people will still think that they are either well-connected enough to get away with it or sneaky enough to get away with it or whatever the case may be.

VICE CHAIRMAN BARTHOLOMEW: Thank you.

HEARING CO-CHAIR TALENT: Commissioner Wessel.

COMMISSIONER WESSEL: Thank you.

Dr. Chase, I'll refrain since my time is short. You mentioned military parades and it generated a couple of questions for me.

[Laughter.]

COMMISSIONER WESSEL: But I know time is short so I'll pass on that question right now.

Our last panel, two of the witnesses talked briefly about biotech. And there was no time to really pursue that. Could any of the witnesses talk to us about where biotech, any of the, you know, ancillary weaponization or other issues that come from that, where does that sit in

strategy? Where does that sit in terms of force modernization and utilization if anyone has any information?

[Laughter.]

DR. CHASE: I think maybe we chose the wrong panel--

[Laughter.]

DR. CHASE: --to address that question.

DR. HOLMES: I would say, I mean Mike alluded to the fact that the PLA Navy has raised its profile as far as nuclear deterrence with the fielding of its first actually useful SSBN and its first SLBNs and so forth, but--and I don't get the sense that the biotech side has really played much into the PLA's maritime strategy thus far.

COMMISSIONER WESSEL: For any of the forces is biotech an issue?

MR. LOWSEN: I would say from what I read last month, rather in December, the PLA came out with a treatise about this new type army that they're building, and it's very much a "super soldier" army where the soldier has UAVs hovering around him that he's controlling with sensors, and he's able to shoot tanks and everything from afar where he's not even in contact, covering many square kilometers. So within this idea of a "super soldier" I can imagine maybe some sort of biological enhancement.

COMMISSIONER WESSEL: Enhancement but not weaponry. We're not focused--they don't appear focused on that; is that correct?

MR. LOWSEN: Not according to the treatise, sir, but it's certainly possible, but they don't talk about it.

DR. MULVANEY: I would just say on that point everything that we've kind of seen in their open press is far more enhancing people as opposed to using it for nefarious reasons.

COMMISSIONER WESSEL: Okay. Related to the comment that was made, what about unmanned systems? Where are developments both undersea and all domains? What kind of activities are ongoing? Where does that play in terms of the approach?

DR. MULVANEY: So this is definitely one of those areas that China is full on board. They are the largest producer of drones in the world. They are happy to export them. They are seeking, actively seeking, to integrate artificial intelligence and swarm technology. We've seen the exercises and train to it. It is definitely something that they're looking forward to.

There's kind of two schools of thought as to how much they're going to turn over to autonomous vehicles, if you will. One school of thought is, assuming you program it correctly, there's no question about the political reliability of a drone; right?

And so, therefore, if you can automate it, if you can get the right algorithms and program it the right way, they very well may have no institutional or cultural qualms about turning drones loose with a given mission.

Some other people think that the PLA is so hierarchical that they're never going to allow something outside of a commander to make that, you know, or a PC, a Party committee, to make that decision.

I think that's an open question at this point, but absolutely they're investing heavily in drones. Looking at--we heard earlier about them using drone technology for logistics, as we've tried to do in Afghanistan. This is certainly a heavy growth and high research area across multiples of fields, for ISR, for attack, for logistics, for everything you can imagine, and they're spending lots of money on it.

From their perspective, drones are cheap--right--so you can do a lot of different things with a lot of different drones, and they're very adaptable. So it's not like you're creating an F-35 production line.

COMMISSIONER WESSEL: And the undersea domain?

DR. HOLMES: Yes, sir. That's exactly where I was going to go, sort of go with the offshore, the aerial domain and the undersea domain. I think the PLA Navy is well aware that it is coming from, trying to come from behind on anti-submarine warfare.

For whatever reason, this has been something that they have not paid enough attention to over the years as they do this very impressive modernization. And yeah, but certainly undersea vehicles complementing, you know, subulites [ph] and so--that's strewn around the Asian sea floor to try to find these American submarines that might be lurking offshore.

Yeah, huge. I can't say it much better than my colleague did. I mean the other thing from the--I think we tend to focus on weaponized, you know, armed unmanned vehicles. But if China's going to do--if it's going to do that from a strategic standpoint, if it's actually going to hold up that defense in the Western Pacific and strike at American task forces coming from Hawaii or whatever the case may be, that's a heck of a lot of sea space to cover.

And I think they see that as--unmanned vehicles as a gap filler where they can get that ISR, try to get that situational awareness, as the Air Force and military people call it, that would allow them to actually unleash the weapons that we've talked about here. I think it's--and that's usually when we talk about anti-ship ballistic missiles and stuff like that, that's usually the pushback that we will get is can they act? So even if this thing works, can you actually find and target it? Can you do the whole detect, engage, and fire sequence? So I think this, so, yeah, I think they see that as an inexpensive way to try to plug that gap.

COMMISSIONER WESSEL: Thank you.

HEARING CO-CHAIR TALENT: Commissioner Goodwin.

COMMISSIONER GOODWIN: Thank you, Senator, and thank you, gentlemen, for your time this afternoon.

Dr. Holmes, I was actually fascinated by your response to Commissioner Tobin's question about the cabbage strategy and the exercise of this monopoly of force in the South China Sea and how China is using it to craft a new narrative and create, in your words, a new normal, then changes the calculations of other actors in the area trying to respond to what China has done.

And I think as you describe it in your written testimony as well, the extent of these efforts really hints at the difficulty of crafting a sophisticated and effective response, especially by the U.S., which in response to Commissioner Tobin's question, you indicated the difficulty is even more pronounced because we are viewed as an outsider in some respect. And we have to frame things diplomatically in a way to make it palatable to local players.

My question is how do we make it attractive to local players here? Rising to meet these challenges--it's not only in the South China Sea, but all the challenges that you all have discussed today. And a representative democracy requires buy-in. How do we do that?

A witness in our next panel this afternoon observes and asserts that it's long past time for Americans to recognize the competition that we are now engaged in with China, an assertion that's certainly underscored by the National Defense Assessment that just came out last month.

So, again, a little far afield from perhaps your day-to-day expertise, but I'm really curious to see what you would say. How do policymakers--as you do say in your written testimony, one of the truths of diplomatic persuasion or any type of persuasion is to say it early, often and

consistently. That's why we see the same toothpaste and political ads five or six times as we're watching the basketball game.

So how do policymakers craft responses and get buy-in from the American people to rise to meet these challenges?

DR. HOLMES: No, that's a great point. It's actually--I actually wouldn't consider that off topic for myself. I've been pushing for some years the idea, especially, in fact, I think it was right after the first encounter at Scarborough Shoal, the idea that--and I put TR's face on it--Teddy Roosevelt's face on it. He was about "carrying the big stick" and doing all manner of things that way, but I started calling it "small stick diplomacy."

If you go by what the "big stick" was for TR, it was they were the "Great White Fleet." Navies fight for things that are in dispute. But if you're Coast Guard, if you're law enforcement, shipping is so strong that you can actually outmatch all of your regional competitors, such as the Philippines, Vietnam, being the chief too. Why not do that? If you send the Navy out to uphold China's claims within the nine-dash line, you are admitting that that territory, that sea space, the airspace, the features within, are actually disputed territory.

But if your Coast Guard is strong enough, if your maritime enforcement serves are strong enough, why not use that "small stick"? Go out and start policing what you are claiming as though it already belongs to you. And dare somebody to do something about it. So we're sort of back to the cabbage, the cabbage strategy as well.

Enclose the South China Sea and use that small stick in order to make those sovereignty claims look like reality and thus we've actually seen even a precedent in our own history with the Monroe Doctrine. The Monroe Doctrine was never international law, but it actually found its way into the Versailles Treaty after World War I because the United States managed to be consistent about it and managed to be consistent about it over the scope of--from 19--or 1823 onward and nobody had a really serious interest in challenging that.

So, and I think there's sort of a similar gradual long-term outlook that's in play there. And it's very--how do you concentrate public attention and passion on it back here? I think that's probably a question for people like you, but I tell you--

[Laughter.]

DR. HOLMES: I know it's the absolute right question though. I mean--and again, we don't do a good job of telling our story. Even if you look at--I mean to go back to the South China Sea, I mean how many mixed messages have we sent even with Freedom of Navigation cruises in the last few years? We're always, we always seem to be tripping over ourselves, either describing them wrongly, not describing them fully, and basically subjecting ourselves to China setting the tone on those things.

I haven't mentioned Clausewitz, and I'm also under obligation to--but he actually makes--I saw Mike look over there when you asked that. He knew I was going to say--but he actually makes a point that's actually a very real thing, and it also comes out from history in a Southeast Asian context. He talks about the value of the object.

The value of my political goals depends. It sets the price. It sets the magnitude and the duration of the effort that I put into those. Basically how many resources will I put into it and for how long will I sustain that investment?

Obviously, the home team like China is going to care more about what happens in the South China Sea than we are all the way on the far side of the Pacific Ocean. And I think that's--I mean that's a real and natural and enduring advantage for a China much as it was even for North Vietnam and its allies during the Vietnam War.

Yes, we had a huge--we outmatched them by a huge margin by any conceivable measure, but yet we didn't care about what was going on in Southeast Asia the way they did. So trying to rally--trying to rally that passion for something that's going on very far away. Perhaps it requires putting it to the American people in terms of international law, Freedom of the Sea.

I like the 2015 Asia-Pacific Maritime Strategy because it actually started off on page one and said our chief purpose in the Western Pacific is to defend Freedom of the Sea. That's something that should resonate with the American people simply because that's what all of our prosperity depends on, it's codified in international law. Yes, you can spare me the "gotcha" line about our not ratifying the U.N. Convention on the Law of the Sea, but, nonetheless, I mean that might be something that we can get our teeth in.

Perhaps that way you can actually mount a campaign to actually get that ratification finally, but these are some of the things that I would reach for would be, reach for that, reach for our alliances upon which our position in Asia depends. These might be some things that would resonate on this side of the Pacific Ocean.

COMMISSIONER GOODWIN: That's fair. Thank you.

MR. LOWSEN: Can I offer a few suggestions to that?

DR. HOLMES: Oh, of course.

MR. LOWSEN: I think you resonate with people by meeting them where they're at. So talk about first their prosperity and the values. Prosperity: China's anti-competitive practices are eating into our national economy. That cuts into the voters' pocketbooks so I think that's an easy way to show it's not right; it's not fair.

We know that. China knows that. But we have to do something about it. And that's why we should do something about it.

Also I would say that some fellow in Monjo getting cancer is not a good result for us. Having cheaper products, unsafe practices in China, the way they bring things to market is simply not right. And I think that resonates with us too both on the values and on prosperity.

And as far as the values go that Dr. Holmes talks about, those are certainly harder to explain, but I think when we look at a world where China is pervasively confronting us and the rest of the world in every domain, and where it's really cutting into the Western world's ability to function in the way they would like, Europe's ability to be a free society, I think that's where you really come to the values and what kind of world we want to live in.

COMMISSIONER GOODWIN: Thank you.

HEARING CO-CHAIR TALENT: Okay. I have several questions, and I think the co-chair and I think we will have time for a second round if anybody, if anybody has any.

Dr. Mulvaney, what's the average age of the airframes in the Chinese Air Force, if you know it? A ballpark? I'm thinking by comparison with ours.

DR. MULVANEY: So the question would be, so I'll tell you--

HEARING CO-CHAIR TALENT: How old is the force?

DR. MULVANEY: So it's getting a lot younger. It used to be very, very old, very, very dated, and it's getting a lot younger. So they just took delivery of new Russian aircraft, the Su-35s. They've been developing their J-20. They are developing a new bomber that they publicly now talked about. So it's getting a lot younger.

The fighter fleet, it's one of the reasons they've dropped from 50 air divisions is because they've just retired all the old ones and just simply gone to the new one. So I can find that out. I'm sure we have it.

I've given your staff a copy of our PLA aerospace primer. That information very well may be linked in there somewhere, but we can get you that. The answer is it's getting a lot younger than it used to be.

HEARING CO-CHAIR TALENT: Any idea what their acquisition rate is for fighters and, you know, major aircraft every year? I'm thinking in terms of comparing with what we're doing because the average age of the airframes in our Air Force is almost 30 years old. And we've got a big capitalization bow wave ahead of us for the Air Force.

DR. MULVANEY: Part of that is how do you, how do you gauge that because, you know, so one B-52 obviously negates all sorts of brand new F-35s when you look at just the average ages.

HEARING CO-CHAIR TALENT: Right.

DR. MULVANEY: So if you talk about their bomber fleet or you talk about their fighter fleet. Their fighter fleet is much younger, but with each generation, and I talk about it a little bit in here, their RD&A process still is a very lengthy process, develop a brand new aircraft, and their production rates are pretty slow.

The main things that are holding them back, they have to buy from outward. Now the nice thing about buying them from other places is that specifically Russia is already producing them--right--so that decreases that timeline. So that the more that they purchase or license from other, other countries, that shrinks that timeline.

The more they have to do it indigenously or rely on essentially copying U.S. F-35 or F-22 plans, that takes a much, much longer time. So we still them heavily invested in Russia. They have licensing agreements, which the Russians for some inexplicable reason still allow them to do even though they've constantly said, well, we're only going--we'll buy 3,000 of these from you, and then they buy four and say we don't need any more because now we're just going to copy them.

HEARING CO-CHAIR TALENT: Right.

DR. MULVANEY: So it's kind of hard to wrap your hand around. The indigenous fighters takes a lot longer and a lot more for them to develop. The stuff that they could buy and then adapt, much quicker.

HEARING CO-CHAIR TALENT: Dr. Holmes, you've mentioned several times the idea of taking some countermeasures that cause uncertainty for them in their near seas. In other words, to force them to focus in their core, you know, inside that first island chain.

What about the--and I know our Navy is talking about this--an inexpensive, relatively speaking, missile frigate, not worrying very much--not worry very much about how survivable it is. So you keep the cost down. Could we get the basing rights to put 40 or 50 of those, you know, throughout the East and South China Sea and turn the asymmetry back on them a little bit? And what do you think of that idea?

DR. HOLMES: I think it's a great idea. That's something we've been talking about at Newport for some years. Tom Mahnken convened, back when he was in our department, we convened a conference on this subject in 2010 I think it was, ended up doing a book through Stanford on competitive strategies, that being a late Cold War term popularized by Andy Marshall when he for many years was in charge of ONA.

But, yeah, I mean that's what we need to do because it does appear that through UAVs and all these manner of things that China has flipped the competitive strategies approach and is competing in areas of its choosing where it can do so cheaply and we have to do so expensively.

And I think that's exactly what we need to do is try to figure out, I mean build the things and also then try to figure out how to get Japan and so forth to let us base them there.

I've been pushing the idea for some years of going back and perhaps doing a diesel submarine contingent in conjunction with the JMSDF and basing it permanently in Japan for operations along the Ryukyus or wherever the hole in the first island chain the push happens to come.

If you look at the figures for the very last Soryu-class submarine that the Japanese fielded for the JMSDF, you can buy, it's almost, the figures are almost to the dollar, you can get five of those for the price of one Virginia-class SSN. That seems like a low-cost way to actually start doing things along the first island chain.

HEARING CO-CHAIR TALENT: It would be hard enough to get the Navy to do this missile frigate. To get them to come off and do a diesel submarine is impossible. I mean--

DR. HOLMES: Yeah. You know what the reply--you know what the reply is. Rickover.

HEARING CO-CHAIR TALENT: Right. You forget, I mean--

DR. HOLMES: Yeah, and I'd say--I get that. But I mean there are also ideas about going, doing unmanned underwater vehicles and so forth, but--

HEARING CO-CHAIR TALENT: We don't normally--I'm going into the second round here because everybody else--which is fine because I'll just lead off the second round.

[Laughter.]

HEARING CO-CHAIR TALENT: And give everybody else time to say--well, I waited till the end of the first one. All right. I mean, yeah, if we can--we don't usually recommend specific programmatic recommendations to our government, but this idea of getting the Department--now that the top line is going up \$100 billion in the next two years, that's baseline money, loosen up and don't always go for the biggest platform and the most powerful. I mean I get it. That's--but I'd love to do that.

And another question--maybe a focus on Mr. Lowson, but for all of you--are they attending to the idea of creating what we do call the "institutional army"? You know, the war colleges, the West Points, the well-read officers, the various, the TRADOC, because it just strikes me, and then I'm done--you all can chime in on this.

When I'm trying to maybe find a silver lining in this cloud of what they're doing is that the shoal they may run up against is trying to get to joint operations without people who really can think jointly. I mean there is just a certain--the kind of officer you describe might be very courageous. I mean I'm not running them down.

But there's a certain sort of breadth of knowledge and approach that you got to have, and they're not going to get it unless they create these institutional things. So what do you all think of that, maybe particularly with the Army you could start off?

MR. LOWSEN: Senator, that's a very interesting point. I think culturally China is a very institutional place. Many of the things we take for granted within our Army are common to the whole populous nation of China.

HEARING CO-CHAIR TALENT: Right.

MR. LOWSEN: And that's how they've been disciplined, especially under the PRC.

As regards the institution of the, the academic institutions and other parts of the institutional army, those actually existed, such as the National Defense University and the Academy of Military Science, which trained, which have been training very successful line officers for some time now, which actually happens that they have set up an army headquarters for the first time, which was rather jumbled before.

HEARING CO-CHAIR TALENT: Right.

MR. LOWSEN: The army was the base service. Everything was army previously until-- and with the other services, it's adjuncts. Now, the army has been to some degree separated out from, as the base. It's no longer the base so it's going to be an inherently more joint structure.

That said, having that institutional army, it could simply be--it could be parochial in its own regard. It's kind of up to them how joint they make it.

DR. HOLMES: Well, I'm representing Admiral J.C. Wylie so let me tell you a quick thing that he says in his book on military strategy. He says in--he comments almost directly on this. He says basically people who come from different schools of thought about combat think in very different terms.

They have different assumptions that are totally ingrained. If you're an aviator, you think about warfare being a matter of destroying things on the ground. If you're a sea fighter, you're worried about command of the sea. If you're in the army, you're worried about having decisive battle and then going on to apply pressure on your opponent.

And he basically said this tends to drive the base towards the lowest common denominator, the thing that's the very small amount of things that they can actually agree on.

Just to bring that into the more practical realm, Bob Komer, who ran CORDS in Vietnam, wrote a book after that about this organizational culture dimension. He basically said, look, the United States Army, the different services went into that with ingrained ideas about how they were going to do things. He calls them "institutional repertoires." It's not simply a top-down thing whereby you can order the services to get over their institutional differences and operate on the same sheet of music.

How many years has it been since Goldwater-Nichols? 22 or 32 rather.

HEARING CO-CHAIR TALENT: Right.

DR. HOLMES: Man. And we're still trying to get that right and talking about revising that. So I don't think--I don't think China is exempt from those organizational, cultural constraints.

To translate that into your previous question about competitive strategies, that's what we--I mean our adversaries are always looking at our administrative seams, seams between services, civil-military, whatever the case may be.

We should be thinking about that and looking for seams between, for example, since I'm talking about the offshore realm, we've got to be looking at the institutional seams that might separate the PLA Air Force from the PLA Navy from the PLA Rocket Force and try to figure out how to gauge our actions so that we can actually put pressure on them in their own backyard and throw a monkey wrench in the works.

DR. MULVANEY: So this is a particular hobby horse of ours lately at CASI so I'll try to be brief, but one thing I want to emphasize is that so I'm a Marine, right, so we are joint by ourselves. We have an infantry, we have artillery, we have army, or we have the tanks, we have aviators, we have our own navy essentially with the "Gator Navy," and it's really hard to--it's really hard to do--

[Laughter.]

DR. MULVANEY: --for us, and then you throw in our brethren from the Air Force and have an A-10 shoot for you is fantastic, but man, they talk a different language; right? And so it's very, very difficult for the U.S., who is the best at joint and combined operations in the world, for us to do it.

The PLA has absolutely no history of doing this. It is a long, long road for them. They're making their first step in we'll call it a marathon, right, so 100 years marathon.

To talk about the institutionalization, the PLA is just completely different; right? So they have their own versions of West Point. It's not nearly what we consider to be West Point. It's just an officer academy. So if you're going to join the PLA, one of the ways you do it is you go to this academy.

They used to have hundreds of academies. Now they're down to the, you know, in the mid-50, 60 range. But especially on the enlisted side, but also on the officer side, you go to this academy, you get your commission, you go to your unit, and when you go to follow-on training, you go back to your academy. And in those academies, it's everyone you've ever gone back to.

It was only recently that in the flight academies they put two dissimilar aircraft pilots together in the same class. So if you're a J-10 pilot, when you went back for training, you would just go back with other J-10 pilots until recently, you know what, maybe for half the year, we'll mix them with other pilots. This was a novel concept for them that they just did a couple years ago.

So they are far, far away from anything that resembles joint. There's no word for PME; right. They use a word for training. So professional military education, which I think we're getting at here, you know, joint training, how do you think jointly? They don't even have a word for PME. It's training; right? Everything for them, and there's a big difference between training and education.

Everything for them is training; it's rote. It's you go back to the same place. You talk to the same people. They are, they've recognized this problem. They are trying to break it, but the whole system and organizational culture is not there. As I said, the first time they do any kind of joint training is at National Defense University.

The problem is if you don't go to NDU, you don't even get that. So Yi Xiaoguang, who just took over as the Central Theater commander, has never been to NDU. He has no formal joint training or experience.

The one thing I will say on the flip side of that is although the CMC remains largely army dominated, not joint in any way, shape or form, and only a few deputies here or there that are not army, the theater commands have actually made a no-kidding effort to become joint. Where they used to have rotational commands for the air force and the navy, they now have permanent air force and navy representatives and in some cases the Rocket Force sitting in the command structure; right.

So they are now actually deputy commanders of the theaters that are there permanently in addition to if they have a fleet there, the fleet commander would be a concurrent deputy commander; right. And so at the theater level, they're making changes, trying to get some of that operational experience, but as far as institutions and going like to Carlisle or the NDU or the Eisenhower School, it's a long way before they can break that institutional mindset.

DR. CHASE: Yeah. I would just say that if you read what the PLA writes about the requirement to have highly educated and well trained, but I think educated also more in the sense of the way we think of educated as well, personnel to actually come up with the operational concepts and carry out the campaigns that they write about, I mean they understand all these problems. I think they understand pretty well the areas in which they still have weaknesses that they need to address.

So I think it's less a question of figuring out what problems they need to deal with and then more a question at this point of how long it's going to take them and how successful they're

going to be in implementing the kind of changes they've identified as necessary to cope with those problems.

And I guess I would just add on the theater commanders, I think it's now two out of the five are not ground force officers. So it's one air force officer, as you point out, is a theater commander, one PLA Navy admiral is the Southern Theater commander. So they're not--you know, I'm sure they're not where they want to be in terms of becoming more joint, but just the fact that the army got its own headquarters instead of running the whole show through the four General Departments, you know, that we're starting to see, I think, some interesting indicators of you have movement in that direction.

Obviously there is still a long way to go, but again they've at least taken some steps that I would regard as pretty important steps.

HEARING CO-CHAIR TALENT: Thank you.

We're now in the second round, and Commissioner Bartholomew has--

VICE CHAIRMAN BARTHOLOMEW: I'll go first or I'll defer to you.

COMMISSIONER WORTZEL: No. I don't care.

VICE CHAIRMAN BARTHOLOMEW: All right.

HEARING CO-CHAIR TALENT: I'll recognize you, Commissioner Bartholomew.

VICE CHAIRMAN BARTHOLOMEW: Thank you. Thanks.

This is very interesting, and it's such an opportunity for us to pick all of your brains. I'd like to just think a little bit more, talk a little bit more about military-civil fusion because I used to think I was pretty clear on the differences between how things work there and how things work here.

But I find that I'm getting a little bit more confused. Sort of how would you differentiate how they do military-civil fusion than how we do it? I mean, Dr. Mulvaney, you know, you were talking about COMAC, but we have Boeing, and Boeing has a very close relationship with our defense establishment. How is it different?

DR. MULVANEY: So certainly we in the West have incorporated our commercial into our military; right? The industrial complex. I would say the nuance difference is that what China is doing is using state-owned organizations, state-owned apparatuses, and specifically targeting using those what we would say civilian things to support the military directly.

And so the U.S. Air Force is not going to go out to Boeing and say we're going to commandeer your 767 line to go start flying bombers; right. They're just not going to do that, whereas that is a legitimate possibility for the PLA because it's a state-owned enterprise.

So the fusion part, so we have more of a cooperative and it's a commercial and of course we work very closely with them. On the flip side of that is we have Boeing and Grumman offices in the DoD--right. So at the headquarters, we have DoD reps who sit at their headquarters. The PLA at this point still doesn't have that; right? So they have people down at the individual factories, but nobody sits at the headquarters for their major aviation producers.

So it's an interesting way that they're approaching it. I would say it's far more focused, and it's far more directed at this point. Boeing does it because it's good for shareholders; right? The more aircraft they sell, the more money they make, the more share--so it's--not to say that Boeing isn't altruistic and, you know, wants to support the United States. It totally does.

However, I think the incentives for Chinese companies to do this are more, far more being directed to do it, and a comprehensive national power to do it as opposed to--and they're perfectly fine blending those lines; right.

So we in the United States like to keep some of those lines very clear, right, so this is the big thing why cyber is breaking from the NSA; right? We want certain authorities over here and certain authorities over there. China has no problem blending those across the entire spectrum.

VICE CHAIRMAN BARTHOLOMEW: Dr. Holmes, Mr. Lowsen, Dr. Chase, anybody else?

DR. HOLMES: I'm not sure it exactly gets at your question, but, well, maybe it does actually. The Chinese are big fans of Mahan, and one thing Mahan says about what he defines what a maritime nation is, one of the key factors that he uses is having state-owned shipyards that build a state-owned fleet. He makes a big deal out of the fact that the merchant fleet is also-- in effect, he ranks it co-equally with the Navy as a bearer of sea power.

So I think if we could conjure him up today, I think he might agree that China is actually more a maritime than we are because we do not, ever since the Civil War, the confederate navy disseminated the merchant fleet, and it all went to foreign flags, I think that was a major departure in U.S. history, whereas China seems to be following more to the traditional pattern in having state-owned shipyards to build not only naval craft but also merchant craft, and that gives the government, the Chinese Communist Party, a lot more say so over what shipping does, how it's designed and built and so forth.

So, yeah, kind of an interesting--good question. Thank you.

MR. LOWSEN: I would just make the point that about authorities, China's civil-military fusion has behind it a great deal of legal authority and a broad range of things. And I think, not that we want to copy the Chinese, but I do think we need to look very closely at protecting our intellectual property, and I think that will require more, more cooperation and more authorities from Congress to do more to fight that.

VICE CHAIRMAN BARTHOLOMEW: Dr. Chase, anything?

DR. CHASE: No, not on this topic.

VICE CHAIRMAN BARTHOLOMEW: Okay. All right. Thank you.

Larry.

HEARING CO-CHAIR TALENT: All right. Well, Commissioner Wortzel, a quick second round.

COMMISSIONER WORTZEL: Let me, if I could, throw out a couple of points and just ask any of you to or all of you to comment. But given the development of intermediate range missiles in China with hypersonic glide vehicles and maneuverable reentry vehicles, how constraining is it for the United States to continue to adhere to the INF treaty? Would we have more options? Would we have more options that would reinforce extended deterrence if we weren't in that?

And related to that is are we unrealistically constraining our allies and partners with our emphasis on the Missile Technology Control Regime limits on the ranges for their missiles?

DR. CHASE: Okay. So on the INF treaty, I'm sure you read Eric Sayers has a piece on this recently. And maybe that's where the question--

COMMISSIONER WORTZEL: I did. That's what did kick me off; right.

DR. CHASE: So there--I mean I think there's a temptation to always kind of want to respond symmetrically, but in fact China has been quite successful by responding asymmetrically. And so I would suggest that we don't necessarily have to respond symmetrically; right.

If we want to have--and it is one way to respond, but there are a couple of challenges that would be associated with that, and of course one of them is where do you deploy the medium

and intermediate range ballistic missiles, and so the choices basically are, you know, Japan, Guam, Philippines, and it's not necessarily apparent to me that everybody who is in one of the right places or--and there would be some other countries--really wants to have medium and intermediate range ballistic missiles operating, you know, running around on, you know, launchers in their neighborhood.

So then there are also, you know, a variety of other ways you can respond. I mean you can have long-range air power with extended range strike capabilities. You can have more surface or undersea-based strike capabilities. So I mean, yes, obviously, it imposes constraints in the ground launched missiles in that, you know, in that, of those ranges, but it's not necessarily apparent to me that that's the--it would be one of several ways to respond to that challenge.

But I think there are others, and you probably have to do a pretty detailed analysis of alternatives that looks not only at the kind of relative costs and the capabilities that you get with different kind of response options but also takes into account the political and diplomatic issues that would be associated with the different basing modes, whether they're air or sea or going to be ground-launched from U.S. territory or from an ally's territory or another, you know, security partner's territory.

So I think there is a whole, whole wide range of issues there that would require--and including the political and diplomatic ones probably don't get as much attention as they deserve.

COMMISSIONER WORTZEL: And, well, for instance, the Japanese and South Koreans would love longer-range land-based ballistic missiles, and really it's our theological adherence to the MTCR that prevents that.

DR. CHASE: So for the Japanese, they're obviously having a lot of discussion about new counter-strike or long-range strike capabilities, and again their, you know, their options will include extended range air-launch capabilities and sea-launched as well as ground-launched.

So I mean, you know, again, I think there are, if you assume that the desired capability is to have some sort of long-range strike as a deterrent or for, you know, to comprise the long-range strike component of whatever kinds of operations that you're thinking about, then they're going to be several different ways to do it, and that's, you know, one of them may be constrained in that respect but the others are not.

And so it's I think a question of whatever, all the political, you know, costs and kind of effectiveness tradeoffs, and you'd have to look in a lot of detail at the different options I think.

DR. HOLMES: I'm sure we'd love to have an anti-ship ballistic missile mounted on a truck here in the United States.

[Laughter.]

DR. HOLMES: I think it would be nice. If the capability existed, I think that would be a really nice thing. I mean as Mike is quite right to point out to host nation relations. I mean that's huge. Obviously, Japan or the Philippines. Under Duterte, I know would have a veto on the use of those weapons.

But I think actually you used exactly the right term. I was reaching for it, and you actually used it. It's in a past life I did non- proliferation and export control work down at Georgia. And one thing as a non-arms control guy going into that world, that was one thing that really struck me about my colleagues and about all the people that we interacted with. It really is a theology, much as it is international law is for anybody who does international law.

The important being not that--that's not a bad thing necessarily, but even if we decide today that we're going to develop this capability, if you've got a theology to overcome, that suggests there's going to be a serious lag in developing and making that capability operational

and it's probably not a near-term thing. I would, I could decree that it be done, but it's not going to make it happen overnight.

COMMISSIONER WORTZEL: Thank you.

HEARING CO-CHAIR TALENT: Okay.

VICE CHAIRMAN BARTHOLOMEW: Can I just note that that theology has been there for a reason?

DR. HOLMES: Indeed.

HEARING CO-CHAIR TALENT: We'll give Commissioner Bartholomew the last word on this panel.

COMMISSIONER TOBIN: Amen. Amen. Right?

[Laughter.]

HEARING CO-CHAIR TALENT: We thank you, all four of you. This has been fascinating.

So we'll take a break until 2:45, and then we'll have the third panel.

[Whereupon, a short recess was taken.]

PANEL III INTRODUCTION BY VICE CHAIRMAN CAROLYN BARTHOLOMEW

VICE CHAIRMAN BARTHOLOMEW: All right. Thank you. Thanks to everybody for your patience. We had to find the introductory material.

Our final panel today will explore the challenges China's military modernization pose to the U.S. and U.S. allies' and partners' security interests in the Indo-Pacific region.

Our first panelist today for this panel will be Mr. Tate Nurkin, executive director of Strategic Assessments at Jane's by IHS Markit. That's getting to be a very long--

MR. NURKIN: Yeah. Don't get me started.

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: Mr. Nurkin is a member of the leadership team responsible for management and operations of the Jane's business.

He previously worked at Booz Allen Hamilton, SAIC, and Joint Management Services, a defense consulting firm based in Atlanta.

He is the lead author of an excellent forthcoming report for the Commission tentatively titled "China's Advanced Weapons Systems," which examines Beijing's development of advanced defense technologies and systems and their implications for the U.S.

Mr. Nurkin will discuss PLA modernization and challenges to U.S. military capabilities and security interests in the Asia-Pacific.

Next will be Dr. Jacqueline N. Deal, President of the Long Term Strategy Group, a Washington, D.C. defense firm that provides research and analysis on future trends and the emerging security environment.

Her work has focused on China's military modernization, alternative PRC futures, and U.S. strategy. She's a senior fellow of the Foreign Policy Research Institute, a contributing editor and editorial board member of the U.S. Army War College's journal *Parameters*, and a co-founder of the American Academy for Strategic Education.

Dr. Deal will discuss how China's military modernization effort challenges PACOM operations in the Indo-Pacific.

And our final panelist of the day will be Dr. Kathleen Hicks, senior vice president, Henry A. Kissinger Chair, and director of the International Security Program at CSIS.

Dr. Hicks served in the Obama administration as Principal Deputy Under Secretary of Defense for Policy and Deputy Under Secretary of Defense for Strategy, Plans and Forces.

She led the development of the 2012 Defense Strategic Guidance and the 2010 Quadrennial Defense Review. She also previously served as a career civil servant in the Office of the Secretary of Defense.

She will discuss the challenges China's military modernization poses to U.S. partners and allies, including Japan, South Korea, Australia, India, and Taiwan.

And, you know, we really should say this with every panel we have, but we're really fortunate to be able to get the brain power that we have of people coming to testify in front of us. We learn a lot listening to all of you. We learn a lot engaging so thank you for the time that you put into preparing and being willing to come and testify in front of us.

You'll each get seven minutes, and you'll know that we'll have lots of questions afterwards. Mr. Nurkin, we'll go ahead and start with you.

OPENING STATEMENT OF TATE NURKIN, EXECUTIVE DIRECTOR, STRATEGIC ASSESSMENTS, JANE'S BY IHS MARKIT

MR. NURKIN: Yeah, sure. I'd like to start my testimony by thanking the Commission for the opportunity to contribute to this panel. It's an honor to be here.

I want to try and do three things in the time that I have. The first is offer a perspective, a framing perspective, on China's military modernization and the risks that it poses to the U.S. capabilities to operate in the Indo-Pacific.

Second, and I'll spend most of my time actually talking about three capability areas, Chinese capability areas, that I think are particularly of concern and hopefully have a couple seconds at the end to talk about some of the things that, approaches that might be useful in maintaining U.S. military and technological superiority.

So my perspective is that China's military modernization has a lot of what I'll call forward momentum in terms of the development of advanced capabilities in three areas that are relevant to its military modernization.

The first is, of course, its core mission of anti-access/area denial. The second is development of power projection capabilities. And the third, and I think probably the most impactful over time, is the development of technologies and capabilities that will first facilitate and then accelerate China's ability to operate an increasingly intelligentized rather than informatized environment. So to be able to operate in future cognitive warfare.

I think taken together and actually individually as well these areas of development and innovation constitute a real risk and in many cases very robust and in some cases urgent challenge to U.S. military and technological superiority.

Now when we talk about specific capabilities, I think probably in the short-term the capabilities that are most of concern are those that are most closely tied to China's A2/AD modernization. And here I'll signal out counter-space, I'll signal out cyber and electronic warfare, all components of I&W concept and which, of course, stresses targeting vulnerabilities in the electromagnetic spectrum, information domain, and in space.

Now I'm sure other panels may have referenced the formation of the Strategic Support Forces. I'll just say that it's a powerful capability enabler. What I really want to focus on is saying that China's development capabilities in this space is about more than just organizational change and even operational concepts.

They're also developing a diverse range of platforms and systems that are designed to carry on these missions, counter-space and EW in particular. It's worth noting that the Chinese state media English language reporting on the July 2017 military parade to celebrate the 90th anniversary of the PLA's founding included an article. It's about a page-and-a-half article that was just about the EW capabilities that were featured in that parade. So there's 16 platforms and systems that were featured.

And I think that's a conspicuous call out, and in conjunction with the formation of the SSF and other data points, I think it reflects the prioritization that the PLA has placed on challenging the U.S. in the electromagnetic spectrum.

The second capability I want to focus on is China's HGV, the hypersonic glide vehicle program, in part because I feel it's an incredibly destabilizing weapon, in part because China seems to have made steady and significant progress over the last decade, and in part because there seems to be a perception, a narrative here within the United States that--at least in the open

sources--that the United States has taken its foot off the gas a little bit in this technology area, and the result is that a once sturdy lead has been compromised.

And I think this perception was summarized by General Selva recently about two weeks ago actually when he said the United States has lost the lead in hypersonics, which was a bold statement, and I think he was careful to say that we haven't lost the contest, we've just lost--and this is my word--the initiative.

But I think in a capability area like hypersonic glide vehicle that is so fundamentally destabilizing, maintaining the initiative and now regaining it is absolutely critical. We don't want to finish second in this capability area.

And the last one I'll mention is really like I said probably the most impactful over the next 15 to 20 years, which is China's investments in artificial intelligence, and I'll couple that with its rapidly advancing unmanned systems industry.

And my view on the bet that China is placing on artificial intelligence is not that it's designed to redress current imbalances and the current competitive dynamics between the United States and China, which is really focused on making more advanced conventional capabilities. It's really focused on changing the game--right--changing the nature of the competition to technology areas where China thinks it can better compete and may actually be able to develop sustainable advantage.

So one way to think about it, although perhaps a bit hackneyed, but I think it's appropriate, is to paraphrase the great hockey player Wayne Gretzky and say that China's investment in AI is not designed to skate to where the puck currently is or where it might be in five years, but it's designed to skate to where the puck is going to be in 15 years, which is cognitive warfare, and to beat the U.S. to that spot.

Now I don't want to be alarmist. I'm not trying to say--the U.S. still maintains a lead in AI technology, but it's worth noting that China's development pattern and its development curve is very steep. There are still vulnerabilities. There are still risks.

But China has moved very far very fast up the development curve in AI, and actually has several levers, some of which are shared by the U.S., some of which are not. Top-down policy direction, the ability to coordinate cross-industry on AI, the ability to access huge sums, amounts of data within China, the Chinese market, talent acquisition and ties to Silicon Valley. There's some flexibility there, and there's some levers there that I know that China will pull very aggressively over the next 12 years, which is the time frame, short time frame for Chinese national plans of its next generation artificial intelligence.

So I'll conclude with just a couple comments on how the U.S. maintains some sense of technological and military superiority in this environment. I think it involves two, four components.

One is technology advancement, which is prioritizing technologies that will allow the United States to better compete in critical military domains. Think undersea. So unmanned systems underwater vehicles, unmanned surface vehicles, the ability to connect that allows us to communicate together, space, so anything that enhances space resiliency. Reusable launch brings down the costs. Micro-satellites I say would be on that list. Also enhanced concepts of dispersion. The electromagnetic spectrum. There's under development now adaptive EW and cognitive EW capabilities, which could be very effective in meeting a fluid EW threat.

And, then, of course, missile versus missile defense, anything that upsets the sort of asymmetric cost curve associated with kinetic intercept missile defense. So low cost of shot. It's basically hyper-velocity weapons, directed energy weapon launch, intervention.

And then there's technology protection, and I would say that's probably much harder than technology advancement. And I think it involves the coordination of domestic policies of engagement with industry, the collaboration across industries who are all interested in AI, and it's certainly alliance management as well, and I think that provides a lot more challenges, but I'm over time so I'm sure you'll ask about those in the conversation.

**PREPARED STATEMENT OF TATE NURKIN, EXECUTIVE DIRECTOR,
STRATEGIC ASSESSMENTS, JANE'S BY IHS MARKIT**

Thursday, February 15, 2018
Tate Nurkin
Executive Director, Strategic Assessments, Jane's by IHS Markit
Testimony before the U.S.-China Economic and Security Review Commission
Hearing on "Implications of China's Military Modernization"

Introduction

I want to first thank the Commissioners for their invitation to participate in this hearing on the implications of China's military modernization. I think this is an important and timely topic as China's military modernization continues to build forward momentum in several capability and technology areas that have the potential to challenge U.S. military superiority in the region and affect U.S. capacity to pursue its interests and support its allies in the Indo-Pacific.

I have been asked to identify outputs and enablers of China's military modernization that pose the most consequential threats to U.S. military capabilities and to provide high-level recommendations of how best to mitigate the risks posed by these capabilities. My testimony is structured in four complementary sections.

The first section will offer a brief perspective on China's military modernization in order to frame assessments made in the rest of the testimony. Section two will discuss five linked capability areas and one enabler of modernization, focusing on providing high-level assessments of China's progress in these areas as well as why these capabilities are of particular concern. This list is not exhaustive or inclusive, but it does assess a compelling set of imminent and longer-term challenges to U.S. military superiority in the Indo-Pacific. The third section offers a series of high-level recommendations for maintaining U.S. advantage in its intensifying, accelerating and expanding military and geopolitical competition with China. The final section offers high-level additional recommendations for ensuring U.S. military superiority in its on-going competition with China.

Framing China's Military Modernization

China's military modernization is in the midst of three interlinked transitions, each in pursuit of a separate strategic objective.

The most immediately relevant and, for the United States, affecting transition is the shift in People's Liberation Army (PLA) posture from a land and territorial defense-focused anti-access / area-denial (A2/AD) force to a maritime – centric A2/AD force more capable of strategically managing the "near seas" and over time beyond.

The second transition acknowledges China's growing geopolitical influence and extra-regional interests and the need to build capacity to support and protect these interests. More frequent deployments to places like the Gulf States and ports in the Indian Ocean, along with the opening of China's first overseas military base in Djibouti all signal an ambition to project power, even in an environment in which China's most immediate military priority is targeting operational vulnerabilities of modern, high-tech militaries as part of a broader A2/AD approach. This transition in both mentality and capability is from a regionally-oriented force built to deny U.S. power projection efforts to a force capable of projecting power beyond the Western Pacific.

The third and over time possibly the most far-reaching, transition is rooted in a growing recognition that the availability and possible defense applications of novel Fourth Industrial Revolution

technologies¹, especially artificial intelligence (AI), are changing the nature of conflict and military capabilities.

Over the last decade-plus, China's force has been optimized to operate in the highly-"informatized" conditions of modern warfare that emphasize connectivity, networks, increased access to information and ease and pace of communications. These capability trends will be initially augmented and ultimately, over the next approximately two decades, superseded by the introduction and refinement of advanced 'cognitive' and autonomous capabilities and advanced manufacturing techniques. Underlying technologies of the future "intelligentization" of warfare are still in the development and testing phase, but China has clearly made an early play to invest in these technologies and the promise they hold to disrupt not just future conflict, but also current trajectories of China's competition with the United States.

Assessing the current state and future importance and trajectory of China's advanced weapons systems programs requires not just an understanding of the tensions, transitions, and varying priorities discussed above, but also analysis of four critical military domain area competitions.

The undersea competition: The United States has long-dominated the undersea domain. Both improved and planned Chinese capabilities—submarines, underwater surveillance nets, unmanned underwater vehicles (UUVs) other ASW capabilities—and a looming "valley"² in the actual size of the U.S. nuclear-powered submarine fleet (SSN) versus anticipated requirements will test U.S. undersea control, likely starting the middle of the next decade.

Missile versus missile defense: China's development of more, more accurate, and longer-range anti-ship cruise and ballistic missiles could overwhelmed by multi-axis saturation. New missile defense measures are being developed to meet this threat. The iterative interaction between new strike capabilities and novel means of providing missile defense will be a central feature of the China-U.S. (and Japan and South Korea) military competition in East Asia over the next two decades.

Space versus counter-space: The global competition in space is growing more crowded and more intense—particularly between the United States and China—as the reliance on space-based assets of modern militaries (and commercial communications) increases. These assets are critical for communication, navigation, intelligence collection, surveillance, target acquisition and reconnaissance. Control of what China's 2015 Military Strategy White Paper calls the "commanding heights" of space will be nearly essential to U.S. power projection efforts and China's attempts to deny U.S. access to the Indo-Pacific and globally project power.³

The electromagnetic spectrum: In both the heavily informatized environment of warfare today and the intelligentized environments of the more distant future, the ability of platforms and systems to send and receive signals, detect, surveil, and emit across the electromagnetic spectrum is critical to operational efficacy and success. For much of the last 15 years, the United States has operated more or less unchallenged in this domain. That is changing, in part because China has developed new organizational structures, operational concepts and platforms and systems to support its electronic warfare and cyber operations.

¹ Typically described as AI, cloud computing, advanced manufacturing, robotics, information technologies, blockchain, quantum computing, big data analytics, internet-of-things, virtual and augmented reality, biomaterials, smart sensors, smart materials, neuro technologies and energy capture and storage technologies

² O'Rourke, Ronald, "Navy Virginia Class (SSN-774) Class Attack Submarine Procurement: Background Issues for Congress," *Congressional Research Service*, October 24, 2017, 11–12. <https://fas.org/sgp/crs/weapons/RL32418.pdf>

³ USNI, "Document: China's Military Strategy," May 26, 2015, <http://news.usni.org/2015/05/26/document-chinas-military-strategy>.

Balances and imbalances in and across these competitions are critical to stability and security in the Western Pacific and to the capacity of the United States and its allies to pursue their interests in the region. They will also help shape the future of China's military modernization and its prioritized capability development.

Priority Threats to U.S. Military Capabilities and U.S. Ability to Sustain and Advance Security Interests

With this context in mind, it is clear that China's military modernization is driving new and intensifying challenges to the U.S. military and its capacity to project power to the Indo-Pacific and pursue U.S. security interests in the region. The capability areas discussed below are all at the top of an expansive list of specific capabilities that pose particularly robust threats to the U.S. military and U.S. military advantage.

Artificial Intelligence (AI)

China has aggressively invested in and pursued the development of AI as a means of ensuring economic growth and demonstrating and furthering national science and technology development. The result is that China is becoming a new center of gravity for AI research, even if China has not yet fully-closed the gap on U.S. leadership in the field.

Indicators of the growing prominence and scale of China's AI research are widespread. And while concerns about the quality of some of this high quantity of research and the nature of the citations are legitimate and dampen to a degree China's overall impact on international AI research, the broader point of China's growing influence holds. As Kai Fu-Lee, a Taiwanese-born AI researcher, former head of Google China, and current Chairman and Chief Executive Officer of Sinovation Ventures, effectively summarized: "It is indisputable that Chinese authors are a significant force in AI and their position has been increasing drastically in the past five years."⁴

In the defense and security context, China's military and political leadership appreciate that the PLA is at the start of changes that could transform warfare and the nature of the capabilities required to detect adversaries, deter and dissuade conflict and diminish, degrade and defeat adversaries. China's commitment to and progress in developing AI for national security and defense objectives is seen at multiple levels, including:

Policy Statements and Investments: The State Council's July 2017 release of the three-stage Next Generation Artificial Intelligence National Development Plan provided a direct and forceful indication of the overall importance the Chinese government is placing on China becoming the global leader in AI development and applications by 2030.⁵ The relatively short timeline of the plan—by comparison the Made in China 2025 plan also includes three stages covering a period from 2015 to 2049—underscores current perceptions of the health and competitiveness of China's AI research and industry efforts. The plan's third phase—which runs from 2025-2030—in particular, includes discussion of military and national security applications of AI.⁶

Autonomous Unmanned Systems Development: In June 2017, China Electronics Technology Corporation (CETC) successfully executed a world record test of 119 networked drones,

⁴ Markoff, John and Rosenberg, Matthew, "China's Intelligent Weaponry Gets Smarter," *New York Times*, February 3, 2017. <https://www.nytimes.com/2017/02/03/technology/artificial-intelligence-china-united-states.html>.

⁵ China Copyright and Media, "A Next Generation Artificial Intelligence Development Plan," July 20, 2017, <https://chinacopyrightandmedia.wordpress.com/2017/07/20/a-next-generation-artificial-intelligence-development-plan/>.

⁶ State Council of the People's Republic of China, "The State Council on the Issuance Notice of the New Generation of Artificial Intelligence Development Plan," July 20, 2017, http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

demonstrating China's growing competence in a capability area that will be critical to future conflict and also highlighted the power of the intersection between AI and unmanned systems—discussed in more detail below.

Other Military Applications: In an August 2016 statement to *China Daily*, Wang Changqing of the China Aerospace and Industry Corporation, claimed that China's "future cruise missiles will have a very high level of artificial intelligence and automation . . . They will allow commanders to control them in real time manner, or to use a fire-and-forget mode, or even to add more tasks to in-flight missiles."⁷ This last function in this list indicates a missile with a cognitive capability to make targeting and navigation adjustments mid-flight absent human guidance or intervention based on its own autonomous reading of the operational situation.

China's investment in AI is at the top of the list of concerns for the United States because it presents China an opportunity to shift the nature of the competition itself. Rather than competing in capability areas in which the United States holds (and is likely to continue to hold) a relative advantage. China views AI investment as a means to get ahead of the U.S. in a new competitive environment that will have profound implications for future conflict.

And to be clear, while the United States currently retains overall global leadership in artificial intelligence, especially in core concepts, the prospect of China catching and subsequently surpassing the United States in military applications of AI technologies over the next decade – plus should not be discounted or dismissed. U.S. advantage will be tested, especially given the impressive range of levers and advantages that buttress and advance China's AI development, such as:

- An active AI research and academic community
- The scale of data available to China's high-tech companies and researchers, which subsequently informs AI application development and deployment
- A dynamic, opportunistic, and highly-competitive indigenous high-tech market environment and entrepreneurial culture. China's high-tech giants are competing to stay relevant in a market that demands rapid innovation and deployment of new commercial applications of AI
- Connections to Silicon Valley and the U.S. high-tech community, both through Chinese high-tech companies establishing research centers in the area and connections to individual leaders and scientists
- Talent recruitment, especially the repatriation of Chinese nationals from the U.S. high-tech industry and academic institutions
- The lure of China's commercial market for U.S. and Western firms and capacity to force U.S. companies to share data collected in China and to form joint ventures that provide China a mechanism for technology and knowledge transfers
- Top-down policy initiatives, funding, and incentives

The U.S. Department of Defense (DoD) sees China's development of AI as a real and urgent challenge and understands the need for vigilance in the development and protection of AI technologies.

Indeed, the DoD's Third Offset Strategy, an approach to achieving and sustaining U.S. superiority in military technology and capabilities, lists five types of AI capabilities as primary priorities for development: Autonomous deep learning systems, human-machine collaboration, assisted human

⁷ Lei, Zho, "Next Generation of Missiles to be Highly Flexible," *China Daily*, August 19, 2016. http://www.chinadaily.com.cn/china/2016-08/19/content_26530461.htm.

operations, advanced human-machine combat teaming and network-enabled, cyber-hardened autonomous weapons.⁸

In addition, former Deputy Secretary of Defense Robert Work touched on the potential risks to U.S. forces of adversaries, especially China, gain an advantage in algorithm-driven combat in a May 2017 speech to the U.S. DoD Applied Physics Lab: “Surprise is going to be endemic because a lot of the advances that the other people are doing on their weapons systems, we won’t see until we fight them. And if they have artificial intelligence then that’s better than ours, that’s going to be a bad day.”⁹

Unmanned Systems

China’s unmanned systems sector has experienced impressive growth since 2010, especially in military unmanned aerial vehicles (UAVs) where China’s defense and private sector have both demonstrated an impressive capacity to produce new designs and capabilities quickly.

China’s unmanned surface vehicles (USVs), unmanned underwater vehicles (UUVs), and unmanned ground vehicles (UGVs) programs are not as mature as its UAV programs, but notable progress in USVs, in particular, has occurred. At the 2017 International Ocean Science and Technology exhibition in Qingdao, China Aerospace Science and Technology Corporation (CASC) outlined its plans for a new family of four USVs aimed at addressing a range of maritime security and naval requirements and gaps to include high-speed patrol, hydrographical survey, ASW, fleet defense, surface warfare and surveillance.¹⁰

Across all categories of unmanned systems, these highly flexible and multi-mission capabilities present a particularly diverse set of strategic and operational challenges for the U.S. military:

Transition to “Intelligentized” Warfare: Swarms of AI-infused drones are likely to be a particularly prominent feature of the future battlefield, enabling groups of linked and autonomous drones to communicate with one another—absent control from platforms, systems or personnel—to carry out a specific mission. Each drone in the swarm may have a different role—for example, some may be equipped with surveillance payloads, others may carry weapons or electronic warfare capabilities, and others may be expendable, included in the swarm only to ‘light up’ adversary air defenses so that they can be targeted by other drones in the swarm or by other assets launching stand-off weapons. Redundancy is built into the swarm allowing for self-healing and adaptation, complicating efforts to defend against them. As a CETC engineer noted to state-owned media after the June 2017 test, UAV swarms will become “a disruptive force” that will “change the rules of the game.”¹¹

Because current operational concepts around drone swarms envision hundreds rather than dozens of individual systems in a swarm and because these swarms are resilient, redundant, self-healing and adaptive, capable of carrying out multiple missions or even altering the mission mid-flight, they present challenges to traditional concepts of air defense, in particular.

⁸ Remarks by Deputy Secretary of Defense Robert Work at the Center for New American Security Defense Forum, December 14, 2015. <https://www.cnas.org/publications/transcript/remarks-by-defense-deputy-secretary-robert-work-at-the-cnas-inaugural-national-security-forum>.

⁹ Freedberg, Sydney J., “War Without Fear: DEPSECDEF Work on How AI Changes Conflict,” *Breaking Defense*, May 31, 2017. <https://breakingdefense.com/2017/05/killer-robots-arent-the-problem-its-unpredictable-ai/>.

¹⁰ Wong, Kelvin, “CASC Unveils Next Generation USV Concepts,” *Jane’s International Defense Review*, 20 September 2017, https://janes.ihs.com/Janes/Display/FG_646729-IDR.

¹⁰ Wong, Kelvin, “CASC Unveils Next Generation USV Concepts,”

¹¹ Tate, Andrew, “China Launches Record-Breaking UAV Swarm,” *Jane’s Defense Weekly*, 21 June 2017, <https://janes.ihs.com/Janes/Display/jdw66273-jdw-2017>.

At an operational level, the sheer number of assets and their capacity to, in advanced concepts of future conflict, dynamically re-task could overwhelm and confuse existing air defense systems, especially if some of these systems are jamming the communication, navigation and targeting communications buttressing air defense systems. At a more strategic level, low cost drone swarms could further intensify U.S. DoD concerns about the cost-curves associated with air and missile defense. According to *Popular Mechanics*, “a few \$45,000 anti-air missiles are a cost-effective way to shoot down an \$18 million Reaper, but firing that same anti-air missile at a smaller, commercial drone isn’t as effective, especially when there are still 102 other drones flying the same mission at the same time.”¹²

Military Modernization and Domain Area Competitions: Unmanned systems, both in isolation and as part of larger multi-domain networks (i.e., land, air, surface and undersea), will support all three of China’s military modernization objectives identified above. UAVs, USVs and UUVs will be used for a range of missions: ISR, mine countermeasure operations, strike missions, electronic warfare, environmental monitoring, installation and force protection and command, control and communications function. China’s next generation of USVs will also reinforce China’s efforts to defend islands and installations in contested maritime boundary areas

Commentary accompanying CASC’s announcement of its new USV concepts is indicative of a growing recognition within the PLA that unmanned systems are indispensable to future maritime domain operations. As a CASC spokesman noted during the introduction of the D3000, “Over the next decade, we also expect to see the introduction of small to medium-sized USVs operating alongside manned platforms, particularly in leading navies, as the concept of mixed manned and unmanned fleets matures.”¹³ In this environment, demand for “autonomous ships, which offer a way to deliver increased operational capability without sending human crew into harm’s way, while at the same time reducing operating and build costs”¹⁴ will increase both within China and in the international market.

China’s ability to compete in the undersea competition by providing more, relatively inexpensive assets to help monitor the undersea domain and meet the challenge of U.S. increased investment in UUVs.¹⁵ China’s UUV and USV development will offer a new means of enhancing China’s ASW and even, over time, potentially offering a new offensive capacity as well. They will also likely play a role in the future development of China’s Great Undersea Wall of sensors in the Western Pacific being developed by China State Shipbuilding Corporation (CSSC) to help deny the U.S. and allied undersea assets access to the close-in undersea areas.

Geopolitical Relationships: China has become a viable defense exporter in many sectors in the last decade, especially in the export of its military UAVs, including the Wing Loong I, CH-3, and Ch-4.¹⁶ to states such as Saudi Arabia, Iraq, UAE, Egypt, Jordan, Kazakhstan, Turkmenistan, Nigeria, Pakistan, Myanmar and Bangladesh.

¹² Atherton, Kelsey D., “Pentagon’s new drone swarm heralds a future of autonomous war machines,” *Popular Science*, 10 January 2017, <https://www.popsci.com/pentagon-drone-swarm-autonomous-war-machines>.

¹³ Wong, Kelvin, “China’s CASC unveils D3000 unmanned oceanic combat vessel concept,” *Jane’s International Defense Review*, September 18, 2017, https://janes.ihs.com/Janes/Display/FG_645421-IDR.

¹⁴ Wong, Kelvin, “China’s CASC unveils D3000 unmanned oceanic combat vessel concept,” *Jane’s International Defense Review*, 18 September 2017, https://janes.ihs.com/Janes/Display/FG_645421-IDR.

¹⁵ Pomerleau, Mark, “DOD Plans to Invest \$600M in Unmanned Underwater Vehicles,” *Defence Systems*, February 4, 2016, <https://defensesystems.com/articles/2016/02/04/dod-navy-uuv-investments.aspx>.

¹⁶ Grevatt, Jon, “Indonesia Looks to China for Combat UAVs,” *Jane’s Defense Weekly*, 28 July 2017, https://janes.ihs.com/Janes/Display/FG_600842-JDW.

The main benefit of these export sales for China is not about funding streams. Rather, they serve as a mechanism to deepen industry and then geopolitical relationships with states that either sit atop key energy and resource reserves or can serve as a hedge against India. Add to this China's recent efforts to sell unmanned aerial vehicles into Southeast Asia and at least one state with an active claim in the South China Sea. In late July 2017, *Jane's Defense Weekly* reported that Indonesian officials have outlined a program to procure UCAV from China. The exact requirement is still being finalized, but features six UCAV units each consisting of three batteries. More recently, the Wing Loong I and II were both displayed at the Singapore Air Show, Asia's largest airshow, in February of 2018, as a means of engaging other Southeast Asian states in order to influence behaviors, policies and perspectives.¹⁷

Counter-Space Capabilities

China's focus on AI and to a degree unmanned systems constitutes a risk to the United States because it presents a pathway for China to create military advantage by beating the United States to the commanding heights of cognitive warfare by the start of the 2030s. In the shorter-term, though, China's military modernization represents more immediate challenges through weapons systems that target the command, control, communication, computers, intelligence, surveillance, target acquisition and reconnaissance (C4ISTAR) vulnerabilities inherent in modern, highly-connected militaries.

The modern "informatized" operational military environment is largely defined by the importance of networked forces being able to communicate with one another to enable C4ISTAR tasks. These communications can take place through many mechanisms and across many domains, including through satellites based in space.

The United States has an extensive and resilient space-based infrastructure and relies on this infrastructure and the advantages it confers to bring to bear the full weight of its power projection and warfighting capabilities throughout the world. China's A2/AD modernization acknowledges the strength of the U.S. military and of its space-based architecture. It also understands that U.S. reliance on space assets constitutes a strategic and operational vulnerability to be exploited.

The result has been a diverse counter-space program with demonstrated capabilities in four categories of counter-space weapon:

- Direct Ascent Anti-Satellite (ASAT) Weapons
- Co-Orbital ASAT weapons
- Directed energy weapons
- Cyber hacking that can disable satellites for several minutes or perhaps longer.¹⁸

Air Force Major General Nina Armagno summarized the outcome of the existence of these weapons by warning that "Russia and China, by the year 2025, will be able to hold at risk every one of (U.S.) satellites in any orbit."¹⁹ This despite continued efforts to develop new technologies and operational concepts, such as disaggregation and development of microsatellites, to mitigate risk and

¹⁷ Wong, Kelvin, "China's Wing Loong UAV family makes Southeast Asian debut", *Jane's Defence Weekly*, February 5, 2018, http://www.janes.com/article/77587/singapore-airshow-2018-china-s-wing-loong-uav-family-makes-southeast-asian-debut?utm_content=buffer29d0&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

¹⁸ U.S.-China Economic and Security Review Commission, "China's Space and Counterspace Programs," *2015 Report to Congress*, November 2015, http://origin.www.uscc.gov/sites/default/files/annual_reports/2015%20Annual%20Report%20to%20Congress.PDF.

¹⁹ Lambakis, Steve, *Foreign Space Capabilities: Implications for U.S. National Security*. Report, pg. 43. <http://www.nipp.org/wp-content/uploads/2017/09/Foreign-Space-Capabilities-pub-2017.pdf>.

vulnerability of U.S. space-based infrastructure. A particularly successful Chinese counter-space campaign could degrade or deny U.S. access to space and ensure U.S. forces could not effectively “see,” “sense” or “hear,” much less navigate, target and communicate. Asymmetric denial of U.S. space assets is the ultimate game-changer and game-leveler in military capabilities.

The Strategic Support Force, Integrated Network Electronic Warfare and the Electro-Magnetic Spectrum

China’s counter-space capabilities and, in part, its burgeoning unmanned systems capability are part of a broader suite of capabilities—to include cyber capabilities, specialized platforms, and directed energy weapons—designed to gain ascendancy in the electro-magnetic spectrum and electronic warfare.

Former Chief of Naval Operations Admiral Jonathan Greenert described the importance of the electromagnetic spectrum in 2016:

“The electromagnetic spectrum is an essential—and invisible—part of modern life [military and civilian]. Our military forces use wireless computer networks to coordinate operations and order supplies, use radars and sensors to locate each other and the enemy, and use electronic jammers to blind enemy radars or disrupt their communications. With wireless routers or satellites part of almost every computer network, cyberspace, and the electromagnetic spectrum now form one continuous environment.”²⁰

China’s efforts to gain advantage in this competition in the electromagnetic spectrum and in the closely linked cyber and space domains have involved the development of new organizational structures, operational concepts and military capabilities, all of which combine to pose a more coordinated and robust threat to U.S. and allied military capabilities and potentially to undermine U.S. ability to pursue its interests in the Indo-Pacific.

In November of 2015, China established the Strategic Support Force (SSF) as a military service level organization reportedly “equal in standing to China’s army, navy, air force and missile service.”²¹ The SSF reportedly combines three former PLA cyber, EW and intelligence services components and is responsible for coordinating and executing electronic warfare, space / counter-space and cyber warfare activities.²²

The establishment of SSF accelerates China’s challenge to the United States in the electromagnetic spectrum and “reflects the on-going Chinese effort at being able to establish ‘information dominance.’”²³ It is also central to China’s efforts to achieve more fully execute operations associated with the concept of “integrated network electronic warfare”²⁴ (INEW). According to Michael Raska, Assistant Professor at the S. Rajanatham School of International Studies in Singapore,

²⁰ Wilson, J.R., “Today’s battle for the electromagnetic spectrum,” *Military and Aerospace Electronics*, 27: 8. <http://www.militaryaerospace.com/articles/print/volume-27/issue-8/special-report/today-s-battle-for-the-electromagnetic-spectrum.html>.

²¹ Gertz, Bill, “Chinese Military Revamps Cyber Warfare, Intelligence Forces”, *Washington Free Beacon*, January 27, 2016, <http://freebeacon.com/national-security/chinese-military-revamps-cyber-warfare-intelligence-forces/>

²² Gertz, Bill, “Chinese Military Revamps Cyber Warfare, Intelligence Forces”, *Washington Free Beacon*, January 27, 2016, <http://freebeacon.com/national-security/chinese-military-revamps-cyber-warfare-intelligence-forces/>

²³ Gertz, Bill, “PLA’s new Strategic Support Force remains an enigma”, *Washington Free Beacon*, December 18, 2017, <http://freebeacon.com/national-security/asia-times-plas-new-strategic-support-force-remains-enigma/>

²⁴ Raska, Michael, “China’s evolving cyber warfare strategies”, *Asia Times*, 8 March 2017, <http://www.atimes.com/article/chinas-evolving-cyber-warfare-strategies/>

“In Chinese strategic thoughts, INEW has a holistic representation that combines coordinated use of cyber operations, electronic warfare, space control and kinetic strikes designed to create ‘blind spots’ in adversary C4ISR systems.”²⁵

And this effort is being supported by more, more robust and more prominently featured capabilities. *Xinhua* reporting on the July 2017 PLA parade in Inner Mongolia marking the 90th anniversary of the PLA’s founding highlighted the presence of “16 items of the PLA’s latest electronic warfare equipment that can disrupt enemy radar and communication in air defense and field battles.”²⁶ Among those 16 items were “two models of electronic reconnaissance vehicles, a Y-8 electronic jamming aircraft and a group of military drones that can ‘paralyze and suppress’ enemy early-warning and command communications systems.”²⁷ China has also used directed energy systems to jam platform or system signals or dazzle (i.e., inhibit the capacity of radars or sensors to ‘see’) platforms and systems.²⁸

The confluence of capabilities, concepts and structures is taking place at a time in which the DoD is coming to terms with potential vulnerability in the electromagnetic spectrum after two decades of under-appreciation of the potential for intense and affecting competition in this area. According to Dr. William Conley, the Deputy Director of Electronic Warfare in the Office of the Undersecretary of Defense for Acquisitions, Technology and Logistics “the foot is fully on the gas pedal”²⁹ within DoD to make up for “twenty – five years of inattention” to electronic warfare.³⁰

Maneuverable Reentry Vehicles (MaRVs): Anti-Ship Ballistic Missiles and Hypersonic Glide Vehicles

MaRV-equipped weapons provide many advantages over traditional ballistic missiles, most notably their ability to maneuver toward their target, potentially taking an irregular or unpredictable path and providing the missile a better opportunity to defeat even the most advanced missile defense systems. In addition, the maneuverability of the warhead enables MaRV-equipped ballistic missiles to hit moving targets.

China’s DF-21D and DF-26 anti-ship ballistic missiles (ASBMs) are thought to be equipped with MaRV warheads.³¹ Much has been written about these systems and their capacity to target U.S. aircraft carriers at long ranges and thereby hold at risk the primary engine of U.S. power projection. These systems are currently deployed, but also vulnerable to U.S. counter-measures against the systems’ reconnaissance –strike complex.

China’s MaRV programs also include its hypersonic glide vehicle (HGV) program, which revolves around the HGV known as the DF/ZF. China has completed seven tests – six successful—of its HGV programs. HGVs are able to travel at speeds above Mach 5 and maneuver to their targets and, as such, are seen as being able to dramatically alter the missile versus missile defense competition.

²⁵ Raska, Michael, “China’s evolving cyber warfare strategies”, *Asia Times*, 8 March 2017, <http://www.atimes.com/article/chinas-evolving-cyber-warfare-strategies/>

²⁶ “China displays electronic warfare equipment at Army Day parade”, *Xinua*, July 29, 2017, http://www.xinhuanet.com/english/2017-07/30/c_136485220.htm

²⁷ “China displays electronic warfare equipment at Army Day parade”, *Xinua*, July 29, 2017, http://www.xinhuanet.com/english/2017-07/30/c_136485220.htm

²⁸ Lin, Jeffrey, and P.W. Singer. “Here’s how China is battling drones,” *Popular Science*. March 28, 2017. <http://www.popsci.com/chinas-new-anti-drone-weapons-jammers-and-lasers#page-2>.

²⁹ Conley, Dr. William, “State of Electronic Warfare in the DoD,” speech at the Mitchell Institute of Aerospace Studies, June 22, 2017, https://www.youtube.com/watch?v=qR_PPGDnejo.

³⁰ Conley, Dr. William, “State of Electronic Warfare in the DoD,” speech at the Mitchell Institute of Aerospace Studies, June 22, 2017, https://www.youtube.com/watch?v=qR_PPGDnejo.

³¹ Fisher, Richard D, “US officials confirm sixth Chinese hypersonic manoeuvring strike vehicle test,” *Jane’s Defense Weekly*, November 26, 2015.

China is still developing HGV maneuverability and the capacity to communicate with the system at such high speeds. It is not expected to come into service for several more years, perhaps not until the late 2020s.

China's main motivation for its program is clear, most notably to counter-act the diminishing effect it believes ever-advancing U.S. missile defense capabilities are having on its strategic and conventional deterrent. China also seeks to match U.S. development of hypersonic weapons being made through the U.S. Prompt Global Strike program.

The success and, critically, continued prioritization of China's MaRV programs, especially HGVs, pose a short and medium-term risk to U.S. military capabilities and regional interests in three ways.

Holding at Risk Critical U.S. Capabilities: A more mature ASBM capability equipped with maneuverable warheads could hold at risk the U.S. Navy's surface fleet and carrier battle groups, a significant component of current U.S. capacity to project power in the Indo-Pacific and meet the PLA's on-going transition to a more maritime posture. The combination of the hypersonic speeds and maneuverability of HGVs would eliminate the reliability of existing missile defense systems. Absent effective deployment of low cost of shot missile defense measures capable of hitting both ASBMs and HGVs—electromagnetic rail guns, hyper-velocity weapons and directed energy, for example—or deterring, dissuading or stopping the launch of these weapons in the first place—to include 'left of launch' interventions—China's MARVs will significantly erode the U.S. ability to protect assets and allies in the Indo-Pacific.

Destabilizing Regional Security: HGVs constitute a particularly destabilizing weapon, upsetting traditional expectations of both nuclear and conventional deterrence and serving to weaken regional security mechanisms. The perception of HGVs as being "unstoppable"³² and able to defeat current missile defense systems—even if there may be means to respond to HGVs in the future—create inducements and incentives for preemptive strikes, a particular anxiety in times of heightened bilateral U.S.-China tension coupled, as has happened since the mid-2000s, with Chinese assertiveness along its Asian periphery in the South China Sea and East China Sea, in particular.

Falling Behind: China has made demonstrable progress in its hypersonics research in the last decade. In addition to the seven tests of the DF/ZF HGV, China has built the world's largest hypersonic testing wind-tunnel and has made progress in ramjet and scramjet engines for a hypersonic cruise missile.³³ There is a growing expectation within the U.S. defense and security communities of future production and deployment by the end of the next decade.

As a result, the United States and its technologically competent defense partners, have little choice but to match and, if possible, regain superiority in hypersonic platform capability. As former Acting Assistant Secretary of Defense Alan Shaffer noted, "We, the United States, do not want to be the second country to understand how to control hypersonics."³⁴

But there is some indication that this may, in fact, be what is happening, due both to advancement of China's program and a perception that the United States, much like with electronic warfare capabilities, has not been attentive in maintaining its advantage. In January of 2018, Air Force

³² Freedberg, Sydney J. "Speed Kills: The Case for Hypersonic Weapons," *Breaking Defense*. June 3, 2014, <https://breakingdefense.com/2014/06/speed-kills-the-case-for-hypersonic-weapons/>

³³ Norris, Guy, "China Reveals Key Test Progress On Hypersonic Combined-Cycle Engine," *Aviation Week*, 10 April 2017, <http://aviationweek.com/technology/china-reveals-key-test-progress-hypersonic-combined-cycle-engine>.

³⁴ Machi, Vivienne, "Future Weapons: Rivals Push Pentagon to Boost Funding for Hypersonics Research," *National Defense*, June 26, 2017, <http://www.nationaldefensemagazine.org/articles/2017/6/26/future-weapons-rivals-push-pentagon-to-boost-funding-for-hypersonics-research>.

General Paul Selva, the Vice Chairman of the Joint Chiefs of Staff, starkly claimed that “We have lost our technical advantage in hypersonics.” General Silva did qualify his statement by saying that the United States has not yet “lost the hypersonics fight”, but he also stressed that China (and Russia) have “moved out pretty smartly” on hypersonics. China, in particular, has been “willing to spend tens to hundreds of billions of dollars on its program.”³⁵ This capacity to spend more or less without meaningful constraint on programs supported and prioritized by the Chinese Communist Party (CCP) is a consistent and common enabler of science and technology success for China, especially in quantum computing and encryption and artificial intelligence.

China’s Technology Acquisition Strategies: A Key Enabler of China’s Defense Industrial Base

Narratives about China’s inability to innovate in key defense capabilities or challenge the United States and its allies in fielding exquisite technologies should be reconsidered, especially in light of China’s recent success in quantum computing and encryption, AI, hypersonic flight, networked unmanned systems and even deep sea exploration as well as general indicators of advancement of the technical capacity of China’s defense industrial base.

At the core of this success is China’s technology acquisition program, another critical aspect of China’s military modernization that, if unchecked, will constitute a challenge to U.S. ability to sustain military and technological advantage over China and other actors.

China’s technology acquisition efforts are directed, aggressive, sophisticated, multi-faceted and concentrated on an impressive array of technologies with a particular focus in 2016, according to the U.S. Defense Security Service in “electronics, aeronautic systems, and C4 technologies.”³⁶

While cyber-theft, solicitation, and espionage of various kinds are still used and highly-effective, China has also benefitted from—and, critically, *will continue to benefit from*—growing intersections between commercial and military technologies and a defense innovation environment in which products from high-tech firms and applied research institutes are frequently the catalyst for new and cutting-edge defense and security capabilities. In this environment China is pursuing several predominantly licit acquisition methods, which are now vital to China’s military modernization and, especially, efforts to develop Fourth Industrial Revolution technologies:

- Inter-governmental and academic science and technology relationships
- Use of Chinese students studying in the United States
- Delegation visits
- Exploitation of a growing range of useful open sources
- Conferences, conventions, and trade shows
- China’s dual-use space program
- Joint ventures with U.S./Western companies

An investigation of China’s inter-governmental and academic science and technology relationships highlights the scale and dimensions of the challenges the United States faces in protecting its own commercial, dual-use, and military technologies and managing the diffusion from other actors of

³⁵ Morgan, Wesley, “Selva: We have lost our technical advantage in hypersonics”, *Politico*, January 30, 2018, <https://www.politicopro.com/defense/whiteboard/2018/01/selva-we-have-lost-our-technical-advantage-in-hypersonics-503866>

³⁶ “Targeting U.S. Technologies 2017: A Trend Analysis of Cleared Industry Reporting”, Defense Security Services, September 7, 2017, http://www.dss.mil/documents/ci/2017_CI_Trends_Report.pdf. The report is careful to not name specific countries and therefore refers only to four regions, including East Asia and the Pacific. It is reasonable to assume that trends and insights regarding East Asia and Pacific region technology acquisition efforts effectively represent the trends in China’s technology acquisition program.

advanced commercial and applied research developed technologies that also have military and security purposes.

According to a January 2017 statement released by China’s Ministry of Science and Technology (MOST), China has S&T relationships with 158 “countries and regions,” including inter-Governmental science and technology accords” with 111 of these countries and regions. MOST asserted that these agreements allow for China to “integrate into the global network of scientific and technological innovation”³⁷and, therefore, they are an input into China’s civil-military fusion efforts that facilitate technology transfer from commercial and civil enterprises to China’s defense industrial base.

One of these programs, established in April 2017, is an agreement between CETC—a member of China’s defense industrial base with commercial and civil interests as well—with University of Technology Sydney in Australia to establish the Australia-China Research Innovation Centre in Information and Electronics Technologies. CETC will provide \$20 million over five years for the initiative, which will engage in research programs focused on several Fourth Industrial Revolution technologies, all of which have important defense applications:³⁸

- Big data technologies (mobile sensing and communications, electromagnetic metamaterials and devices, big visual data analytics, transfer learning, and Internet of Things)
- Quantum computing and quantum communications
- AI
- Simultaneous localization and mapping, assisted robots and robots for infrastructure monitoring and maintenance
- Advanced materials and electronics (THz devices, environmental and industrial sensors and integrated circuits)

Capabilities and Technologies

China’s military modernization—pursuing objectives across three transitions and seeking to alter strategic and operational balances in domain area competitions—poses complex and durable challenges to the U.S. military’s capacity to operate and press U.S. interests in the Indo-Pacific. Meeting these challenges and mitigating risk from them over the next three decades requires an understanding of the nature of the conflict, gaps and vulnerabilities in U.S. capabilities and, ultimately, investment in specific capability and technology areas.

Prioritizing capabilities and (re) gaining superiority: A thorough review of recent developments across a range of advanced weapons systems of interest to both the United States and China reveals several instances in which U.S. superiority in critical technology and capability areas is being called into question. For example, in June 2017, China claimed that it had leap-frogged the United States in integrated electronic propulsion systems (IEPS).³⁹ The claim is apocryphal, and it is not surprising, nor *necessarily* worrying that China would make such claims.

What is worrying, though is when similar statements about U.S. advanced technology programs are made by U.S. defense leaders, such as Dr. Conley’s and General Silva’s comments referenced above (about U.S. electronic warfare and hypersonic developments respectively). Both of these comments

³⁷ Grevatt, Jon, “China Grows Its International Technology Network,” *Jane’s Defense International*, January 19, 2017. <https://janes.ihs.com/Janes/Display/jdin91289-jdin-2017>.

³⁸ *University of Technology Sydney*, “Joint IET Research Centre with China Electronics Technology Group Company,” April 26, 2017. <https://www.uts.edu.au/about/faculty-engineering-and-information-technology/news/joint-iet-research-centre-china>.

³⁹ Jane's by IHS Markit. “Chinese navy claims lead in IEPS development,” June 5, 2017. <https://janes.ihs.com/Janes/Display/jdw66061-jdw-2017>.

suggested that China (and others, including Russia) had either closed the gap or inched ahead in key technology areas in large part because they had been more aggressive and attentive to these technology areas than had the U.S. DoD, which only regained focus after the full scope of China and Russia's advancement was revealed. Indeed, Dr. Conley's exact comment was that "the foot is fully on the gas pedal"⁴⁰ within DoD to make up for "twenty – five years of inattention" to electronic warfare.⁴¹

This dynamic, which one can argue is also seen in China's advancement in AI, drone swarms and, quantum encryption, can be slowed and reversed through effectively prioritizing the most important military competitions—the undersea domain, missile versus missile defense, space and the electromagnetic spectrum are all good places to start—and comprehensively assessing the capabilities required to retain U.S. pre-eminence both now and into the future.

A list of initial capabilities features:

- Unmanned systems (UAVs, USVs, and UUVs)
- Deep magazine, low cost of shot air and missile defense capabilities (electromagnetic rail guns and / or hypervelocity guns and directed energy weapons)
- HGVs
- Reusable space launch
- Microsatellites
- Advanced position, navigation and timing capabilities, including the capability to navigate absent information from Global Positioning System satellites or other global navigation satellite systems
- Adaptive and cognitive EW
- Advanced and remote sensors

Core technologies: Maintaining advantage in these competition and capability areas will require the United States to invest in emerging supporting and enabling technologies. This list of supporting technologies is a long one, though the five technology areas discussed below are especially relevant:

- *Artificial intelligence and big data analytics:* Certainly, maintaining U.S. advantage in AI concepts and defense applications is a powerful priority for the U.S. DoD as part of an effort to lead the way toward an era of cognitive warfare, as evidenced by the five AI technology areas prioritized in the Third Offset Strategy. AI is a foundational technology for development of drone swarms, which will present vexing problems for China, just as Chinese swarms will test U.S. air defense concepts and capabilities.

But AI has several other applications for the future of military capabilities and intelligence and decision-making and for the future of U.S. competition in military capabilities with China. For example, AI applications will be core to cognitive electronic warfare capabilities designed to retain dominance of the electromagnetic spectrum, already under-development by the United States. Cognitive electronic warfare systems will enable U.S. platforms to enter into any environment with no information about adversary electronic warfare systems and independently and rapidly identify the capabilities they face and formulate countermeasures. According to Jane's C4ISR desk analysts, effective and rapid development

⁴⁰ Conley, Dr. William, "State of Electronic Warfare in the DoD," speech at the Mitchell Institute of Aerospace Studies, June 22, 2017, https://www.youtube.com/watch?v=qR_PPGDnejo.

⁴¹ Conley, Dr. William, "State of Electronic Warfare in the DoD," speech at the Mitchell Institute of Aerospace Studies, June 22, 2017, https://www.youtube.com/watch?v=qR_PPGDnejo.

of cognitive electronic warfare “will provide the United States with a decisive advantage within the critical EW [electronic warfare] domain.”⁴²

More generally, but still highly-relevant to meeting the challenges posed by China’s military modernization, AI will also support the necessary enhancement of perception and processing of information and design and execution of new approaches for both humans and machines to queue, synthesize, digest, and discern information. These new approaches are necessary cope with complex and fast – moving strategic and operational contexts that will be marked by a surfeit of available information of variable quality and timeliness arriving at increasing velocities.

- *Power and energy capture and storage:* Power limitations are a potential “long pole in the tent” for advancement of several types of U.S. military capabilities referenced above, particularly unmanned systems and electromagnetic rail guns. As the U.S. military (as well as others), ask unmanned systems to carry out more missions and carry more sensors and more powerful payloads, it will also need to develop more efficient means of powering these sub-systems and payloads while not adding size, weight or significant cost.

Energy capture and storage and propulsion technologies will also be critical for unmanned systems and other advanced platforms as they seek to balance the general need for persistence—the ability to stay on mission for longer durations at longer ranges—with the need to stay relatively low observable in operational environments that are likely to have more and more powerful sensors.

Power is also a concern for electromagnetic railguns, which require a tremendous amount of energy to operate and need to be able to store this energy to be able to fire on-demand. According to a June 2016 *Popular Mechanics* article, “The problem (with railguns) is that the only ships that will be able to generate the gargantuan 25 megawatts of power (enough to power almost 19,000 homes) required to fire the railgun are the Zumwalt-class destroyers, which will use Rolls-Royce turbine generators to produce as much as 78 megawatts of power for the ship.”⁴³

- *Information security:* China’s cyber capabilities and its successful development in quantum computing and encryption have not been touched on in much detail in this testimony. However, they are part of a strong focus on the information domain rooted both in a sense of vulnerability—amplified by information contained in the Edward Snowden leaks that showed that China was “always being hacked”—and opportunity to use cyber weapons to exploit vulnerabilities in the high-tech, highly-networked U.S. military and defense industry. China’s investment in cyber technologies and in quantum encryption, in particular, will continue, requiring a U.S. response in order to both protect U.S. information and to continue to carry out effective offensive cyber operations against China. U.S. investment in quantum encryption as well as other novel technological approaches to cyber-defense, such as blockchain, will be warranted to keep pace with China in this domain area.
- *Advanced materials:* In July of 2017, U.S. Army Chief of Staff General Mark Milley noted that the nature of future armored vehicles and main battle tanks would be determined in large

⁴² This analysis was provide both in phone discussions between the author and Jane’s C4ISR Systems team on May 23, 2017 as well as through written analysis included in primer / informational papers submitted to the author on May 20, 2017.

⁴³ Bennett, Jay. “The Future of the Navy’s Electromagnetic Railgun Could Be a Big Step Backwards,” *Popular Mechanics*. April 2, 2017. <http://www.popularmechanics.com/military/weapons/a21174/navy-electromagnetic-railgun/>.

part by the nature of the materials out of which these platforms would be constructed. According to Milley, “the real sort of Holy Grail of technologies that I’m trying to find on this thing is material—is the armor itself. If we can discover material . . . That is significantly lighter in weight that gives you the same protection, that would be a real significant breakthrough.”⁴⁴

Of course, the importance of advanced materials is not limited to ground vehicles. The ability to develop lighter weight, stronger, more dynamic materials is a fundamental element of the conceptualization and design of future military capabilities that will allow the United States to maintain its military advantage vis-à-vis China and other actors. Of particular interest are smart, nano and bio-materials that retain at scale the dynamic and customizable attributes they exhibit at the atomic or genome level. These materials can promote qualities in advanced platforms and systems like self-healing, adaptation to environments, low observability, ultra-high strength and speed, and energy capture and storage. They also can support force and platform protection through increasingly attainable capabilities such as adaptive camouflage or smart armor.⁴⁵

- *Advanced Manufacturing:* Optimizing the effects of new materials with novel properties will rely on the concurrent development of new means of manufacturing with a heightened level of precision and customization. Virtual and augmented reality manufacturing, computer aided design, additive manufacturing (also known as 3D printing), 4D printing, synthetic biology manufacturing and automation are all technologies in which the U.S. should invest in order to retain advantage in the modern military capabilities required to retain advantage in military competition with China. The combination of new, smart, nano-, and bio-materials and advanced manufacturing will not only create cost and performance efficiencies, it will also create the potential for a new industrial Design Age in which manufacturing processes and material properties will be seen as powerful enablers of constructive innovations in capabilities rather than constraints.

Additional High-Level Recommendations

Technology protection: Many of the technologies driving the future of military capabilities are also of interest to and/or being developed by the high-tech industry, applied research institutes and other non-defense industries, such as automotive, commercial aerospace, maritime and energy. While this dual-usization of emerging technologies creates salutary new pathways for innovation in defense technology, it also complicates the challenge of technology protection, especially in light of China’s aggressive technology acquisition program. Mitigating risks associated with technology transfer—intentional or otherwise—of Fourth Industrial Revolution technologies will require a cross-industry understanding of what technologies China is prioritizing and how it is pursuing these technologies.

The U.S. government can support this collaboration by establishing and facilitating cross-industry working groups and panels that will first identify key strategic technologies that should be protected and second create guidelines to help companies across all relevant industries understand and address risk in a consistent manner and better anticipate when technology theft is more likely to take place.

⁴⁴ Freedberg, Sydney, “Milley’s Future Tank: Railguns, Robotics and Ultra-Light Armor”, *Breaking Defense*, July 27, 2017, <https://breakingdefense.com/2017/07/railguns-robotics-ultra-light-armor-general-milleys-future-tank/>

⁴⁵ Nurkin, Tate, “Promise and Peril: Opportunities and challenges of disruptive technologies and innovation”, *Jane’s blog*, June 22, 2017, <https://ihsmarkit.com/research-analysis/promise-and-peril-opportunities-and-challenges-of-disruptive-technologies-and-innovation.html>

The U.S. DoD, Congress, State Department and other agencies of the Executive Branch can also enhance technology protection by working with allies, especially in the Indo-Pacific, to establish a common understanding of the threat and ramifications of China’s technology acquisition approaches. This common understanding can serve as a foundation on which to deepen collaboration in the protection of critical and sensitive dual-use technologies.

Adjacent Reforms and Other Transaction Authorities: Developing novel technologies is just one step in the overall development of capabilities. The move from novel technologies to fielding a viable capability involves several other adjacent innovations in operational concepts, training, organizational structure and legal and procurement frameworks. Given the pace of innovation in technology areas of increasing importance to the U.S. DoD, continued innovation in procurement processes that allow for rapid acquisition of platforms and systems will be essential to maintaining U.S. competitiveness and sustained ability for the U.S. to project power and pursue security interests in the Indo-Pacific. Initial DoD efforts to accelerate procurement processes for certain capability types—known as Other Transaction Authorities—should be refined and expanded as should efforts to collaborate the U.S. high-tech industry.

OPENING STATEMENT OF JACQUELINE N. DEAL, PH.D., PRESIDENT AND CEO, LONG TERM STRATEGY GROUP

VICE CHAIRMAN BARTHOLOMEW: Sure. Dr. Deal.

DR. DEAL: Thank you to the co-chairs, to Senator Talent and Co-chair and Vice Chair Bartholomew, to the other commissioners. It's great to be back. It's a privilege to testify and answer your stimulating and tough questions and appear with such distinguished peers.

I'm just going to give you my bottom lines. Ideologically hostile, revisionist, expansionist major powers pose the greatest threat to U.S. national security interests, and the PRC is proving to be an ideologically hostile, revisionist, expansionist great power, a major power. It is past time for us to recognize the competition. Thank you, Senator Goodwin.

At the 19th Party Congress, Xi followed the lead of recent Chinese Communist Party general secretaries in emphasizing the socialist nature of the PRC regime. They are proud to be pioneering "socialism with Chinese characteristics," and the CCP has no intention of giving up or sharing power. They are authoritarians, and unfortunately they're also militarists.

So let me just speak about the militarist side, the authoritarian side. Just last month, Xi Jinping stood in a camouflage uniform and told thousands of assembled PLA soldiers and hundreds of thousands who were listening in not to fear death and to be ready for combat.

His broad "China Dream" slogan clearly incorporates a narrower "strong army dream" within it. He said, quote: "To achieve the dream of the great rejuvenation of the Chinese nation, we must quicken the pace of building the People's Army into a world-class army."

He has revived the classical Chinese slogan, "fuqiang," "wealth and power," derived from the more infamous line, "rich country, strong army," which was the Meiji Japanese slogan carried over into the Imperial Japanese era. That didn't turn out so well.

This militarism is in service of a belief that the PRC needs, quote, "more strategic space" to make it safe for the PRC to coerce regional powers, and, over time, to spread the CCP's own rules and norms, so that countries in Eurasia and beyond defer to and accommodate the Party's wishes.

Note the way Beijing has recently coerced Marriott, Mercedes Benz, Zara, Delta Airlines, Qantas, Audi, and Medtronic into changing their advertising and their websites, or the way the PRC has treated the countries that host the Dalai Lama or offer support for a Chinese Nobel laureate like the late Liu Xiaobo.

This is what it means for an authoritarian country to be number one. To make it safe for the CCP, no one anywhere, inside or outside China, can express sympathy for oppressed minorities or dissidents. Criticism of the Party line will be increasingly dangerous to anyone.

To ensure that other countries go along, the PRC must disrupt U.S. alliances and extrude or neutralize our military presence and influence in the Asia-Pacific AOR.

To this end, the CCP, as you know, coordinates PLA activities to work together with, and support, non-military efforts. For instance, in the economic, diplomatic, and political/information warfare domains.

The PRC is mounting challenges at an accelerating pace out of weakness as well as out of strength, though, and the United States still possesses many competitive advantages that we could exploit if we seize the opportunity, which brings me to my four recommendations, including some I didn't submit in the written testimony. So I apologize for that.

The new National Defense Strategy recommends that we focus on, quote, "expanding the competitive space" by improving our relationships with allies; improving our capacity for

innovation; and improving the lethality of our armed forces-- all areas of existing strength and areas where the Chinese are insecure or historically have been vulnerable.

I know Dr. Hicks will underscore that allies are a particular opportunity because of their geographic position, encircling China, sitting astride sea lines of communication on which the PRC depends. We and our allies share the same goals in the competition with the PRC--to deter Chinese aggression and compel better adherence to the liberal order, including principles of dispute resolution.

So protecting the territorial integrity of our allies and helping them bolster their own defenses is therefore an integral part, must be a part of our strategy.

The lethality opportunity exists because of trends in technology that we pioneered and first exploited toward the end of the Cold War that make it possible to build relatively large numbers of offensive weapons, precise conventional weapons, and decoys to overwhelm defenses, and we have seen that the PRC has used these technological advances to put us on the wrong side of the cost-exchange ratio, but we have an opportunity if we focus on the China challenge to reverse this logic and put them on the wrong side of the cost-exchange ratio with regard to these capabilities, especially as they are now moving out to achieve more strategic space and adopting a posture of forward defense.

Innovation lastly is an area of historic strength and PRC weakness where we have to maintain our lead and be vigilant not to lose critical dual-use or military intellectual property, as Tate said, to PRC espionage or acquisition.

So, first, Congress could play an important role in reviewing implementation of the new NDS. A key first step would be to identify metrics for assessing whether associated policies are having the desired effect in terms of improving our position in the competition. And that sounds simple, but I think in practice, it will actually prove complicated so Congress would have a role first in identifying the metrics to use and then requiring annual or regular reviews, classified and unclassified, on how we're doing.

Second, as I tried to show in my testimony, competition with the PRC is the biggest national security challenge that we face. So it should receive top priority, and I think this means, you know, at a minimum, a lot more hearings, and that would be one way of getting public opinion aroused on this set of issues. We could have hearings on many of the issues that have already come up in the previous panels, including technology transfer, trade terms, the issues that, you know, are really the bread and butter of this Commission.

Third, it's possible to encourage more research and analysis. Congress might want to establish new FFRDC-like organizations focused on the competition. There is a case to be made that the U.S.-PRC competition is so broad and different from what the original cast of FFRDCs, federally funded research and development institutions, were set up to study that we need new places funded specifically to undertake this work.

Finally, to complement the work of this fine Commission, Congress might want to set up an office intended to track the course of the broad U.S.-PRC political-diplomatic, economic and military competition.

This Commission looks at PRC developments where they interface with U.S. forces or business and financial interests. An office designed to track the competition would have to look at other areas, for instance, how the United States is doing at preserving our alliances against Beijing's efforts to drive wedges between Washington and Taipei, Tokyo, Manila, Canberra, and Delhi.

We also have to look at questions like how the U.S. military is doing relative to its modernization goals and how that compares with how China is doing relative to the PLA's strategy. And I think the U.S. side of this comparative analysis might be a kind of orphan area in our system because the intelligence agencies that usually focus mostly on what the Chinese or other powers are up to don't typically look at the U.S. side of the picture, and that means that there are too few places that are doing comparative analysis.

So I think I'll leave it at that. Thank you very much. I look forward to your questions.

**PREPARED STATEMENT OF JACQUELINE N. DEAL, PH.D., PRESIDENT AND
CEO, LONG TERM STRATEGY GROUP**

15 Feb. 2018

Jacqueline N. Deal

President, Long Term Strategy Group

“Testimony before the U.S.-China Economic and Security Review Commission”

Hearing on “China’s Military Reforms and Modernization: Implications for the United States”

Introduction

Thank you for the opportunity to testify. I was asked to address how the People’s Republic of China’s (PRC’s) military modernization is challenging both US Pacific Command (PACOM) operations and US national security interests in the Indo-Pacific Area of Operations (AOR), and then to outline some recommendations to Congress. Below I will start with the challenge to our national security interests and then cover the challenge to our operations in the PACOM AOR before offering some recommendations, but let me first state my bottom lines:

- Ideologically hostile, revisionist, expansionist major powers pose the greatest threat to US national security interests, and the PRC is proving to be an ideologically hostile, revisionist, expansionist major power. Xi Jinping’s pronouncements at the 19th Party Congress made clear the Chinese Communist Party’s (CCP’s) intent to supplant US global leadership. This suggests that it is past time for Americans to recognize the competition in which we are now engaged.
- Ongoing modernization, restructuring, and operations of the PRC’s military, the People’s Liberation Army (PLA), are aimed at creating more “strategic space” for the PRC, to make it safe for the PRC to coerce regional powers and, over time, to spread the CCP’s own rules and norms, so that countries in Eurasia and beyond defer to and accommodate the party’s wishes. A prerequisite for accomplishing this goal is disrupting US alliances, and extruding or neutralizing the US military’s presence and influence in the Asia-Pacific AOR.
- To this end, the CCP coordinates PLA activities to work together with and support PRC efforts in other domains, including economics, diplomacy, and political/information warfare. These efforts have succeeded in some measure in deterring the United States from developing, much less implementing, effective strategies for the competition.
- The PRC is mounting challenges at an accelerating pace out of weakness as well as out of strength, and the United States still possesses many competitive advantages that we could exploit if we seize the opportunity.
- If the PRC succeeds in securing additional “strategic space” and enforcing deference, US prosperity and freedom will suffer, and the PLA threat to our physical security will grow.
- To forestall ominous trends and protect US interests, members of Congress should consider reinforcing the new US National Defense Strategy and designating the PRC our number one foreign policy and defense challenge. They might also consider the following:
 - Countering PRC strategy should be our paramount priority, to include redressing PRC espionage and sensitive technology extraction (whether by theft or through investment in US firms or funds), deleterious trade policies, and political warfare and intelligence operations.
 - Congress could encourage or require federal departments and agencies to undertake cooperation with US allies and partners to respond to the array of challenging activities that the PRC is undertaking.
 - Congress could also mandate regular unclassified and classified updates of the Defense Department’s implementation of the new National Defense Strategy. These reviews

would have more leverage if Congress identified metrics for assessing the success of policies taken to advance the strategy over time.

Challenges to US National Security Interests in the Asia-Pacific

The new US National Security Strategy (NSS) sets out US national security interests as follows:

- First, our fundamental responsibility is to protect the American people, the homeland, and the American way of life...
- Second, we will promote American prosperity...
- Third, we will preserve peace through strength...
- Fourth, we will advance American influence.¹

In other words, as a primary matter we seek to protect our people and territory, our prosperity, and our freedom. We don't want to be targeted physically, robbed, coerced, or deprived of our ability to exercise basic rights, including the right to select our leaders, exercise free speech, and assemble and worship as we choose, among other important freedoms. How does PLA modernization, and the broader PRC strategy within which it fits, challenge these interests?

As the new US NSS notes, for much of the last century, US strategy was focused on defeating ideologically hostile, revisionist, expansionist major-power opponents, which we recognized as our principal security challenge. After the Cold War, however, the United States entered a period of strategic "drift,"² during which we lost focus. Instead of seeking to limit the power of the CCP regime, another potential peer competitor, we instead encouraged it, in the mistaken belief that once the PRC reached a certain level of development and engagement with the world, the party would fall or at least become less authoritarian and more inclusive. In other words, in the decades after 1989 we fostered the rise of a 21st-century major power whose ideological hostility, revisionist aims, and expansionist tendencies many Americans are only just now coming to appreciate. Because of the character of its regime, and by virtue of its size and capabilities, the PRC is on track to threaten the fundamental US national security interests laid out in the 2017 NSS.

A brief review of the PRC's strategy over the past several decades will illuminate the nature of the challenge. For much of the post-Cold War period, the CCP under Deng Xiaoping, Jiang Zemin, and Hu Jintao sought to restore the PRC to major-power status, while denying that this was their ambition. "Revival" or "rejuvenation" (*faxing*, 复兴) had been a goal of Chinese nationalists and strategists since the Opium Wars of the 19th century,³ but for the aforementioned "paramount leaders" (*zuigao lingdao ren*, 最高领导人), it was also a way of justifying the CCP's monopoly on power and attendant abuses. Their road to revival began with an embrace of the United States,⁴ which would supply the PRC with technology and investment even after the Tiananmen Square crackdown because Americans believed

¹ *National Security Strategy of the United States of America*, Dec. 2017, p. 4, available at: <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>.

² *National Security Strategy of the United States of America*, Dec. 2017, p. 2.

³ Orville Schell and John Delury, *Wealth and Power: China's Long March to the Twenty-first Century* (New York: Random House, 2013).

⁴ "Road to Revival" (*faxing zhilu*, 复兴之路) was actually the name of the exhibit on the "Century of Humiliation" (discussed below) at the PRC's National Museum in Beijing that Xi Jinping visited in one of his first public acts upon becoming General Secretary of the CCP in Nov. 2012.

and were assured that such commerce would be good for both sides, that the PRC would remain internally oriented for many years to come, and that the CCP would liberalize politically after it opened up economically.⁵ This essentially deceptive, or “hiding and biding,” approach to accumulating resources from abroad succeeded. By the early 2000s, the CCP retained its monopoly in power, even as the PRC was on the verge of overtaking Japan as the second biggest economy in the world. The PLA was also in the final stages of developing formidable new anti-satellite and anti-ship weapons specifically targeted to hold US assets at risk, and it would soon roll out a so-called fourth-generation fighter and the PRC’s first aircraft carrier. Since the global financial crisis of 2007-08 and the accession of Xi Jinping in 2012, PRC strategy has shifted in a more explicitly hostile direction. While Beijing still emphasizes interdependence and promises that cooperation with it will be “win-win,” it has added a layer of threats involving the PRC’s economic leverage and new military capabilities; when threats have not sufficed, it has not hesitated to use these tools – to punish those who defy the CCP’s wishes, and to erode the US military’s ability to support its East Asian allies and partners.⁶

What are the CCP’s wishes? At the 19th Party Congress in October 2017, Xi Jinping declared, many times, the dawn of a “new era,” and as important but often overlooked, he described this era as one of “socialism with Chinese characteristics,” a phrase he used 70 times in the report, and three times in the first two sentences. Xi further stipulated the PRC’s pre-eminence “in the East” and described its rising “comprehensive national power” (*zonghe guoli*, 综合国力) as putting it on the road to world-leading status. Achievements cited in support of this proposition included not only economic development and military modernization but also Xi’s signature Belt and Road campaign, along with other initiatives designed to build up the PRC’s “international influence” and advance the CCP’s vision of a “new type of international relations.”⁷

These pronouncements, as well as Xi’s suggestion that the PRC offers a “new choice” or model for developing countries to follow,⁸ are unfortunately not empty slogans or boasts. They reflect a bold, direct challenge to the liberal order backed by the United States – a set of institutions that we see as serving the interests of all participants and as conducing to the maintenance of international peace. Where the liberal order revolves around respect for the basic rights and equality of all countries under international law, the protection and promotion of free trade, and the use of juridical means to settle international disputes, the CCP believes, as then-Foreign Minister Yang Jiechi asserted in a fit of pique at an ASEAN meeting in 2010, “China is a big country, and other countries are small countries, and that’s

⁵ Meanwhile, CCP officials also courted Moscow in the 1990s and secured Russian support for the PLA’s modernization.

⁶ Examples include sanctions against foreign businesses on the mainland and the manipulation of protests, imports, exports, and tourist visas, as well as the deployment of ostensibly civilian, paramilitary, and law enforcement forces, backed by the conventional PLA, around territory claimed by Beijing.

⁷ Xi Jinping’s Report to the 19th Party Congress, available in Chinese at: <http://news.dwnews.com/china/news/2017-10-18/60018047.html>; cited in Rush Doshi, “Xi Jinping just made it clear where China’s foreign policy is headed,” *Washington Post*, October 25, 2017, https://www.washingtonpost.com/news/monkey-cage/wp/2017/10/25/xi-jinping-justmade-it-clear-where-chinas-foreign-policy-is-headed/?utm_term=.1694f3b2be0f, and Michael Swaine, “Chinese Views of Foreign Policy in the 19th Party Congress,” *China Leadership Monitor*, Issue 55 (Winter 2018), <https://www.hoover.org/sites/default/files/research/docs/clm55-ms-final.pdf>.

⁸ *Ibid.*

just a fact.”⁹ In other words, smaller countries should fall in line and concede whenever their territorial claims or other economic, security, or political preferences clash with the CCP’s. Other states should also ensure that none of their nationals “hurts the feelings of the Chinese people,” regardless of whether this requires the suspension of popular rights or privileges inherent in their political systems.

The PRC is seeking to achieve this vision of international relations not only by expanding and flexing its military capabilities and economic leverage in the form of trade and market access, but also through external investments in transportation and communications infrastructure, risky loans with foreign property or territory as collateral, the provision of PRC-made weapons, and other projects near to the hearts of autocrats from Eurasia to Africa and South America. All of these lines of effort are designed to help the PRC control and protect resources outside its borders, bind smaller states to Beijing, bypass or eviscerate the existing liberal institutions that govern international relations, and make it harder for the United States to intervene.

In the physical world, the PRC’s investment in container ships and port infrastructure around the world confers the ability to control, monitor, and perhaps interfere with, maritime commerce. “As of 2015, nearly 70 percent of global container traffic passed through Chinese-owned or Chinese-invested ports located around the world,” according to one analysis. “Other reports suggest that Chinese officials may be able to control key ports, such as those running along the Asia-Europe route via the Suez Canal, which could give priority to Chinese vessels.”¹⁰ In the world of institutions and virtual space, the PRC is also sponsoring new bodies, such as the Shanghai Cooperation Organization (SCO) and the Asian Infrastructure Investment Bank (AIIB), in which it plays a dominant role and which compete with liberally governed or Western-led organizations; creating new networks, such as the Cross-Border Inter-Bank Payments System (CIPS) to bypass the Western SWIFT system and deprive other states of a window onto its transactions; and racing to deliver new internet and telecommunications standards, such as 5G wireless communication technology, which would afford Beijing the opportunity to regulate or at least monitor information traffic.

Much of this effort is now subsumed under the banner of the Belt and Road initiative,¹¹ which an Australian member of Parliament recently warned “employs economic power as an expression of strategic power.” She went on to call it a “game-changer” that represents “a rejection of the conventional ways of doing business since the end of World War II.”¹²

Given how many benefits the PRC has gained from the existing order over the past several decades, its hardly concealed efforts to re-shape it may come as a surprise. Why would the CCP now bite the hand that has fed it? Doesn’t the party worry about losing access to other major powers’ technology and

⁹ Yang was promoted to the Politburo in Oct. 2017. On his ASEAN outburst in 2010, see John Pomfret, “US Takes a Tougher Tone with China,” *Washington Post*, July 30, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/07/29/AR2010072906416.html>.

¹⁰ Tony Padilla, “China to Shape International Trade Via Belt and Road,” *Reconnecting Asia*, July 19, 2017, <https://reconasia.csis.org/analysis/entries/china-shape-international-trade-belt-and-road/>.

¹¹ Nadège Rolland, *China’s Eurasian Century? Political and Strategic Implications of the Belt and Road Initiative*, National Bureau of Asia Research, 2017.

¹² David Wroe, “China’s massive global infrastructure spending a ‘game changer’ for world power, says Labor’s Penny Wong,” *Sidney Morning Herald*, Jan. 24, 2018, <http://www.smh.com.au/federal-politics/political-news/chinas-massive-global-infrastructure-spending-a-game-changer-for-world-power-says-labors-penny-wong-20180123-h0n09g.html>.

resources, or inspiring a countervailing effort by them? Recent events make more sense when one takes into account the lessons of Chinese history, as they are understood in Beijing, along with the CCP's very real sense of current vulnerabilities.

As reflected in Yang Jiechi's outburst quoted above, Chinese tradition teaches that major powers or "hegemons" (*ba*, 霸) behave in a certain way. They use their economic, military, and political influence to coerce smaller powers, and they set up institutions to reinforce a hierarchy of relations on which they sit atop to enable this coercion. Despite our protestations, CCP elites have never really believed that the post-World War Two institutions underwritten by the United States and its allies were neutral or designed to help the PRC prosper. Indeed, modern China's first encounter with international commerce is remembered as the dawn of the "Century of Humiliation" (*bainian guochi*, 百年国耻) in the 19th century, a period in which foreign imperialist powers exploited the Qing dynasty's weakness to wrest territorial concessions and one-sided trade deals from Beijing.

A corollary of this perspective is that PRC strategists have long anticipated that US patience with the party regime would wear thin. The hope was that by the time we woke up to the reality of CCP ambition, it would be too late – the PRC would be too big and too formidable a competitor to challenge. The United States would have to concede major points of division and generally take into account Beijing's interests in all of our policies. Following the advice of Sun Zi, the PRC would thus be able to "win without fighting." The timeline for this reckoning has contracted both because of the progress that the PRC has made to date (some in the West have estimated that the PRC will overtake the United States in absolute GDP as early as this year¹³), and because internal pressures now compel Beijing to look abroad for new markets and sources of support for, or validation of, the CCP's rule.

If the PRC appears to be in a hurry to cement its position as the new hegemon, that's because it is. Over the last few decades, as its economy has expanded dramatically thanks to manufacturing and exports, the country's reliance on overseas supplies of raw materials, trade routes, and markets has also skyrocketed. This creates an untenable set of external vulnerabilities for the PRC in a world where the old hegemon, i.e., the United States, possesses an asymmetric ability to project power and interdict global sea lines of communication (SLOCs).

In the same period, internally, even as it has increasingly openly challenged the United States and other countries the party has been battling the effects of endemic corruption; a widening gap between the haves and the have-nots; rising tensions among religious and ethnic minorities; pollution that has ravaged the PRC's land, air, and water; an increasing dependency ratio that is only partly the result of the One Child Policy; and the limits of an investment-led economic growth model that has produced scary sums of internal debt.¹⁴ Rather than liberalize to address these issues, the CCP has doubled down on existing policy tools, including using new technologies to broaden and deepen the regime's surveillance apparatus, so that any restive elements can be identified and neutralized before they pose a serious political threat. The PRC's political situation has thus been growing more, rather than less,

¹³ Mike Patton, "China's Economy Will Overtake The U.S. in 2018," *Forbes.com*, April 29, 2016, <http://www.forbes.com/sites/mikepatton/2016/04/29/global-economic-news-china-will-surpass-the-u-s-in-2018/#5d251ec5474b>.

¹⁴ On the growth challenge, see Dan Steinbock, "How to Beat the Middle-Income Trap," *China Daily*, Jan. 29, 2018, <http://www.chinadaily.com.cn/a/201801/29/WS5a6e603fa3106e7dcc1373b1.html>, which allows that the PRC is still only a developing country in per capita GDP terms.

fragile. Its push to lock in global major-power status is on the one hand premature and on the other urgent.

Challenges to US PACOM Operations

In regional military terms, the PRC's ambition to be recognized as a major power – and respected as a Chinese-style hegemon – translates into a requirement to neutralize or extrude US forces. This will help the CCP convince local powers that the US role and influence in the region since World War Two has been an historical anomaly; that American power is fading; and that a reversion to Middle Kingdom primacy is under way, so they have no choice but to accede to a new Beijing-sponsored order. PRC military strategists also appreciate that trends in warfare demand that the PLA move out into peripheral areas where the US military has been routinely operating – from the East and South China Seas to the Western Pacific and Indian Ocean. This adds an operational rationale to the strategic imperative to push back the United States.

According to the 2013 edition of the *Science of Military Strategy* textbook published by the Academy of Military Science in Beijing,¹⁵ “strategic space” (*zhanlue kongjian*, 战略空间) is the area required by a people to “resist foreign interference and aggression, and safeguard their own survival and development.” The extent of the space required “will follow and depend on the extent of expansion of national interests, and even more will depend on the range at which military power can be projected.” Trends in other countries’ ability to conduct power projection, moreover, compel the PLA to transition to “forward defense” (*qianyan fangwei*, 前沿防卫):

The world’s military powers and some peripheral nations are all striving to develop informatized long-range operational systems with new generation aircraft carriers, aircraft, missiles, submarines, unmanned weapons, and space-based information and weapon platforms, etc. as the backbone, and to raise the land, sea, air, space, and networks multi-dimensional long-range operations capability based on information systems. Along with the continuous rise in our nation’s comprehensive national power, the possibility of facing a large-scale invasion, especially on land, is further decreasing. The main war threat has switched from traditional inland direction toward the ocean direction, while the main mode of threat has changed ... to integrated air and space, air and sea, and networks and non-contact air strikes, and our home territory’s interior will be under the enemy’s mid- and long-range firepower coverage.

The concept of expanded strategic space is thus connected to forward defense insofar as the PLA must strive to:

externally push the strategic forward edge from the home territory to the peripheral, from land to sea, from air to space, and from visible spaces to invisible spaces to expand the strategic depth and gradually form into a new three-dimensional strategic space of surrounding and protecting the home territory, radiating to the periphery, and taking care of both the physical and virtual realms.

¹⁵ Shou Xiaosong, ed., *The Science of Military Strategy (Zhanlue Xue, 战略学)*, (Beijing: Military Science Press, 2013), the source of the quotations in the rest of this paragraph.

According to the text, this will also clearly require the adoption of “jointness” and improvements in “long-distance warfare,” which the restructuring of the PLA announced in Dec. 2015 was designed to facilitate. Geographically, moreover, the areas within the First and Second Island Chains out to the Western Pacific and northern Indian Ocean are highlighted:

We should fully consider bringing about the geographical superiorities of our nation’s broad land territory and complex, multi-formed terrain, including the protruding arc facing the Western Pacific Ocean and the Northern Indian Ocean, and utilize the rapid development of basic infrastructure such as national transportation and communications as well as the favorable condition of their simultaneous radiation toward the periphery. Then, ... [as necessary], we could implement operations with the mainland and the coastal waters as the strategic inner line to deter, absorb, and control the Western Pacific Ocean and Northern Indian Ocean strategic outer line.

Over at least the past five years, such thinking has inspired an increasingly intense campaign of PRC political warfare and military pressure, along with operational activities designed to decrease US military effectiveness and open up those spaces for the PLA to intimidate regional states and secure strategic depth for a potential future conflict with the United States. Again, Beijing would prefer to “win without fighting,” but PRC strategists know that the best way to avoid a war is to prepare to prevail in one.

In a 2015 monograph US Navy Captain Christopher H. Sharman documented the PLA Navy’s (PLAN’s) steady progress since 2004 in implementing “far seas defense” (*yuanhai fangwei*, 远海防卫) in the Western Pacific and Indian Ocean.¹⁶ In the same period, the PRC has built up a network of substantial new PLAN bases in the South China Sea and interfered with US Navy and auxiliary operations in that area. Regular PLA forces, along with paramilitary and law enforcement assets, have verbally harassed US forces, menacingly shouldered them, sought to damage their towed arrays, and even stolen a US Naval Ship (USNS) unmanned underwater vehicle (UUV).

Together with the threat posed by Chinese anti-ship missiles, these activities seem to have had the desired effect. At a “Luncheon Town Hall” panel discussion at a conference I attended in 2013, the video of which is available on Youtube, then-Chief of Naval Operations Admiral Jonathan Greenert conceded that at least on the surface, the US Navy had changed its pattern of operations within the First Island Chain:

Moderator: If I could just ask about China for a moment, it’s clear that the PLAN is modernizing; they’re increasing their force size; they’re ranging beyond their normal operations areas, and becoming a little bit more assertive out there. Is there anything in what they’re doing that’s causing us to have to make a change at the moment?

Adm. Greenert: Yes, in a way that we are making the change, but we’re making it by conscious effort, and a lot of that has to do with operations inside the First Island Chain. Clearly we talk about maritime interactions as a strategic area. As we look across the interagency approach to, you know, what is it worth where we operate? How does it impact our overall posture in the

¹⁶ Christopher H. Sharman, “China Moves Out: Stepping Stones to a New Maritime Strategy,” *China Strategic Perspectives* 9, Center for the Study of Chinese Military Affairs, Institute for National Strategic Studies, National Defense University, April 2015.

Western Pacific and in the world, and with a country that we trade with? So some call it lawfare; some call it ... many different areas, but it becomes not just, could we win in a conflict? The question is, do we want to risk that? What is it worth diplomatic-wise and overall? So it has caused us to operate differently, but again it's by conscious [effort]. There are some domains [where] we haven't changed anything. The undersea domain, we own it, we go wherever we want right now today, and it's our job to assure that that is the case. But in some domains, yeah, we've operated somewhat differently. But that's again by our choice. We have the option to approach it differently if we choose to.¹⁷

As late as 2014, moreover, US civilian and military leaders were putting our defense planners and other national security personnel in a difficult position by invoking concerns about the maintenance of commercial relationships as a reason not to mention the PRC as a competitor.¹⁸

The PLA, meanwhile, has identified this tendency and approves, noting in the 2013 *Science of Military Strategy* that “intertwining interests” and “common global challenges” mean that countries “cannot stop cooperating with each other in all the other areas because of their differences in one area, and cannot conduct full-scale confrontation because of confrontation in one domain.”¹⁹ Distinguishing friend from foe has become more difficult in this environment, and the thresholds for political and military conflicts have risen.²⁰ PRC political and information warfare initiatives are therefore designed to encourage the US perception that interdependence guarantees peace, and that any attempts to prepare for hostilities would be not only economically costly but militarily destabilizing. This dynamic creates space for the PLA to act aggressively in the region without fear of serious repercussions. The *Science of Military Strategy* identifies a cyclical pattern of US-PRC interactions, which “ease—intensify—ease,” as struggles of “containment and counter-containment, extrusion and counter-extrusion” unfold.²¹ PRC strategists’ confidence that tension will stay within certain bounds partly explains the boldness of their recent initiatives to usurp our global leadership role. It also suggests that the United States could give Beijing pause by appearing to prepare to actually use its competitive advantages to target PRC weaknesses.

Recommendations for Congress

US national security policy includes all instruments of power, not just military or defense instruments, and the challenges outlined above clearly implicate a range of US government and private-sector interests. That said, the Pentagon’s new US National Defense Strategy offers a useful point of departure in identifying the PRC as our primary threat and in recommending that our strategy involve “expanding the competitive space,” to include working with allies and building on the US military’s enduring strengths in the area of lethality and innovation. To clarify the situation for themselves and educate the American people, members of Congress should consider reinforcing the new NDS and designating the PRC our number one foreign policy and defense challenge.

¹⁷ AFCEA West 2013, “Pivot to the Pacific: What Are the Practical and Global Implications,” Jan. 29-31, 2013, San Diego Convention Center, Luncheon Town Hall, <https://www.youtube.com/watch?v=A8YcuvAATEQ&list=PLWX4R7nG6a8moZ0bIUtkBBIqaOkbr85zb&index=7>.

¹⁸ <http://news.usni.org/2014/06/17/greenert-dont-unnecessarily-antagonize-china>

¹⁹ Shou Xiaosong, op cit.

²⁰ Shou Xiaosong, op cit.

²¹ Shou Xiaosong, op cit.

They might also consider the following:

- Countering PRC strategy should be our paramount priority, to include redressing PRC espionage and sensitive technology extraction (whether by theft or through investment in US firms or funds), deleterious trade policies, and political warfare and intelligence operations.
- Congress could encourage or require federal departments and agencies to undertake cooperation with US allies and partners to respond to the array of challenging activities that the PRC is undertaking.
- Congress could also mandate regular unclassified and classified updates of the Defense Department's implementation of the new National Defense Strategy. These reviews would have more leverage if Congress identified metrics for assessing the success of policies taken to advance the strategy over time.

**OPENING STATEMENT OF KATHLEEN HICKS, PH.D., SENIOR VICE PRESIDENT,
HENRY A. KISSINGER CHAIR, AND DIRECTOR OF THE INTERNATIONAL
SECURITY PROGRAM, CENTER FOR STRATEGIC AND INTERNATIONAL
STUDIES**

VICE CHAIRMAN BARTHOLOMEW: Dr. Hicks.

DR. HICKS: Good afternoon and thank you to the commissioners for inviting me to speak today.

You've asked me to focus in particular on assessing the challenges that China and its military modernization pose to U.S. partners and allies in the Indo-Pacific region and to provide associated recommendations to the Congress.

For at least the past decade, the specter of China's growing military and economic power has been the central galvanizing feature of U.S. relations in Asia. China's power is not growing benignly. I probably do not have to belabor that point at this stage.

The views of our regional allies and partners are not monolithic however on China. Each has its own historical and geographic context and the degree of economic, political, and cultural ties with China varies.

It is thus unsurprising that there is little serious consideration of the kind of collective military alliance the United States and European allies enjoy through NATO.

These caveats, however, do not diminish the reality that China's regional neighbors rely on their relationships with the United States and the military capability and capacity it brings to the Pacific region in order to balance China.

U.S. presence has always brought some friction, especially from the stationing and behavior of U.S. military personnel, but it the single greatest stabilizing element in the region. We are not being fleeced in this approach. It was a carefully designed strategy aimed at protecting our economic interests in Asia, where in 2017 the United States exported \$486 billion in goods, and deterring the kinds of conflicts that killed over 100,000 U.S. servicemembers in World War II and more than 36,000 in the Korean War.

My written statement summarizes the approaches of key allies and partners in meeting the challenges posed by China. I'll say just a few words about each here. You gave me a number of allies. So I will be brief on each.

Given the increased nuclear threat posed by North Korea, missile defense is a high priority for Japan. Japan is also debating right now whether to acquire additional strike systems. I think the United States should generally be supportive of this approach. Investment in unmanned systems could be a natural additional area for focus in Japan given its demographic challenges.

The Republic of Korea is understandably focused on its North Korean neighbor. Yet, it has demonstrated its commitment to the U.S. alliance with Korea beyond the peninsula, including by deploying forces in Afghanistan.

The most significant contributions that South Korea can make to balancing China are to provide the United States assured access and basing rights, improve its own capabilities to defend and defeat North Korean threats, and to improve its security relationship with Japan.

The expansion of Australia's maritime edge--measured in technological advances as well as operational expertise--redounds to the alliance in any potential contingency involving China, as does Australia's ISR and facilities opportunities, such as for the dispersal of U.S. aircraft and other assets beyond the range of China's A2/AD capabilities.

In addition to long-standing border disputes, China--excuse me--India is concerned with China's maritime advances into the Indian Ocean, cyber intrusions and attacks, and growing economic and political links in their region.

India has consequently energized its defense cooperation with the United States and sought to improve its own air and maritime domain awareness and strike capabilities, including subsurface capabilities.

Taiwan relies on defensive systems and asymmetric capabilities that make the most of its limited force and resources, all aimed at denying Chinese advantages and providing time and space for other actors, such as the United States, to come to its aid.

In October 2017, Taiwan's president vowed to increase defense spending by two percent per year through 2025. Reported areas of investment include electronic warfare, cyber defense, advanced unmanned systems, as well as improvements to existing platforms, such as mobile missile launchers, Patriots, and F-16s.

Congress can do much to strengthen the allies and partners who work alongside the United States in contesting Chinese military advances. Congress should focus foremost at the strategic level, amplifying messages and policies that promote the value proposition for these alliances.

The issue of allied burden sharing has always been an important one. The United States must ensure that allies and partners are contributing effectively as their assets and position allow, including, but not limited to, their military investments.

Yet the United States should never find itself so consumed with a narrow accounting of what allies buy that we lose sight of a fundamental security reality: our alliance and partner network in Asia is our center of gravity. Where the alliance system is strong, China's ability to advance as a world power against our collective interests is most limited.

Recognizing this reality, it is our alliance system that China, and North Korea, most seek to undermine. As Clausewitz said of the center of gravity: "It presents the most effective target for a blow." And they read Clausewitz.

The United States should not undermine itself by alienating allies and partners in such a way that it helps potential adversaries strike their deadliest blow to U.S. power.

Specific areas where members of Congress can advance our alliances and partnerships to achieve U.S. economic prosperity and security goals in Asia including the following:

First, reinforce the 2018 Nuclear Posture Review's emphasis on the U.S. extended nuclear deterrent. We should not signal a desire for South Korea and Japan to procure independent nuclear arsenals, and we should assure them that our nuclear power extends over them.

Second, develop an affirmative economic message for the region. At present, the United States lacks a trade strategy that can serve as "carrots" to bind allies and partners more closely to us. "Sticks" are needed to combat the extensive Chinese ties that threaten to undermine the endurance of our security relationships with numerous countries, but they will not succeed alone.

Third, support the forward posture of U.S. military capabilities where prudent. Too often, the resources expended for forward posture and facilities are treated not as the strategic national investment they are, but as a net drag on domestic basing that could advance localized interests.

Congress should change this a-strategic framework, which over several decades it itself has largely created.

Fourth, United States should be investing in the resiliency of forward U.S. capabilities. This includes support for facilities' hardening, investments to support next-generation concepts

for missile defense, and infrastructure improvements needed to ensure effective dispersal of forces in the Pacific.

Fifth, Congress should continue to insist on the host nation support agreements, status of forces arrangements, and operational flexibility needed for the United States to protect its interests and leverage its alliance and partner network effectively for common goals.

Sixth, the United States should pursue reforms in U.S. security cooperation to enable collective security arrangements with allies and close partners. For the countries of focus in this testimony, priorities should include better information and intelligence sharing, revisions to our technology security and foreign disclosure processes, and the routinization of exportability considerations introduced early in defense requirements and acquisition processes.

Thank you very much, and I look forward to your questions.

**PREPARED STATEMENT OF KATHLEEN HICKS, PH.D., SENIOR VICE
PRESIDENT, HENRY A. KISSINGER CHAIR, AND DIRECTOR OF THE
INTERNATIONAL SECURITY PROGRAM, CENTER FOR STRATEGIC AND
INTERNATIONAL STUDIES**



**Testimony before the
U.S.-China Economic and Security Review Commission**

***“PLA Modernization and Implications for the
United States and Beyond”***

Dr. Kathleen H. Hicks

Senior Vice President for Asia, Henry A. Kissinger Chair, and Director,
International Security Program, CSIS

February 15, 2018

Thank you to the Commissioners for the opportunity to testify today. The Commission has asked me to focus on assessing the challenges that Chinese military modernization pose to U.S. partners and allies in the Indo-Pacific region and to provide associated recommendations to the United States Congress.

Over the past seventy years, the United States has developed an extensive alliance and partner network in Asia. For at least the past decade, the specter of China's growing military and economic power has been the central galvanizing feature of U.S. relations in the region. China's power is not growing benignly. With a decided lack of transparency in its investments and intentions, alongside a manifest series of coercive and, at times, extralegal actions in the cyber, air, and maritime domains, China has largely demonstrated a will to compete rather than cooperate. In the defense realm, the same can be fairly said of the United States.

The views of our regional allies and partners are not monolithic on China. Each has its own historical and geographic context and the degree of economic, political, and cultural ties with China varies. It is thus unsurprising that there is little serious consideration of the kind of collective military alliance the United States and European allies have through NATO.

These caveats do not, however, diminish the reality that China's regional neighbors rely on their relationships with the United States, and the military capability and capacity it brings to the Pacific region, to balance China. U.S. presence has always brought some friction, especially from the stationing and behavior of U.S. military personnel, but it is the single greatest stabilizing element in the region. We were not being fleeced in this approach; it was a carefully designed strategy aimed at protecting our economic interests in Asia, where in 2017 the United States exported \$486 billion in goods, and deterring the kinds of conflicts that killed over 100,000 U.S. servicemembers in World War II and more than 36,000 in the Korean War. Our allies have welcomed the U.S. defense department's steady rhetoric on balancing Chinese military improvements—from its 1990s declarations of a transformation to its 2010s "pivot" and "rebalance" frames to the Trump Administration's warnings of competition—but rightfully worry about our focus and commitment amid military challenges facing us in the Middle East and, now again, in Europe.

Key Regional States: Contributions, Challenges, and Recommended Focus Areas

Summarized below are the approaches of several of our key allies and partners in meeting the challenges posed by China. The assessments draw extensively on the 2016 CSIS independent report to Congress, *Asia-Pacific Balance 2025*, of which I am a co-author.¹

¹ Michael Green, Kathleen Hicks, and Mark Cancian, *Asia-Pacific Rebalance 2025* (Washington, DC: Center for Strategic and International Studies, November 2015), https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/160119_Green_AsiaPacificRebalance2025_Web_0.pdf, pp. 50-84.

Japan is critical to US strategy in Asia. The U.S.-Japan alliance is the most important foundation for U.S. military access in the region. Japan's foreign policy, in turn, is grounded in our 1960 Treaty of Mutual Cooperation and Security. Japan has increased defense spending for each year for the past six. Its National Defense Program Guidelines, set in late 2013, identified key capability needs in amphibious operations, C4ISR, ballistic missile defense, and space and cyber defense. Japan is currently revising the guidelines for the next five-year program period. Given the increased nuclear threat posed by North Korea, the upcoming Guidelines provision will codify the requirement to fund two Aegis Ashore systems, as recently approved by Abe. The demographic challenges Japan faces restrict the size of the manned force it can deploy. Investment in unmanned systems in all domains lags that of the United States and could be a natural additional area for focus, at least for intelligence, surveillance, and reconnaissance missions and logistics functions.

The greatest debate for the Guidelines revision involves whether Japan will state its intention to acquire additional strike systems, which the Abe government has assessed to be within the bounds of Japan's constitution. The United States and its other Asian allies should welcome any such decision by Japan where it is in keeping with its constitution and critical to its own defense. In those circumstances, offensive Japanese capability will contribute positively to common security goals.

The security concerns of the Republic of Korea are understandably focused on its North Korean neighbor. Equally understandable, South Korea views its alliance with the United States as foundational to the nation's existence. It has demonstrated its commitment to the alliance beyond the peninsula, deploying forces to every war the United States has fought, including Afghanistan. On peninsula, South Korea hosts 28,500 U.S. forces, works closely with the United States through the framework of Combined Forces Korea and the United Nations Command. Seoul shares significant and growing economic ties with China—its top trading partner by a wide margin—but many South Koreans are wary of the potential for Chinese dominance and seek strong and enduring U.S. leadership in the region. The most significant contributions that South Korea can make to balancing China are indirect. First, to continue providing the United States assured access and basing rights. Second, to improve its capabilities to defend against and defeat the range of North Korean threats to its existence. Third, to improve its relations with Japan to affirm the strength of the U.S. alliance network and prevent would-be adversaries in North Korea, China, and Russia from succeeding in attempts to divide it.

Australia has fought alongside the United States more often than any other ally across the globe. Its top trading partner, however, is China. These economic imperatives, combined with Australia's geographic distance from China, dampened the Australian public's concerns about its rise, at least relative to the concerns of the United States and Japan. China, however, has been working hard, if inadvertently, to increase Australian leaders' concerns. A perusal of Australian newspapers and discussions with officials reveal immense concern with growing Chinese ties in Australia and throughout Southeast Asia, most evident in the depth of its commercial presence and a wave of indicators that it is seeking to shape other nations' politics and policies to fit the Chinese Communist Party's interests. This shift in Australian viewpoint presents an opportunity

for closer collaboration with the United States on military matters. The expansion of Australia's maritime edge—measured in technological advances as well as operational expertise—redounds to the alliance in any potential contingency involving China as does Australia's ISR and facilities opportunities, such as for the dispersal of U.S. aircraft and other assets beyond the range of China's anti-access/area-denial capabilities.

Defense ties between India and the United States have grown closer in the past five years, particularly since the 2014 election of President Modi and the increased disenchantment of the United States with Pakistan. India has longstanding land border disputes with China and distrusts the strong relationship between China and Pakistan. In recent years, India has also elevated its concern with China's maritime advances into the Indian Ocean, cyber intrusions and attacks, and growing economic and political links with Myanmar, Bangladesh, Nepal, and Sri Lanka. Nearby Chinese submarine activity is particularly worrisome to India. India has consequently energized its defense cooperation with the United States and more generally sought to improve its air and naval capabilities alongside its traditional focus on ground forces. Air and maritime domain awareness as well as improved strike capabilities, including subsurface, are potential investment areas of note. Also notable is India's increased interest in being able to project this power at longer range, which would require an improved logistics tail to support it.

Taiwan faces existential concerns about growing Chinese capability. Taipei wants to preserve peace across the Taiwan Strait, which necessitates a credible deterrent posture for the island. Maintaining such a deterrent is challenged by Taiwan's geographic proximity to China, the Chinese goal of reunifying with Taiwan, and the limitations on foreign military assistance to Taiwan that follow from its disputed political status. The resulting strategy for Taiwan is to rely on defensive systems and asymmetric capabilities that make the most of its limited force and resources, all aimed at denying Chinese advantages and providing time and space for other actors, such as the United States, to come to its aid. Executing this approach will require Taiwan to improve its air defenses, the resiliency of its intelligence, surveillance, and reconnaissance, its abilities to deny Chinese amphibious landing, and growth in its munitions. In October 2017, Taiwan's president vowed to increase defense spending by 2 percent per year through 2025. Reported areas of likely investment include electronic warfare, cyber defense, advanced unmanned systems, as well as improvements to existing platforms, such as mobile missile launchers, Patriot missile defense systems, and F-16 fighters.²

Recommendations for Congress

Members of Congress singularly, and Congress collectively, can do much to strengthen the allies and partners who work alongside the United States in contesting Chinese military advances that undermine our security. Congress should focus foremost at the strategic level, amplifying messages and policies that promote the value proposition for these alliances.

² Jess Macy Yu and Greg Torode, "Taiwan plans to invest in advanced arms as China flexes its muscles," Reuters, January 11, 2018, <https://www.reuters.com/article/us-taiwan-defence-spending/taiwan-plans-to-invest-in-advanced-arms-as-china-flexes-its-muscles-idUSKBN1F00PC>.

In the United States, some, including President Trump, have expressed concern that our Asian allies and partners do not contribute sufficiently to common security. The issue of allied burden sharing has always been an important one. The United States must ensure that allies and partners are contributing effectively as their assets and position allow, including but not limited to their military investments. Yet the United States should never find itself so consumed with a narrow accounting of what allies buy that we lose sight of a fundamental security reality for the United States: our alliance and partner network in Asia is our center of gravity. It is the point of our greatest strength. Clausewitz wrote, “Where there is cohesion, the analogy of the center of gravity can be applied.... In war as in the world of inanimate matter the effect produced on a center of gravity is determined and limited by the cohesion of the parts.”³ Where the alliance system is strong, China’s ability to advance as a world power against our collective interests is most limited. Recognizing this reality, it is our alliance system that China (and North Korea) most seek to undermine. As Clausewitz says of the center of gravity, “It presents the most effective target for a blow.”⁴ The United States should not undermine itself by alienating allies and partners in such a way that it helps potential adversaries strike their deadliest blow to U.S. power.

Specific areas where Members of Congress can advance our alliances and partnerships to achieve U.S. economic prosperity and security goals in Asia include the following:

- Reinforce the 2018 Nuclear Posture Review’s emphasis on the U.S. extended nuclear deterrent. We should not signal a desire for South Korea and Japan to procure their own nuclear arsenals.
- Develop an agenda for a U.S.-led multilateral regional trade regime. At present, the Administration and Congress lack an affirmative economic message for the region. The United States must have a plan of “carrots” for allies and partners, alongside “sticks” to combat the extensive Chinese ties that threaten to undermine the endurance of our security relationships with numerous countries.
- Support the forward posture of U.S. military capabilities where prudent. Too often, the resources expended for forward posture and facilities are treated not as the strategic national investments they are, but as a net drag on domestic basing that could advance localized interests. Congress should change this a-strategic framework, which it has largely created.
- Invest in the resiliency of forward U.S. capabilities. This includes support for facilities’ hardening, investments to support next-generation concepts for missile defense, and infrastructure improvements needed to ensure effective dispersal of forces in the Pacific.

³ Carl Von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), pp. 485-486.

⁴ Clausewitz, p. 485.

- Continue to insist on the host nation support agreements, status of forces arrangements, and operational flexibility needed for the United States to protect its interests and leverage its alliance and partner network effectively for common goals.
- Pursue reforms in the U.S. security cooperation toolkit to enable collective security arrangements with allies and close partners. For the countries of focus in this testimony, priorities should include better information and intelligence sharing, revisions to our technology security and foreign disclosure processes, and the routinization of exportability considerations introduced early in defense requirements and acquisition processes.

PANEL III QUESTION AND ANSWER

VICE CHAIRMAN BARTHOLOMEW: Excellent. Thank you so much.

We'll start with Commissioner Wessel.

COMMISSIONER WESSEL: Thank you all for being here.

This is very helpful testimony. A lot of questions come from this. Let me focus on a current debate that's going on in Congress and get your thoughts about its importance to the overall questions and goals that you describe, which is both the potential for updating CFIUS, as well as the question, associated question that some are trying to bring up, which is the need to enhance the Export Control Act or Export Administration and what roles those two initiatives could play.

You know we've talked about informationized, you've talked about cognitive warfare, et cetera, all the concepts that in many ways are going to be enabled by the technologies that are either on the horizon or over the horizon.

What types of changes, if any, do you think we should be looking at? How aggressively should we be using those policies, if we should be using them, to try and advance U.S. interests?

MR. NURKIN: Thanks for the question.

I think the first thing to say is that you very rightly identify that these technologies are at or over the horizon. But the other attribute that it's important to note is that they're not all being made by Northrup Grumman or BAE Systems or you pick the defense prime or first-tier contractor. A lot of them are being made by Google or Alibaba or others or being designed.

And so I think that intersection between a lot of these what we frequently call "fourth industrial revolution" technologies. AI is the top of the list. There are many others. The intersection between development and innovation in the commercial sector, development and innovation in the applied research sector, and development and innovation in defense really does pose some serious challenges for export control and technology protection.

And I think those are going to grow more intense rather than less because this intersection I don't think it's going to slow down. I think we're only going to see more of it as-- because I think what's going to happen is there will be more collaboration between high-tech industry and the defense industry but--so I think that's a little bit of prologue to say that the biggest I think attribute that we could have in CFIUS and our export control is really around adaptability and flexibility because the technology landscape moves so quickly that you can categorize or control technologies one day and then a year later you find yourself that those technologies are no longer the highest priority and that now you've got to worry about something else.

So I think being able to adjust those levers and use them--I think we should definitely use export control and CFIUS, but I think there's got to be a way to more frequently review and then effectively communicate what the priorities are that we're really watching. What is China really going after? And that's an intelligence challenge; it's not a policy challenge.

So I think that's really where I would say these are valuable tools, but they have to be supported by more flexibility and really good monitoring of these technology environments and what China is doing so far.

COMMISSIONER WESSEL: From that perspective, do you believe there is an adaptive mechanism? I mean CFIUS looks at transactions, yes, broadly, and how they may be applied, but, you know, the current focus is on semiconductors, not necessarily AI or some other technology.

MR. NURKIN: Right.

COMMISSIONER WESSEL: What kind of changes could help in that realm?

MR. NURKIN: It's a good question. I don't know if I have the specific answer, to be very frank. But I do think, you know, I think what we've seen, again more on the intelligence side than the policy side, is the U.S. law enforcement and intelligence community becoming much more aware of the urgency of the technology diffusion and the complexity of China's technology acquisition program and, you know, I think the scale.

So I think, I think there is a sense now to be able to use some of these technologies like AI to actually better track and anticipate when these technology acquisitions are about to take place because we generally have a good sense of the mechanisms, and if we can get to the point where we can understand the networks and develop the sort of machine learning and deep learning required, I think that might be another approach to this.

But to the first question, I'm sorry, I don't have a compelling answer.

DR. DEAL: I only have I think a reasonable excuse for Kate and myself, which is that I don't think as a society, even our economics profession, much less our defense security legal community, has gotten our heads around what it means to be competing in the domain of information and to be an information economy, much less a--I mean we don't know really how to value the information as assets of companies. We don't know how to account for the fact that, you know, the thing in your pocket is not only a phone but a camera and a computer and a library. We don't know how much extra productivity points we should credit ourselves for that.

So coming to reckon with what that means for our CFIUS-like and Export Control Regime, which many people thought was already broken at the end of the 20th century. Now we're in the 21st century world. It's clearly not adapted for that. It was adapted to protect stuff, basically hardware, I think mostly, and the Chinese think that the center of the competition, future of military and political competition, is information.

So I think more serious work has to be done to figure out what that really means in a lot of different domains unfortunately.

DR. HICKS: I think the United States needs to have a defense trade strategy, and this isn't only about defense, but in the context of this panel, how we reform CFIUS, how we think about export control are all pieces of that.

To pick up on the example that Jackie is using of the thing that's in your pocket, which I assume was the phone, right, it's not made in one place. We all know that. It has parts and pieces around the world. Well, that's true for our defense industry now too. It's not in our pocket yet mostly, but it is, the real issue is around supply chain security. There isn't sort of a hard wall anymore between what's built, if you will, in the United States and what is overseas.

We have an international commercial combined playing field for defense, and I do think we've started to recognize more clearly in Washington the commercial and government link and the need to improve on that.

But the national-international, we're in a weird place on right now I think it's fair to say. So I think those all come together. A lot of the innovations that we need may not be born here in the United States or pieces of the supply chain are not going to be born in the United States so we have to really think about defense trade totally differently.

Meanwhile, we have Russia, the world's second-largest arms exporter; China, the third largest and fastest growing arms exporter. It's not an even playing field. And so therein brings export control and some of the other issues. I mentioned exportability as a consideration early in the acquisition process in my comments. You still need to protect those exquisite capabilities

that the United States wants to protect that other people are going to sell. And they're selling a lot of things that we are putting up barriers for us to sell, and that's not just an economic issue. It's also, again, about how you bind people with you, how you develop interoperability, how you become the go-to partner of choice. These are parts of our foreign policy that the defense trade needs to attend to.

On CFIUS, I think, you know, reform is needed to make it faster, to make sure the national security flags go up, that there's coherence across the government, but I think by and large the CFIUS structure I'm more comfortable with than I am with the export control structure, as it stands today.

MR. NURKIN: Just one quick complicating comment.

[Laughter.]

MR. NURKIN: No, I just, to highlight the complexity of this issue, what Dr. Hicks said is exactly right. I think compounding it is the prevailing dynamic in a global defense industry and export market right now is that the export markets have figured out they have leverage over the defense primes, going back to 2008 and the collapse, actually predated it a little bit, but so right now to be competitive in this what my colleague Guy Anderson at Jane's Defense Industry says is "a savagely competitive export market," you need to be willing to give away technology, you need to be able to meet offset requirements that are growing more aggressive, you need to be able to do co-production and joint development.

And these are big asks for American companies without the financial and political support of the U.S. government. So there do need--I fully agree that especially in all the things that Dr. Hicks said plus that it's a complicated environment that requires I think probably a refined strategy for that export.

VICE CHAIRMAN BARTHOLOMEW: All right. Thanks.

Senator Talent. Dr. Hicks, I really appreciated your testimony about alliances. What can we do and should we be doing that we're not doing--I'm talking about the United States government--to enable the South Koreans and the Japanese to work together better, which means to move past, you know, the tragic and terrible circumstances of the past? It's a major--I just want your ideas on that.

And for you and Dr. Deal, although certainly, Nate, if you want to jump in, do you have ideas about how we might be able, who we might be able to negotiate with in terms of forward basing for assets in the South China Sea, assuming that we increase the force structure and have them? Because I just feel like we've sort of given up on the South China Sea. I don't want to say that.

We still do the FONOPs and the other things. But effectively they're exercising the prerogatives of a sovereign there. And who is it that would be most likely to work with us in dealing with that?

DR. HICKS: I'll start and then turn the mic over. On South Korea and Japan, the United States, I think it's fair to say, has been the actor most interested in a trilateral approach.

HEARING CO-CHAIR TALENT: Right.

DR. HICKS: And, you know, so it's often not because of our foot dragging, if you will, or some law and our policy that we can't bring the South Koreans and Japanese together.

That said, right now, I think our messages are very confused with regard to protection of South Korea. We have, things are better in the U.S.-Japanese relationship than they are in the U.S.-South Korean relationship, and that puts us even further off in trying to create a trilateral arrangement. What would be the incentive to the Japanese really to do that?

So what the U.S. could do with the right diplomatic "oomph" on, which might include ambassadors, would be to have a statement to try to pressure those two countries, if nothing else, to do a joint statement. Even something as simple as that is lacking right now and could be the basis for further concrete advances.

On the concrete defense side, clearly the area of greatest hope and opportunity is missile defense. Very difficult to get them to share the information that would allow what one would want to create better than a hub and spoke process.

But I think given what's happened with North Korea--with our eye towards China, but given what's happened with North Korea, I think there are things we can do to advance now. Even if it's two bilateral approaches, that still helps build that basis for the trilateral approach in a concrete way, and missile defense I think is the area of greatest promise.

On the issue of where to put assets, I actually will be quite interested to hear Dr. Deal's view on this. The first place that pops out to me--these aren't big assets, right, in terms of what we're talking about, but I think that Vietnam is an area where we have been progressing quite well and positively. I don't think we want to consider like a carrier or a major, but that we have some basing assets there, and I think there are things we can do to improve upon that, and the Vietnamese are incentivized vis-a-vis China to want to have the United States near by.

Philippines, tougher, and has the greater capacity in the long run, but I'm wary of trying to do too much more. We are doing some things now with the Philippines, but it's a difficult situation into which I think to introduce some kind of major new--

HEARING CO-CHAIR TALENT: That's primarily because of the nature of the current government; right?

DR. HICKS: That's exactly right.

HEARING CO-CHAIR TALENT: If it wasn't for that, that would be the logical place to go.

DR. HICKS: That's exactly right. And again there have been advances on U.S.-Philippine facilities and arrangements, and we still do port calls and all those. Those help. I mean not all, not all roads have to lead to stationing nor be very large. So I think to continue on that pace with the Philippines is a good way to go. I think there's probably more opportunities with Vietnam. Those are the ones that stick out to me.

DR. DEAL: I agree. I think unfortunately the impediments that we face now are not just-- with the Philippines, for instance, they are not just the result of the current government but also past mistakes or failures to act say back in 2012. We have a kind of credibility gap that I think in some ways this question goes back to the prior question because if we were willing to share capabilities or help these countries develop capabilities that they should have, and at this point, you know, the Chinese have a lot of, say F-35, and so things that we're very vigilant about protecting, we know are actually penetrated by the Chinese. We're worried they're getting it; they've already got it.

So we should actually be much more forthcoming with these important third-parties, friends, partners, allies, future allies, whatever you want to call them. I think the Philippines is still an important geographic position. We have an important treaty relationship. It's not lost-- Vietnam is clearly interested in more help in standing up to the Chinese and doing what it can, purchasing submarines, other materiel, working with the Indians.

The other big point I would make is we don't have to necessarily be the leaders of all of this. It's not natural as an American to say that, but at the same time, given the geographic situation, you know, the Indians, the Japanese, Australians, they're a lot closer. It's great that the

Brits are now going to do a transit through the South China Sea, but in some ways it's more the merrier, and some of these other countries are better positioned to help the locals develop capabilities that because of either our export controls or because of INF constraints or other constraints, we haven't even built for ourselves, like certain kinds of anti-ship missiles or because they're also culturally anathema to our services.

So we have a lot of issues that we have to resolve for ourselves, but we also have a lot to offer, and I think if we started offering more, either in the ISR realm or in the offense-defense strike realm, we would get a lot of I think reception because all of these countries are scared, and, as Dr. Hicks said in the testimony, I don't think we're at risk of being fleeced by them or of being dragged into war by them. I think we're at the risk of their being steamrolled, and that's against everybody's interests in peace and stability and upholding the liberal order.

MR. NURKIN: The only thing I'd add is there might be an analog here that's worth considering in terms of joint projects, which probably applies more to Japan and Korea and Australia, the sort of more advanced defense industrial bases, but with Israel and now Poland, the U.S. industry, Raytheon, has effectively developed low-cost interceptors, jointly developed, which then become the property of Rafael, and I forget the name of the Polish company, but these are--again, you don't want to always shoot an SM-6, an unmanned system; right? It's a four million, \$5 million interceptor--a \$40,000.

And so maybe there are examples like that we can develop lower, not quite as exquisite as the technology, that can go to meet what are probably more urgent threats, and that I think, that sort of collaboration would be helpful in alliance management as well.

HEARING CO-CHAIR TALENT: Thank you.

VICE CHAIRMAN BARTHOLOMEW: All right. Commissioner Shea.

COMMISSIONER SHEA: Well, I want to join with Vice Chairman Bartholomew in saying we're very lucky to have such smart people come and educate us. So thank you.

Mr. Nurkin, you said that China is focused on beating us to the commanding heights of cognitive warfare by the start of the 2030s. And I was just wondering what does that mean? What is cognitive warfare? And what are we talking about? What kind of platforms? Are we talking about terminator and driverless tanks? I mean what are we talking about?

And is there a difference between a country who's at the commanding heights of cognitive warfare who happens to be, as Dr. Deal said, authoritarian and militaristic, as opposed to one that is democratic and believes in the liberal order and the rule of law? Do they approach the commanding heights in different ways?

MR. NURKIN: Great questions. So first one, what is cognitive warfare? How does AI affect military operations? I think in this paper I point out three kind of levels. One is again an intelligence issue. So the amount of information available to decision-makers and intelligence analysts has grown and the velocity in which it arrives is increasing.

So having some mechanism, again, a sort of machine learning mechanism to be able to queue that information, to sort it, to make connections. All of that I think is one really big focus area of AI in the military and security space.

And the second is very directly connected to unmanned systems. And I think what gets most of the discussion, most of the attention, are drone swarms. So dozens or hundreds potentially of interconnected unmanned systems, in this case, unmanned aerial systems, these drones, that are all doing different missions but connected to one another.

So you might have some drones that are solely designed to be expendable to light up integrated air defenses, you might have some that are EW, or electronic warfare, you might have

some that are strike, some certainly would be C4ISR, but they're all working together in a way that currently is not possible and provides a really dynamic capability, the ability to adapt to situations as they evolve rather than having to phone home to someone who's many miles away.

That really is a very interesting capability and it would pose problems to most on our military because of the inherent resilience of these swarms. It's worth noting in June of last year, China tested the largest drone swarm on record, 119, they were Skywalker 6. That's actually a commercial drone. They engineered it.

But anyway, it's kind of rudimentary technology demonstrator, but it's demonstration of a technology that's really important to be able to do this. And even if you don't have unmanned drone swarms, increased autonomy or any unmanned system is really important.

It's one of the long poles in the tent, for example, for unmanned underwater vehicles, because it takes so long to communicate in the undersea domain, that if you have something that can see there's something at the bottom of the sea, is a submarine or is a refrigerator, and they can act, that's really critical. So these are all very important areas where AI and cognitive warfare are headed.

The last one, and this gets to your second question, I think is a transition, is autonomous or semi-autonomous strike. So that's unmanned systems, land, air, ground, or that sort of ground, air, surface or even potentially undersea that are able to carry out strike missions without even pulling the trigger.

Now semi-autonomous is more I think where the U.S. has sort of settled. That's probably as far as right now a society like ours is willing to go where you program a missile and say this is the target. Now you can be adaptable; if that target is moving or it's hiding, it's able to find it much more easily. But I think some authoritarian regimes may not be constrained by sort of the moral principles that suggest that humans should be involved in that final strike actually targeting other humans.

So I think that's one area where we might see a big difference. And again, that's a problem because it creates a capability that we as a society, rightfully, aren't interested in going and developing. Others may. It may create an advantage, a tactical advantage.

COMMISSIONER SHEA: Thank you.

Anything?

DR. DEAL: I just want to echo that and reinforce it. I think we will spend a lot of time worrying about the ethics of various degrees of autonomy. They will not have those kinds of ethical debates. They don't have a just warfare tradition. They don't have our Judeo-Christian inheritance that gives framework for those debates. Culturally they're much more comfortable with robots, at least in the sense of they're much less inclined to trust ordinary soldiers, and so in a way, these technologies offer a way to avoid having to put lethal weapons in the hands of potentially untrustworthy pilots or other operators.

And so I think our orientation would be different in that regard because we do have a tendency to put a lot of faith and trust especially in our operators and that has to do with a lot of things about our political system and culture.

The only other thing I would say is it's often cited that we are already deploying certain kind of AI in our system. So I think we should recognize that because of their internal security needs, insofar as it's connected AI to facial recognition, they're already employing it for surveillance of their population and even I hear foreign diplomats. So when you go to China these days, you're representing the U.S. government, you have your face scanned, and it is put

into a database that is ultimately going to be used to try to at least track you everywhere in China. Wherever you go, they will know.

And you know, potentially outside China too, broadly. Obviously we all read that there was a concern that Chinese drones were involved in security around those bases. If there are Chinese hobby drones or drones flying around the United States that are connected to information centers in Beijing collecting information, and they have facial images of important people in the United States or whoever, they want the ability to extend the system that they're trying to impose on their own population to us or you can imagine them doing it in other countries.

So we have totally different priorities I think with regards to these kinds of technologies. The times that we've used it, we used it for counter-terror missions, not to control our own population. So I think we will see important asymmetries or divergence in how we approach the new next-generation intelligent warfare capabilities.

COMMISSIONER SHEA: Thank you.

VICE CHAIRMAN BARTHOLOMEW: All right.

COMMISSIONER SHEA: Uplifting.

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: Dr. Wortzel.

COMMISSIONER WORTZEL: The three of you really put out some very difficult things to think about. I wanted to pursue the idea of offense- defense strike and ISR and getting it out to the right allies.

What strikes me there is the limitations on that are our own. In other words, Congress can effect that. That is in a certain sense part of our regulatory structure. We could develop systems or manage systems that can do certain things but can't be turned against us.

Where can Congress can help with that? Or can it? You know, but that's the limitation. The limitation isn't the ability to get that stuff out there, and some of it doesn't cost that much. It's that we won't sell it or share it.

Second, the capabilities that Mr. Nurkin described are capabilities that would be sort of latent in systems and put into effect when you go to war. The systems could be underground in islands along an archipelago. They could be undersea, and you hit a button, and a signal goes out, and they do what they do.

But they're, by their very nature, highly escalatory, and Dr. Deal talked about a competitive strategic environment that's going to lead to a point where the expansion of national interests and the narrowing of strategic opportunity is moving the U.S. and China closer to a collision. All right. That's what, I mean you got two articles that say that.

DR. DEAL: Oh.

COMMISSIONER WORTZEL: One you did for Parameters and part of your testimony. So if that's the case, where are the dangerous places and what are the dangerous things, and how can we maneuver around them and confront them or present risks to them without escalating into that collision?

DR. HICKS: I'll just address the first one, which is big, but I'll put some thoughts out there and then we can come back if it's not fully satisfying.

As I said, I think we need a defense trade strategy, and that should start with a sense of where we want to go with it. I think what we really are looking for is a capable federated or networked, whatever your preferred word is, you know, alliance approach that has real military capability and it's tailored by region and it's tailored by the type of activity we believe needs to

be done, and you have to be willing and able to meet allies and partners where they're willing to be met, if you will.

So we can't, we just can't idealize it in a very deductive way. It has to be partially about where they are and where they're willing to go and how you plug in gaps.

Now what does that mean for the questions that you raised? Well, I think first there's this normative question of what, what actually drives the norms we want to see in that world when it come to export of arms? What we want our arms trade to look like from the United States? And I think we have to remember we have some advantages that make people want to work with us and to buy what we have.

And I very firmly believe that when you are the seller, you have a better chance--you have a vote on the norms more than if you're not. So that gets to my point earlier about China and Russia. If everybody can just get everything they want elsewhere, you've lost the norms race.

COMMISSIONER WORTZEL: Right.

DR. HICKS: So what do we do to get a system where we can sell, but we can do it in a way where we feel like we're upholding our ethics and we can craft our norms? What are our advantages?

The first advantage is we make the best stuff in most cases. The second is there still is a cache for many countries to work with the U.S. Either they have affinity for us or there's just that sense that working with the U.S. brings them legitimacy and credibility to their military.

And the third is that we provide in a very real sense, we tend to provide support and maintenance operations, those kind of things, that other sellers, particularly the Chinese and the Russians, don't.

So there are a lot of reasons why people would still want to come to us, and I think we should leverage that in order to get the kinds of ethics we want.

What can Congress do very explicitly then, I think it's to think if they've got that framework in mind, is to think about what are the ways that they can walk that balance. I think the way in which the U.S. thinks about exportability and the way Congress in particular puts holds on the ability to sell advanced weapons, particularly beyond the MTCR signatories or even with the MTCR signatories with regard to unmanned. I think unmanned is a huge area where we've basically lost advantage.

So I think we should solve that, but I'm not sure we'll fix the problem. I mean it's gone well beyond what the United States industry can catch up to in terms of overseas sales. But we should use that at least as a warning for what happens when we decide to hold those barriers up and everybody can buy from Israel and China and Russia and others.

So that's what I think we have to do. We have to have Congress think about what those holds are doing in terms of that competitive landscape for our companies and think about the fact that if instead they change that frame around to, well, how could we use these sales to craft our own strategic advantage by pushing alliances, by having norms out there, I think that's that sort of the turn as a way to think about the problem that can really help Congress release the holdups that we're having in a lot of these sales.

DR. DEAL: And thank you for the other question. I appreciate it because as you know for too long we've told ourselves that the only possible flashpoint with China was Taiwan.

COMMISSIONER WORTZEL: Right.

DR. DEAL: And I think we held that belief longer than we should have, and among the many unfortunate things about recent history in the South China Sea is I think we've emboldened

China to think that it can get what it wants, it can--you know, you quoted Clausewitz. I'll quote Sun Tzu. It can win without fighting. It can--yeah.

So I think an obvious place where our interests might collide because of Chinese overconfidence is East China Sea, Japan around the Senkakus. I think the behavior we saw over the summer around the Indian border means that it's not just confined to the maritime territorial disputes. We could see some misunderstanding on the Chinese part about Indian resolve and a broader conflict ensue, and we would have an interest in how that unfolded.

I can't predict exactly. I mean I think we need to be a little bit humble, not make point predictions, but I think the trend that I'm worried about is the Chinese having the sense that they can use a combination of non-military, paramilitary, political warfare, information warfare, economic warfare tactics to aggrandize themselves, take territory, undermine our alliances, and do it all sort of below a certain threshold.

As I quoted in my testimony, they write in Science of Military Strategy 2013, tensions with us will kind of spike and then ease, spike and then ease, and they seem to be too confident that things will stay in certain bounds, and I think it would be better for world peace if they were worried that things could get out of hand, and if they had some uncertainty, that would impose or introduce a certain amount of caution, and I think we should be thinking about how to restore stability by inducing caution.

They should be worried that things might actually get of hand if they make one false move or if they go too far. I don't think they have that sense unfortunately anymore.

MR. NURKIN: Just one, maybe two, comments. I think I align pretty closely to the fellow panelists. You know, I think we've covered the regions, the geographies where escalation can happen, but I think that one of the big escalatory risks that I have is that we are now using technologies and operating in domains, in much more crowded domains, where I'm not sure we have fully established dissuasion, deterrence, and escalation management.

How do you manage escalation of a bunch of autonomous vehicles showing up in the South China Sea? I don't know if we know how to do that. And I do think, I mean what does escalation look like in the undersea domain where there are already a lot more submarines there? The U.S. has programs on the open source that have prepositioned UUVs, hundreds of them, based underwater. China maybe--has a great underwater net or undersea wall.

I mean there's just a lot more things out there in the same space. And do we really understand how crises can start? How we can stop them? I think that seems to be a vulnerability with new technologies and more of these technologies in some of these domains.

Where you might not see--I mean space escalation we talked about for years, but now there's really savvy counter-space capabilities that can be essentially deniable.

COMMISSIONER WORTZEL: Right. And I would think a lot of the undersea capabilities are deniable as well.

MR. NURKIN: Sure, yeah. I mean, yeah, I think without a doubt.

VICE CHAIRMAN BARTHOLOMEW: Okay. Commissioner Tobin.

COMMISSIONER TOBIN: Great. Thank you. Thank you all.

Dr. Deal, as you were presenting your recommendations, you had to speak quickly. So I'm going to give you and your colleagues a chance to expand on one of yours, which is you propose that Congress implement a system of metrics and that that would be not that easy to do, but, and that we would need to think of pursuing those metrics in a disciplined way. And that we would need to identify what our priorities are as we pursue that.

So I'd like to give you a chance to talk about that, what kinds of things might it be that it would have left? Would it be freedom of navigation? Would it be rule of law? Something connected to BRI, the Belt and Road Initiative?

Let me let you start off, but Dr. Hicks and Mr. Nurkin, I'd like you to expand on that because I think we do need to sustain our focus, and this could be a way to do so.

DR. DEAL: Thank you for the question and I appreciate the extra time.

I was thinking in terms of encouraging the Defense Department to implement the National Defense Strategy, which says that we have three important areas of opportunity among others where we should try to expand the competitive space vis-a-vis our major power competitors, and those three areas include our relations with our allies; the lethality of our forces and increasing it; and the way we do business and our innovative capacity.

So the question is if the NDIA says we should increase our lead in those areas, press those advantages, develop them, try to induce relatively favorable behavior from the competitors as a result of our actions in those areas, then we need to think about, okay, well, what steps are we actually taking to increase or improve the lethality of our forces and thus act on the right side of the cost exchange ratios?

What new offensive capabilities and decoys are we developing? What capabilities are we transferring to our allies and encouraging them to produce? What innovative, what areas, at least, of innovation or areas of warfare do we think it's really important to dominate, and therefore where do we want to be most innovative?

And then what--what results do we want to see in China? How do we want the PRC? What do we really expect to get from these improvements, these areas of competitive advantages, or the competitive space that we've opened up where we have advantages to press? So we have expectations about how they'll respond to our behavior in those areas. For instance, we expect them to have to invest more in defensive systems rather than in offensive systems that threaten us.

Or we expect them to have to invest more in internal security rather than external military capacity, again, which is more threatening, or we expect them to invest in systems that are much more expensive than our counters, say more defensive systems that aren't on the right side of the cost exchange ratio with regard to these missiles and decoys. We have to track is that effect being arrived at?

COMMISSIONER TOBIN: Right.

DR. DEAL: And so that requires both open source and probably classified tracking of their behavior over time, and we have to see, you know, when we stimulate them in this way, do we get the response that we hope for? So we have to watch what we do, where we spend our money, what we build, how we signal it. That's another big important question.

You know we can spend money and build things, and if they don't see it or they don't get the message--

COMMISSIONER TOBIN: Right.

DR. DEAL: --we're not going to have the desired effect so we have to figure out what's our communication strategy, our information strategy.

Are we going to do exercises? Are we going to have tweaks? Are we going to have declarations, new declaratories, declaratory policies? Are we going to test certain things? And then again what's the desired impact or effect on them, and can we see that they have actually had that effect or not? Do we have to switch? Did we have a good idea? It didn't work out.

So we need to have, as you said, we have to sustain this over time. We have to be focused and diligent, and that's what it would mean to implement the new defense strategy, and somebody has to, I think, ensure that that happens. Whether it's Congress--it seems like it could be Congress or I guess it could be the White House or the Secretary of Defense and the Defense Department itself, but usually it's helpful if there's some push or encouragement.

COMMISSIONER TOBIN: Right. And could it be, because you argue, Dr. Hicks, for a defense trade strategy that you could hook in with this.

So what are your thoughts?

DR. HICKS: Yes. You beat me to the punch. I feared I was going to have to argue for strategies twice, which is always bad for a strategist to just say we should have a strategy.

[Laughter.]

DR. HICKS: So I apologize. But I think, I agree with everything that Dr. Deal said, and I think she would agree with what I'm about to say which is that's all part of a virtuous cycle of strategy. Strategy is not stagnant. Strategy is not, you know, a point in time. It's about a virtuous cycle of sensing, you know, developing objectives, figuring how you're going to execute them, and then assessing it, and it's continuous; right? It's a campaigning framework, if you will, that she's describing.

And I also think she would agree that ideally in this instance in which we're talking about competition, it's a whole-of-government.

COMMISSIONER TOBIN: Right.

DR. HICKS: A whole-of-government, but at a minimum it's a whole-of-government approach. Back to my point about a big piece of this ought to be the economic element, defense-trade or trade in general, you know, human rights agenda, what are all the pieces of how the United States can think strategically about how to compete and win against China, if that's what expanding competitive space means although I look forward to the department explaining what it means too.

I like shrinking competitive space. So I'm having trouble with their construct. But I think what they're trying to say is they want to be able to escalate horizontally and that's a whole other set of issues to get into.

But I think the idea that we have to compete, and we have to be thinking very broadly about how we compete is right, and that--and it does mean that you have to have some push in the system to say, okay, you said this is what you want to do, now let's hold your feet to the fire; how are you doing at it?

COMMISSIONER TOBIN: Right.

DR. HICKS: Show us what it is you're measuring and how we're progressing. I would just say it shouldn't be only the Defense Department and we'll just keep doubling down on what we've been doing for awhile, which is there's really only one leg to rebalance, which is the defense leg.

COMMISSIONER TOBIN: Right.

DR. HICKS: And that's having trouble too, but it's a problem when it's the only leg.

COMMISSIONER TOBIN: And if the PRC has whole-of-government and whole-of-nation focus, that's why we need to begin to get to at least whole-of-government and informed nation too.

DR. HICKS: Yeah. We know, just taking the gray area or competition below the threshold of conventional war piece, whether it's China or Russia or Iran, they do it differently.

Or North Korea. But they are accessing and integrating elements of power in a way we are not, to our extreme disadvantage. So we should fix that as a priority.

COMMISSIONER TOBIN: Thank you.

MR. NURKIN: Very briefly. I think two thoughts come to mind. One is I think Dr. Deal and Dr. Hicks have very comprehensively treated the topic, but don't underestimate the power of competitive strategy. How do we get China to compete in competitions that we're going to win?

COMMISSIONER TOBIN: Yes, good.

MR. NURKIN: And the answer is not, you know, say that and then immediately say I don't have the answers.

[Laughter.]

MR. NURKIN: Don't hold me to that. But I do think understanding--again, it's understanding. We know what some of their vulnerabilities are, we know what some of the risks are, we know what some of their strengths are, but understanding how they all interplay and how they can be exploited. Some of them you wouldn't want to because it would be inhumane, but others you can. How do you force China into competitions where we've got the advantage?

The other thing I would say is some of these things are not about technology clearly. I think Dr. Deal mentioned operational concepts, but this is a big deal for how we can ensure resilience and how we can maybe get them to do, behave in ways we want them to. Distributively validate, for example, and putting more anti-ship cruise missiles on our ships makes China put more defensive weapons on their ships, which means they have fewer offensive weapons.

COMMISSIONER TOBIN: Right. Right.

MR. NURKIN: So all that. So I think we need to think in that kind of context as well. What else makes the capabilities, not just the technology.

COMMISSIONER TOBIN: I really like the concept of the metrics and the signaling is critical, too. Thank you.

VICE CHAIRMAN BARTHOLOMEW: Okay. Senator Goodwin.

COMMISSIONER GOODWIN: Thank you.

I'm going to continue my inward focus for the day. I want to return back to the National Defense Strategy assessment that I alluded during our last panel. And it found that inter-state strategic competition has replaced terrorism as the primary concern of the U.S. national security.

And China is that inter-state strategic competitor that we're facing. And I think the juxtaposition of that assessment against some of the other things that we've heard today and we've seen in the news everyday from Chinese state-owned enterprises setting up research centers in Silicon Valley as part of their AI effort, to an \$80 billion investment in a natural gas storage hub. I just, how do we strike that balance between, Dr. Deal, as you said, our paramount priority should be countering their efforts to establish this strategic space? How do we do that in the face of these economic realities?

DR. DEAL: It's a really good question, maybe the ten hundred billion trillion gazillion dollar question. I think, you know, the NDS did us a favor. I think Chinese behavior is doing us a favor, as people start to confront what it means to do business in China, what it means to have the Chinese system spread, when they see what kind of deals are being struck in the Belt and Road Initiative, and how the lion's share by far of the laborers are Chinese, and the terms turn out to be really beneficial to China, especially if payments aren't made and the territory goes to China.

These are not win-win kind of, despite what the Chinese claim, deals. So I think people are waking up to the reality that there are serious risks involved in doing business with China, not to the point where there is such a stigma that, you know, American firms won't set up research centers in China or invite Chinese money here, but we're getting closer and closer.

I mean if I were in Beijing, I'd be worried about this reckoning that's coming. In fact, they do anticipate there's a time where, you know, the period of strategic opportunity will end, and they will come under, they will find it much more difficult to gain access to foreign know-how, intellectual property, technology, and in some ways I think their behavior is hastening that day's arrival.

So maybe the best we can do is prepare ourselves for that day. I think they're preparing for that day in all sorts of ways. That's part of the Belt and Road expansion is to try to lock in relationships and access resources and markets, and we should also think about how the world could look very different if we wake up because the Chinese do miscalculate and overstep and do something so aggressive that we have no choice but to respond, either to one of our allies or another third-party, and we're going to wake up, and it's going to be a very different world than the world today.

And that's not satisfactory. It would be better if we could, you know, avoid that world by--and also render China a less dangerous competitor by denying them access to the things that they are getting access to today, but I mean I guess that's what the conversation was about with regard to export controls and CFIUS and, you know, having more hearings shining light on all these issues.

So I'm a huge fan of the Commission and your work because I think you do that. I'm sure that the NDS was inspired, you know, in part by your work. So I think we're getting there for better or for worse, but it is the question. It's a very important question.

I guess one way to look at it is we've thought of ourselves as both engaging and hedging or balancing, and Professor Aaron Friedberg from Princeton has said, you know, it's not that we need to totally cut off the engagement piece, but we certainly need to think about rebalancing.

You know we've gone a little bit overboard on the engagement and the openness and the access to markets and technology while probably minimizing the balancing of the harder-edged, let's be serious about the competitive aspects of the relationship parts of it. And it's always easier to be friendly, but we also have to wake up to the reality that that's what I'm trying to stress. Their intentions toward us don't seem to be benign.

They intend to remain socialists with Chinese characteristics. The Communist Party wants to stay in power. That means, just by virtue of our existence as a democracy, they see us as a threat, an existential threat. So that's a real problem. That's a structural issue that can't be overcome by, you know, efforts to reassure.

DR. HICKS: I apologize. I didn't hear the last panel so I hope this is on point. There are two things I wanted to say. One is back to the issue of on economics. I'll just repeat what I said in my testimony and expand a little bit that it's very important that we have those sticks and recognize the competition economically and the extractive nature. We can exploit, if you will, the extractive nature of what the Chinese are doing to expose that.

But, you know, for many of these other countries, for many of our companies here in the U.S. who see advantage in working with the Chinese, you can't beat something with nothing. So the U.S. if it focuses entirely on a stick approach economically, it's not going to win. We cannot win that way. We can't just simply say here's everything China is doing, and we're really mad about it. We have to actually have a positive economic agenda, and so what is that agenda?

For awhile, it was TPP. I think the Japanese and others are going to move forward--I do--with TPP-11, and maybe the U.S. will decide to get on board that. But we're going to have to have some kind of strategy that marries the carrots and sticks that they want.

Then, too, on the NDS, just because you raised it, not having been here for the last panel, I do hope you are, it has been impressed upon you or you have impressed upon yourselves that the National Security Strategy and State of the Union treat terrorism in the Middle East very differently than the National Defense Strategy. And so there's a tension there.

And obviously the way in which we are operating today, we have forces in Afghanistan and Syria-Iraq theater that we expect to have continue for some time. It's certainly not at the level that they were at the height of the Iraq and Afghanistan war, but if you look back at the 2012 DSG, which I noted in my opening bio I was the author of, primary author of, that document assumed we would be able to get out of the Middle East too.

And that's not what happened. So I just think you see tension inside the administration, and that's a caution not that I think we shouldn't be able to do those things, but that it may be very difficult, and to the extent that we can't, the words on the paper about rebalancing or competing or focusing on China, they're going to have real trouble being enacted, even at the resource level that's just been requested because we're using our force very differently than how those words look on the page.

COMMISSIONER GOODWIN: Thank you.

VICE CHAIRMAN BARTHOLOMEW: All right. No. Nothing to add. You don't have to.

[Laughter.]

VICE CHAIRMAN BARTHOLOMEW: So first I would really like to commend all of you for your diplomatic skills in addressing what I would say are rather unusual circumstances that we are facing here with our own government as it functions overseas and functions here at home.

So I commend you on that. I have one thing I just want to follow up on, and then we'll let you all, we'll liberate you all unless people have a second round of questions. I'm thinking about how dependent is our DoD on U.S. commercial technology research and development?

And I'm thinking of it in part, Jackie, you mentioned these companies that are getting pulled back on the ads that they've done. They're getting whacked for saying things that the Chinese government doesn't like that they're saying.

And we know that companies have been forced to do technology transfer one way or another. What I'm just finding myself wondering is are we going to face a circumstance where the commercial companies that are working on innovation, the kinds of innovation, AI, robotics, all of these things, might be pressured by the Chinese government to not work with the U.S. government on some of these things?

MR. NURKIN: It's possible. I think in the current environment, we should consider all options. But so I think that if I were to have any additional comments to the previous question, it is to highlight the importance of incentives, so particularly with our commercial industry. Their incentive is to go sell to the Chinese massive market and make lots of money. So how do you--they can't just be punished, as Dr. Hicks said.

So I think finding ways to incentivize the commercial industry to work with DoD, with the U.S. government, and actually right now my impression is not that the bigger risk is that China coerces and coopts our industry. It's that we are not effective, that we don't have enough engagement with the high-tech industry, right, that we've made it so hard--although this is

changing--but previously made it so hard for these companies, which move very quickly and like to see profit margins that probably are different than the ones you get in the federal space.

And we need to make it easier for them to engage with us and incentivize them to keep those secrets. But that's my impression is the bigger risk is really that we miss the opportunity, the advantage that we have, with this remarkable industry that's given so many remarkable things.

VICE CHAIRMAN BARTHOLOMEW: Jackie, anything?

DR. DEAL: I agree. I mean I think the other risk is we have all of these major companies that have, as we've talked about, innovation hubs overseas and labs all over the place, and as the FBI director just testified, we have a system that's very open and treats science and research as a kind of sacrosanct sphere where the goal is truth, not national advantage, but we're dealing with a state that believes that its overseas nationals want it and are there to pursue China's national advantage.

Even people who are American citizens, and I'm sure many of them resist that impulse and are caught in that, but they're still subject to pressure, and I don't know that we've come up with a response to offset that pressure or protect them or to target or to be vigilant against those who are part of their system and are actively working for it.

DR. HICKS: I agree with both sets of comments and just to go back to Tate's original comments, if you talk to folks working out whether it's Silicon Valley or Austin or wherever, China has just spent a huge amount of money there. So, yes, there is a coercion concern. I do think that's real. But they're just getting bought up too. So the technology is created, the innovation exists, and then the Chinese can extract it because they are there, and they're spending the money, and the United States government is not doing something.

VICE CHAIRMAN BARTHOLOMEW: All right. Any other, second round of questions from my colleagues? If not, thank you all very much, very interesting. I think we all have a lot of issues we need to continue to work on and we look forward to having additional contact with you all.

Thank you. With that, we'll adjourn for today. Our next hearing is--is it March 8--March 8. Thanks very much.

[Whereupon, at 4:06 p.m., the hearing was adjourned.]