



China's Incomplete Military Transformation

Assessing the Weaknesses of the
People's Liberation Army (PLA)

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Kristen A. Gunness, Scott Warren Harold, Susan Puska,
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NATIONAL SECURITY RESEARCH DIVISION

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Preface

Since the mid-1990s, the People's Republic of China has invested enormous resources in developing the People's Liberation Army (PLA) into a modern force that can secure various national interests both at home and now increasingly abroad. The stunning U.S. victory in Operation Desert Storm (Iraq) in 1991; U.S. involvement in the 1995–1996 Taiwan Strait Crisis; and U.S. military intervention in Kosovo in 1999, during which the United States accidentally bombed the Chinese Embassy in Belgrade, motivated Chinese leaders to invest considerable resources in the transformation of the PLA into a more modern, professional, and operationally capable fighting force. These conflicts bluntly demonstrated to the People's Republic of China that it lacked a military that could effectively fight and win wars against modern opponents, especially adversaries who could effectively harness the information revolution and successfully conduct joint operations. Although the modernization drive is now over two decades old and has yielded impressive results, numerous weaknesses persist. This report assesses many of the weaknesses in the PLA's human capital and organizational realms, in the PLA's combat capabilities across various domains (land, sea, air, space, cyber, and electromagnetic), and in China's defense research and industrial complex. It does so by examining how these weaknesses affect the PLA's performance of missions Beijing tasks or may task the force to carry out and by reviewing Chinese assessments of the PLA's shortcomings and their potential implications. This study should be of interest to military analysts, policymakers, lawmakers, or

anyone interested in Chinese military affairs and their security implications for the United States and its allies and partners.

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Contents

Preface iii

Figures and Tables..... vii

Executive Summary ix

Acknowledgments xv

CHAPTER ONE

Introduction: The Importance of Understanding the People’s Liberation Army’s Weaknesses..... 1

Defining Weakness 2

Sources and Methodology 3

Limitations of Sources and Knowledge Gaps..... 7

Organization of This Report..... 11

CHAPTER TWO

People’s Liberation Army Modernization: Mid-1990s to 2025 13

People’s Liberation Army Modernization Since the 1990s..... 13

Likely Trajectory of People’s Liberation Army Modernization Through 2025..... 19

Factors That Could Change the Direction of People’s Liberation Army Modernization..... 21

CHAPTER THREE

Missions of the People’s Liberation Army..... 25

The People’s Liberation Army’s Strategic Objectives..... 25

People’s Liberation Army Mission Sets, Relevant Campaigns, and Intended Campaign Effects..... 27

People's Liberation Army's Capabilities to Conduct Missions Through 2025.....	39
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CHAPTER FOUR

Weaknesses in People's Liberation Army Organization and Human Capital.....	43
Potential Weaknesses in People's Liberation Army Organization and Human Capital.....	44
Impact on the People's Liberation Army's Ability to Achieve Its Missions	60
How the People's Liberation Army Is Attempting to Address These Weaknesses.....	61

CHAPTER FIVE

Weaknesses of People's Liberation Army Combat Capabilities.....	69
The Two Incompatibles and the Two Gaps	69
The Land Domain	74
The Sea Domain.....	87
The Air Domain.....	101
The Space, Cyber, and Electromagnetic Domains	114
Nuclear Deterrence	119

CHAPTER SIX

Weaknesses in China's Defense Industry	125
China's Improving Defense Industry Capabilities	125
Weaknesses of China's Defense Industry.....	126
Potential Impact of Weaknesses in China's Defense Industry.....	133

CHAPTER SEVEN

Conclusion: People's Liberation Army Weaknesses and Their Implications.....	135
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APPENDIX

Critical Assumptions.....	139
Abbreviations.....	147
References	151
Index	173

Figures and Tables

Figures

4.1.	PLA Manpower, 1990–2014	54
5.1.	Numbers of PLA Main Battle Tanks, by Generation, 1990–2014.....	78
5.2.	Comparison of Main Battle Tank Inventories Possessed by China’s Neighbors, 1990–2014	79
5.3.	Numbers of PLA Air Defense Surface Combatants by SAM Range, 1990–2014.....	89
5.4.	Comparison of Principal Surface Combatants Possessed by China’s Neighbors, 1990–2014	90
5.5.	Numbers of Modern and Legacy PLA Fighter Aircraft, 1990–2014.....	102
5.6.	Comparison of Fighter and Fighter Ground Attack Aircraft Possessed by China’s Neighbors, 1990–2014.....	103
5.7.	Numbers of PLA Special-Mission Aircraft by Role, 1990–2014.....	111

Tables

4.1.	Major PLA Organizational Changes	58
5.1.	The Impact of Identified Land Domain Weaknesses on PLA Missions.....	84
5.2.	The Impact of Identified Sea Domain Weaknesses on PLA Missions.....	95

5.3. The Impact of Identified Air Domain Weaknesses on
PLA Missions 108

Executive Summary

The People's Liberation Army (PLA) has undergone a remarkable transformation since the mid-1990s. With most of the attention currently devoted to the PLA's growing capabilities, it is easy to forget that, in the 1980s and 1990s, the PLA was not only saddled with outdated equipment but also hamstrung by problems with personnel quality, poor training, and the distractions and massive corruption associated with involvement in an array of commercial activities. Reflecting the high priority attached to modernizing the PLA, sustained increases in defense spending, reaching double-digit percentage increases in most years, have fueled the PLA's rapid progress since the mid- to late 1990s. Along with the substantial resources China is devoting to national defense, the PLA's progress has been impressive overall, and the PLA is clearly becoming an increasingly professional and capable fighting force. It is thus understandable that assessments of the PLA tend to focus on the achievements of its rapid modernization over the past two decades. Analysts have devoted insufficient attention, however, to studying the PLA's persisting weaknesses and vulnerabilities.

We have found that the PLA suffers from potentially serious weaknesses. These shortcomings could limit its ability to successfully conduct the information-centric, integrated joint operations Chinese military strategists see as required to fight and win future wars. Chinese military writers and outside analysts generally agree that these weaknesses fall into two broad categories. The first is institutional. The PLA faces shortcomings stemming from outdated command structures, quality of personnel, professionalism, and corruption. The second

set of weaknesses centers on combat capabilities. These shortcomings include logistical weaknesses, insufficient strategic airlift capabilities, limited numbers of special-mission aircraft, and deficiencies in fleet air defense and antisubmarine warfare. Although the PLA's capabilities have improved dramatically, its remaining weaknesses increase the risk of failure to successfully perform some of the missions Chinese Communist Party leaders may task it to execute, such as in various Taiwan contingencies, maritime claim missions, sea line of communication protection, and some military operations other than war scenarios.

Our premise was that understanding where the PLA falls short of its aspirations, or perhaps has not fully recognized the need for improvement, is just as essential as understanding the PLA's strengths. The PLA is increasingly capable of threatening its neighbors and holding U.S. bases and other high-value assets at risk, but shortfalls threaten its ability to accomplish many of its assigned missions. It is also important to know what Chinese military officers think about the PLA's shortcomings: Understanding the PLA's self-assessments can enable U.S. planners and policymakers to respond more effectively to the challenges China's impressive, but incomplete, military transformation poses.

Assessing a rapidly modernizing military's emerging operational concepts and capabilities in peacetime is a difficult analytical task, but understanding that military's shortcomings is perhaps even more complex. Some weaknesses are readily apparent in the form of a brittle capability or a single point of failure, but other weaknesses truly manifest themselves only when a gap exists between the requirements of a mission and the actual ability of a military to perform it. Indeed, accurately and completely assessing PLA weaknesses requires understanding the various missions and the potential threat environment in which the missions may be conducted. Far from the infantry-centric army of the past, which sought to draw invaders deep into Chinese territory to fight a guerilla war, the PLA today performs an increasing number of missions that span the spectrum of conflict and military operations other than war both at home and, increasingly, regionally and globally.

Although the PLA has dramatically improved its ability to perform assigned missions, including countering U.S. military intervention, if necessary, we found that a number of serious challenges remain.

The PLA itself seems to be well aware of its shortcomings. Indeed, PLA publications are replete with references to problems in many areas, and discussions of these problems often highlight what Chinese writers refer to as the “two incompatibles,” reflecting their assessment that the PLA’s capabilities are still unable to (1) cope with the demands of winning a local war under informatized conditions and (2) successfully carry out the PLA’s other missions.¹

Chinese military writers, as well as expert foreign observers, note that many of the key weaknesses of the Chinese armed forces stem from shortcomings in organizational structure and the challenges involved in bringing the PLA’s human capital up to the proficiency levels required to perform its missions effectively. The PLA’s organizational structure is often portrayed as an obstacle to greater “jointness” and to the PLA’s ability to execute modern informatized military operations. Weaknesses in the realm of human capital include continuing concerns about insufficient educational accomplishments and levels of technical proficiency among soldiers and officers; shortcomings in the realms of mental and physical health; and problems with corruption, morale, and professionalism, including difficulties accepting military discipline and maintaining operational security.

The PLA also faces shortfalls in terms of its combat capabilities. Many Chinese strategists identify the inability to conduct integrated joint operations at the desired level of competence as the central problem China faces as it aspires to project combat power beyond its land borders. Indeed, Chinese sources highlight several problems that contribute to the PLA’s shortcomings in the area of joint operations and suggest that there is still a large gap between China and developed countries’ militaries, especially the United States. PLA publications also highlight continuing shortfalls in training, despite years of effort to make training more realistic and more valuable in terms of addressing shortcomings and improving the PLA’s operational capabilities.

¹ *Informatized conditions* is a PLA concept characterized by a “system-of-system operations . . . [focus that] 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, 2014, p. 9).

In addition, the publications point to persistent challenges in combat support and combat service support functions and forces, as reflected by frequent discussions of shortcomings in logistics and maintenance capabilities that appear in PLA newspaper reports and journal articles.

Many shortfalls specific to China's naval and air forces remain despite major advances in their capabilities in recent years. While the People's Liberation Army Navy's (PLAN's) new surface combatants and submarines boast impressive capabilities comparable with those of a modern world-class navy, the PLAN still faces a number of challenges. These exist in such areas as the integration of increasingly complex modern weapons and equipment platforms; the training of PLAN personnel, who currently are not fully equipped to operate or maintain them; and the mastery of such capabilities as antisubmarine warfare and amphibious operations. The People's Liberation Army Air Force has similarly made enormous strides but must still cope with such challenges as a large force comprising multiple generations of aircraft, a shortage of key special-mission aircraft, unrealistic training, and insufficient strategic transport capability.

The PLA also faces potential weaknesses in its ability to protect Chinese interests in space and the electromagnetic spectrum and to operate successfully in these areas to support military campaigns requiring information dominance. Indeed, as China places more and more satellites in orbit, the PLA is becoming more dependent on space capabilities for such important functions as intelligence, surveillance, and reconnaissance; navigation and positioning; and communications. Chinese military publications suggest that the PLA still sees itself as less dependent on space than the U.S. military but also appear to recognize, albeit largely implicitly, that increasing reliance on space brings greater vulnerability. China also sees itself as potentially vulnerable in the electromagnetic spectrum. One area in which this concern has been particularly pronounced is Chinese concern about cybersecurity weaknesses. Indeed, the PLA clearly views itself as occupying a relatively disadvantageous position due to its perceived inferiority in the key aspects of "network military struggle." This problem may become more pressing as the PLA increases its reliance on technology that is

potentially vulnerable to disruption, thus creating a weakness an adversary could exploit.

Although China's defense industry has made tremendous progress in terms of its ability to deliver advanced weaponry and equipment to the PLA over the past two decades, it also suffers from a number of problems that have yet to be resolved. Indeed, China's defense industry is still in transition from central planning to a more market-oriented system, and many major obstacles remain to be tackled. The main problems the defense industry faces include widespread corruption, lack of competition, entrenched monopolies, delays and cost overruns, quality control problems, bureaucratic fragmentation, an outdated acquisition system, and restricted access to external sources of technology and expertise.

The PLA can be expected to attempt to address these self-assessed weaknesses and vulnerabilities and to develop new capabilities to fill gaps in its ability to protect China's expanding international interests. As the PLA continues to modernize, it is critical for U.S. analysts, planners, and decisionmakers to improve their understanding of the PLA's shortcomings—and how the PLA itself sees these weaknesses and vulnerabilities. This is key to identifying the PLA's future modernization paths; enhancing military-to-military engagement; tailoring deterrence strategies to be the most effective in influencing the Chinese leadership's decision calculus; and if deterrence fails, exploiting the PLA's weaknesses to ensure the United States and its allies are able to prevent China from using force to achieve its policy objectives.

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Introduction: The Importance of Understanding the People's Liberation Army's Weaknesses

Much of the growing scholarly and analytical attention devoted to the Chinese People's Liberation Army (PLA) focuses on improvements in its capabilities; the military modernization of the People's Republic of China (PRC) has achieved impressive results since the 1990s. In recent years, observers have chronicled China's deployment of increasingly capable equipment, including modern multimission surface ships; advanced submarines; more-modern fighter aircraft; and conventional cruise and ballistic missiles, including an antiship ballistic missile (ASBM) designed to target U.S. aircraft carriers (Office of the Secretary of Defense [OSD], 2014). Scholars and analysts have also highlighted Chinese efforts to enhance the PLA's command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems and its space and cyber warfare capabilities (for example, Pollpeter, 2012, and Tellis, 2007). Other studies have highlighted China's transition to a more-credible nuclear deterrent force. In addition, a number of studies have addressed improvements in PLA "software," such as in the areas of personnel quality, education and training, and joint operations capabilities (for example, Ayuso and Henley, 2014).

It is certainly understandable that assessments of the PLA typically focus on the achievements of its rapid modernization over the past two decades, but studying its weaknesses and vulnerabilities is equally essential. It is also important to know what Chinese military officers think about the PLA's shortcomings. In particular, better understanding of how the PLA itself sees these weaknesses and vulnerabilities is

key to understanding its future modernization priorities; enhancing military-to-military engagement; tailoring deterrence strategies to be the most effective in influencing the Chinese leadership's decision calculus; and if deterrence fails, exploiting these weaknesses to ensure that the United States and its allies will be able to prevent China from using force to achieve its objectives.

Understanding the PLA's weaknesses is clearly important, but assessing a rapidly modernizing military's shortcomings is not straightforward. Some weaknesses are readily apparent in the form of a brittle capability or a single point of failure, but other weaknesses truly manifest themselves only when a gap exists between the requirements of a mission and the actual ability of a military to perform it. Indeed, to accurately and completely assess PLA weaknesses, it is essential to understand the various missions assigned to the force and the potential threat environments in which these missions may be conducted.

Defining Weakness

For the purposes of this report, *military weakness* can take three forms: (1) outright inability to perform a mission, (2) high risk of mission failure, or (3) inefficiencies that degrade mission outcomes.¹

Clausewitz (1984, p. 95) famously stated that the “end for which every soldier is recruited, clothed, armed, and trained, the whole object of his sleeping, eating, drinking, and marching is simply that he should fight at the right place and right time.” This is as true of the soldiers in the PLA today as it was for the Prussian army in Clausewitz's time. Keeping this in mind, the most obvious weakness that might assail the PLA (or any military force) is the very inability to fight or, to take some liberty with the above quote, to perform missions where and when called on to do so. Utter inability to perform a mission constitutes the

¹ This definition is only intended to provide a functional, policy relevant means of considering weakness as it relates to the realm of military affairs. Furthermore, it is not intended to be PLA specific but rather applicable to all militaries.

most severe form of military weakness.² We refer to this as a Type 1 weakness.

Weaknesses are also present if the mission has a high risk of failure. This type of weakness might originate from an external source, such as the threats an adversary's relative military capabilities or the operating environment itself might pose.³ The source might also be internal, derived from reliance on single points of dependency. Such weaknesses might be known ahead of time and would therefore constitute calculated (or reckless) risks. Pressing ahead in this instance is a form of gambling. Alternatively, weaknesses might be recognized only in retrospect, when decisions to press ahead have been made in ignorance. We refer to this as a Type 2 weakness.

The third form of military weakness occurs when inefficiencies in military capabilities degrade a military operation's outcome. These inefficiencies could originate from numerous sources (processes, personnel, equipment, leadership, force structure, etc.) and are often, although not exclusively, due to factors within a military. Unlike the binary nature of the first weakness mentioned, this weakness is usually recognized through comparison, either by comparing one military's performance to another's or by using some other measuring stick. Although problematic, this form of weakness is the least severe because the probability of (eventual) mission achievement is the highest. We refer to this as a Type 3 weakness.

Sources and Methodology

Our methodology is empirical and inductive. Our approach relied on the collection, synthesis, and analysis of a wide range of Chinese military publications, including volumes on military strategy and campaigns, journal articles, and newspaper reports. We also reviewed unclassified U.S. government and foreign government publications

² This should not be confused with effort, as a military may exert considerable effort but still fail.

³ Numerous militaries, even in the 21st century, cannot effectively fight at night.

that address various aspects of Chinese military modernization, such as the U.S. Department of Defense's (DoD's) annual reports on military and security developments involving the People's Republic of China, various assessments by the National Air and Space Intelligence Center (NASIC) and the Office of Naval Intelligence (ONI), and previous RAND research on the transformation of the PLA. In particular, such publications helped us corroborate the material that appears in Chinese self-assessments and facilitated the exploration of weaknesses Chinese sources may overlook, as discussed in greater detail later.

Regarding primary sources, this analysis relied on official documents, such as Chinese defense white papers, and on key PLA publications on military strategy and campaigns. Some of the Chinese military books we relied on most heavily in areas related to military strategy are the three editions of *The Science of Military Strategy* (Gao Rui, 1987; Peng Guangqian and Yao Youzhi, 2005; and Shou Xiaosong, 2013), which were published by Military Science Press, the publishing house of the PLA's Academy of Military Science.⁴ We consider these three volumes to be authoritative representations of PLA thinking on issues of military strategy. Furthermore, they are core textbooks in the PLA's masters-level professional military education curriculum taught to the cohort of midcareer PLA officers from whom the PLA's future general officers will be chosen.

With respect to issues related to campaigns, we relied most heavily on three sources:

1. *The Science of Campaigns* [战役学] (Wang Houqing and Zhang Xingye, 2000)
2. *The Science of Campaigns* [战役学] (Zhang Yuliang, 2006)
3. *Campaign Theory Study Guide* [战役理论学习指南] (Bi Xinglin, 2002).

To the best of our knowledge, these are the most authoritative publicly available sources on Chinese military thinking about the campaign

⁴ The 2005 English edition of *The Science of Military Strategy* is a direct translation of a 2001 Chinese-language edition of that work.

level of warfare. These books are not doctrinal publications, but we believe they are informed by Chinese military doctrinal publications, which are known as *campaign outlines* or *campaign essentials* [纲要], and that they are very likely to reflect official views on doctrinal issues. That said, doctrine is always evolving, and the PLA can be expected to continue to revise or update its doctrinal thinking along with changes in China's military strategic guidelines and the expected reform of the PLA's organizational structure.⁵

We also used a number of books and other sources that focus more narrowly on particular aspects of Chinese military modernization, specific types of operations, or certain components of the PLA. For example, two important books that specifically address strategic missile force issues are

1. *The Science of Second Artillery Campaigns* [第二炮兵战役学] (Yu Jixun, 2004)
2. *Intimidation Warfare: A Comprehensive Discussion of Missile Deterrence* [慑战—导弹威慑纵横谈] (Zhao Xijun, 2005).

The former is a detailed volume that covers virtually all aspects of missile force campaign operations, from deterrence actions to conventional missile strike campaigns and nuclear counterattack campaigns. The latter, edited by a former deputy commander of the PLA Second Artillery Force (PLASAF), covers a wide range of subjects related to the employment of the strategic missile force for deterrence and the intimidation of potential rivals.

We also reviewed more than 300 recent articles from authoritative Chinese Communist Party (CCP) and military journals and newspapers that discuss problems and shortcomings. These sources include such journals as *China Military Science*; *PLA Daily*; the official service newspapers and military region newspapers; and defense industry periodicals. The main Chinese military newspapers we used in the preparation of this report are the following:

⁵ On organizational restructuring, see “Full Text of 18th CPC . . .” (2013); “China Plans Military Reform . . .” (2014); Mulvenon (2014a, 2014b); and Heath (2014).

1. *Liberation Army Daily* [解放军报], the official newspaper of the PLA
2. *People's Navy* [人民海军], the official newspaper of the PLA Navy (PLAN)
3. *Air Force News* [空军报], the official newspaper of the PLA Air Force (PLAAF)
4. *Rocket Force News* [火箭兵报], the official newspaper of PLASAF.

Additionally, each of the military regions publishes a newspaper, of which we have consulted various editions:

1. *Advance News* [前进报], from the Shenyang Military Region
2. *Vanguard News* [前卫报], from the Jinan Military Region
3. *People's Armed Forces* [人民军队], from the Lanzhou Military Region
4. *People's Front* [人民前线], from the Nanjing Military Region
5. *Battle Flag News* [战旗报], from the Chengdu Military Region
6. *Soldiers News* [战士报], from the Guangzhou Military Region
7. *Comrade-in-Arms News* [战友报], from the Beijing Military Region.

Unlike similar discussions in the past that were vague and anonymous, most of these recent articles, presumably with Xi Jinping's encouragement or inspiration, discuss more openly the who, what, when, and where of the self-criticism related to continued military weakness. This may signify that, under Xi Jinping, China's leaders are more focused on identifying and correcting the PLA's weaknesses than they were under Hu Jintao's leadership.

We have attempted to evaluate the level of authoritativeness of the Chinese-language publications we cite here. Particularly as China's publishing landscape has become more complex and as the availability of Chinese language publications on military affairs has increased in recent years, it has become more and more important to attempt to ascertain whether a given publication reflects the views of an individual author or is more representative of broader thinking in the PLA. In all, these sources provide a broad view of Chinese military shortcomings,

although they have their limitations and still leave a number of important knowledge gaps.

Limitations of Sources and Knowledge Gaps

On the whole, we believe the sources on which we have relied paint an accurate picture of the PLA's strengths and weaknesses. Such documents as China's defense white papers and PLA professional military education publications present what we consider to be a reliable, highly authoritative description of the Chinese military's roles and missions and of the types of campaigns it must be prepared to execute. While professional military education publications are not doctrine, we assess that they are doctrinally informed and that they make up the curriculum of what the PLA is teaching its midlevel officers, including those who will ultimately become senior officers. With respect to human capital issues, the PLA newspaper articles and many of the other sources that address these problems are official publications aimed first and foremost at an internal audience.

While the available data provide an excellent window on relatively open assessments of the state of Chinese military modernization, the fact that these articles come from officially censored Party and military publications raises questions about the nature of some of the content. The repetitive pattern of the critiques seems to indicate preapproved talking points to shape the narratives, while excluding other topics and details. This raises questions about the political intentions—such as whether they are intended to support Xi Jinping's political agenda and, if so, whether they being used primarily to consolidate his power across the military rather than to discuss shortcomings critically. Is this a shift to greater openness as China's capabilities improve? Does it reflect substantive changes in China's quest for modern military power? Additionally, service newspapers offer considerable insight into areas that senior officers appear to recognize as requiring greater attention, but in most cases, they do not provide finely grained assessments. We believe it is reasonable to assume that, because these are unclassified Chinese publications, they probably do not talk about certain particularly sen-

sitive or otherwise potentially high-risk weaknesses and vulnerabilities that the PLA presumably wishes to conceal from outside observers.

Further deep mining of Chinese open sources (including books, professional journals, newspaper articles, and theses and dissertations) over a longer period could add further details on the problems being discussed across the services. On the other hand, we should also consider the elements of propaganda these may serve—disinformation and exaggeration—domestically and internationally. Domestically, these could be a push to energize change and break deadlocks in implementing reforms. Concurrently, at the international level, these may encourage complacency and debate to influence how Asia-Pacific neighbors and others view the challenges of China's rising combat power and, especially, to undermine the ability to formulate strategies individually or collectively to manage the challenges of a rising China.

Furthermore, the PLA certainly understands that these publications are also accessible to external audiences, which raises the possibility that at least some of the content is intended to influence the perceptions of foreign observers. However, we judge it is extremely unlikely that the PLA would be able to employ this vast body of literature primarily for denial and deception without confusing and misleading the PLA officers and other personnel who constitute the vast majority of the audience for these publications.

Capturing more detail from Chinese open sources will still not resolve all outstanding questions about China's current and future combat capabilities. Confirmation from direct and/or third-party observation is critically important. This information gap could be addressed to some degree by exploiting other open sources that discuss Chinese military capabilities in Russian and other third-party sources; exploiting information from military-to-military activities between China and other countries; and of course, collecting intelligence.

Chinese military publications are replete with references to areas in which PLA officers themselves acknowledge China's military still falls short of the requirements for a broader and more-complex set of missions. Yet these publications may not tell the full story, for a variety of reasons, so it is necessary to corroborate the self-assessments to the degree possible. To judge the extent that such publications offer accu-

rate insights into the PLA's actual shortcomings, we compared them with external assessments. The sources we used to corroborate the characterizations of PLA weaknesses that appear in Chinese publications include studies from think tanks and research institutions, such as the International Institute for Strategic Studies (IISS), the RAND Corporation, and CNA Corporation; congressional testimony and other public statements from senior U.S. military officers and intelligence officials; various unclassified reports from ONI and NASIC; DoD's annual reports on Chinese military power (Office of the Secretary of Defense [OSD], 2014, and earlier editions); and assessments of PLA modernization that appear in similar reports from the governments of Taiwan (Ministry of National Defense, Republic of China, 2013, and earlier editions) and Japan (Japan Ministry of Defense, 2014, and previous editions).

Further discussion in the relevant sections of this report will also discuss what these external sources have to say, if anything, about the weaknesses identified in PLA sources, to try to corroborate the validity of the Chinese-language primary sources. Specifically, our comparisons appear at the end of each of the sections that address potential weaknesses in the land, sea, and air domains. Overall, we found the PLA publications to be consistent with the judgments contained in these analyses of Chinese military modernization, and there is substantial overlap between the findings of outside analysts and the PLA's own assessments in a number of key areas related to the PLA's strengths and weaknesses. Indeed, in many cases, the outside assessments track relatively closely with self-assessments from PLA authors.⁶ Two prominent examples are the clear match between the judgments of outside observers and PLA sources that the PLA's command structure is in

⁶ Some external assessments of PLA capabilities and weaknesses were drawn in part from the same primary sources we examined and should therefore be seen as reflecting, rather than corroborating, the judgments that appear in the Chinese publications. We have attempted to ensure that we do not cite external judgments as corroboration when they appear to be based on the same Chinese primary sources we reviewed for this report. Additionally, we have attempted to address this problem by relying less on Western publications that depend largely on the same types of Chinese publications we reviewed in the course of this study and more on U.S. and foreign government assessments that draw on other sources of information.

need of reform and that the PLA still falls short of its desired capability to carry out “integrated joint operations.” It is notable, however, that we are unable to compare these publications to PLA self-assessments in some cases. For example, in some areas, the coverage does not overlap enough to make a clear judgment about the validity of the PLA’s own assessments of its weaknesses.

On the whole, we believe that our approach, despite its limitations, represents the best available way to address the research questions. There are, however, some potential problems our approach can mitigate but not fully address. For example, a number of possible weaknesses may not be discussed in PLA publications and may not be readily apparent or easily identifiable by outside observation, while others may be exaggerated for effect in PLA publications and may be difficult or impossible to independently verify. Because the objective of this report is to highlight potential weaknesses that an external audience might not otherwise recognize and because we believe that understanding the PLA’s subjective evaluation of its own weaknesses is important even if some of the PLA self-assessments may be mistaken or perhaps even deliberately over- or understated, we err on the side of including all available sources that appear to shed light on the research questions.

On the whole, we believe the available sources paint a fairly clear picture of the PLA’s sense of its own weaknesses, and in many cases, these track with the openly available assessments contained in a variety of external reports on the Chinese military. Where divergences exist, we believe the Chinese sources remain useful, even though it is possible that the PLA is attempting to deceive outside observers. If so, analysts may gain a better understanding of which capabilities or weaknesses the PLA may seek to exaggerate or conceal. It is also possible, however, that divergences could arise because the PLA may suffer from organizational or cultural biases that complicate self-assessments. In such cases, the perceptions of Chinese military officers still matter. Even if these subjective assessments do not correlate with actual weaknesses, they are still likely to inform the PLA’s thinking about its modernization priorities and are potentially relevant to efforts to deter China from using force to resolve disputes with its neighbors.

In the course of our analysis, we identified some important knowledge gaps that should be highlighted. One of the key knowledge gaps is the extent to which a rapidly changing military, one that is clearly becoming much more capable despite persistent weaknesses, may convince Chinese leaders that they have policy and strategy options they previously lacked. Another is how China's thinking about its defense requirements and the PLA's weaknesses might change in the event of a major shift in its threat environment, such as a sharp downturn in the U.S.-China relationship or a major deterioration of Sino-Indian relations accompanied by a perception of an increasing nuclear threat from India. The self-assessments the PLA presents to senior CCP leaders and how they interpret the judgments the PLA presents to them constitute another key gap that is not easy to fill using the available Chinese-language publications or the outside assessments in government and think tank reports. This is a particularly important issue because what the PLA tells Party leaders about its ability to perform various missions presumably influences Beijing's calculus about scenarios in which it might consider employing military power to achieve its national security objectives.

Organization of This Report

The rest of this report is organized as follows. Chapter Two details the overall scope and scale of PLA modernization since the mid-1990s and assesses its likely trajectory through 2025. Chapter Three presents an overview of the missions CCP leaders have assigned to the PLA. Chapter Four provides an assessment of the PLA's organizational and human capital weaknesses. Chapter Five provides detailed assessments of weaknesses in the PLA's operational capabilities in the land, sea, air, cyber, space, and electromagnetic domains and nuclear deterrence. Chapter Six offers an analysis of shortcomings in China's defense industry. Chapter Seven compares many of the potential weaknesses identified through examining PLA self-assessments with outside analysts' views and then highlights some final thoughts on the importance

of conducting further research on the PLA's weaknesses and strengths. Finally, the appendix outlines the assumptions for our analysis.

People's Liberation Army Modernization: Mid-1990s to 2025

To provide broader context for this assessment of the PLA's shortcomings, this chapter provides an overview of the overall scope and scale of PLA modernization since the 1990s, during which the PLA has undergone a rapid transformation characterized by a series of important changes in such areas as equipment, doctrine, personnel, and training. The chapter also assesses the PLA's likely trajectory through 2025.¹ Finally, it offers a brief discussion of internal and external events that might alter the direction of PLA modernization over the next decade.

People's Liberation Army Modernization Since the 1990s

The PLA has undergone a remarkable transformation since the 1990s.² With all the attention currently devoted to the PLA's growing capabili-

¹ It is important to note that the PLA is only one component of the PRC's armed forces. The other components are the People's Armed Police and the militia. The scope of this report is limited specifically to the PLA, which includes the PLA Army (PLAA), PLAN, PLAAF, and PLASAF and the PLA's leadership organizations, which are the military regions, Central Military Commission (CMC), and four general departments. Although we refer to the People's Armed Police and militia in passing when directly relevant to the discussion of issues falling within the scope of the study, we consider both organizations to be beyond the scope of this report.

² We chose the 1990s as the starting point for our assessment for several reasons, including the importance of the PLA's assessments of the 1991 Gulf War, the promulgation of China's new military strategic guidelines in 1993, and the increases in defense spending that date to this period. We acknowledge, however, that various other starting points could be used. Some analysts might prefer an earlier starting point, such as the period following China's

ties, it is easy to forget that, not long ago, the PLA was widely dismissed as a “junkyard army,” one that was not only saddled with outdated equipment but also hamstrung by problems with personnel quality, poor training, and the distractions and massive corruption associated with involvement in a dizzying array of commercial activities.

The PLA was well aware of these problems, which were thrown into sharp relief as PRC leaders assessed the outcome of the First Gulf War. This conflict not only highlighted the impressive performance of the U.S. military but also underscored the implications of major changes in the nature of modern warfare for the PLA. In 1993, China issued a new set of military strategic guidelines [军事战略方针] to provide guidance and direction for the PLA (Finkelstein, 2007). Yet even though China clearly recognized the key changes that were under way, the PLA faced many problems. Indeed, Chinese military officers and U.S. and international observers at the time reached largely similar conclusions about the PLA's principal weaknesses.³ Many observers viewed the PLA as unable to effectively execute its newly emerging doctrine for high-tech local wars and therefore incapable of successfully performing the tasks assigned to it by CCP leadership. Beijing reached similar conclusions about the implications of the PLA's shortcomings, and modernization of the PLA became a higher priority. Subsequently, Washington's involvement in the 1995–1996 Taiwan Strait Crisis highlighted the potential for U.S. military intervention in a regional conflict, and the accidental bombing of the Chinese Embassy in Belgrade

1979 border war with Vietnam, or Deng Xiaoping's 1985 reassessment of the international situation. Others might suggest that the most important trends only began to emerge later, perhaps following the 1995–1996 Taiwan Strait Crisis, which highlighted the likelihood of U.S. military intervention in the event of a cross-strait conflict, or after the May 1999 accidental bombing of the Chinese Embassy in Belgrade during Operation Allied Force, which convinced Beijing that the PLA would need more-advanced asymmetric capabilities to deter or counter any future military threats from the United States.

³ One representative study by a U.S. analyst characterized the PLA as severely constrained by its “short arms and slow legs,” borrowing a phrase a PLA officer had used to describe the Chinese military's many problems (Howard, 1999, p. 28).

in May 1999 convinced Beijing it needed to accelerate its development of asymmetric capabilities to deter or counter the United States.⁴

Reflecting the higher priority attached to modernizing the PLA, its progress since the mid- to late 1990s has been fueled by sustained growth in defense spending, reaching double-digit percentage increases in most years.⁵ In 2013, China's announced military budget was about \$119.5 billion. Most analysts believe China's actual military spending is higher than the announced figures, in part because the official budget excludes some important categories of expenditure, such as procurement of foreign weapon systems and equipment. DoD estimates that China's actual military spending in 2013 was more than \$145 billion (OSD, 2014, p. 43).

With the substantial resources China is devoting to national defense, the PLA is clearly becoming an increasingly professional and capable fighting force. The PLA has devoted considerable attention to modernizing its ground forces (see, for example, Blasko, 2007), but the most notable improvements have come in China's naval, air, missile, space, and C4ISR capabilities. The PLAN's surface ships have improved dramatically since the 1990s, when China began acquiring modern destroyers from Russia. In recent years, China has shed its reliance on imported surface ships and produced a number of classes of modern surface combatants, including guided missile frigates (FFGs) and guided missile destroyers (DDGs) with greatly improved antisurface and antiair warfare capabilities. Along with improvements to its surface fleet, the modernization of China's submarine fleet has focused on qualitative improvements resulting in a more-modern and -capable undersea warfare force. In addition, China commissioned its first aircraft carrier in September 2012.

Since the early to mid-1990s, the PLAAF has pursued an ambitious modernization program, one that has decreased the overall number of aircraft in its inventory but rapidly increased the number of

⁴ On the impact of the May 1999 accidental bombing of the Chinese Embassy, see Zhang Wannian (2011, pp. 414–421).

⁵ For a Chinese perspective on defense budgets and related issues, see Wu Xizhi and Huang Jing (2013).

modern combat aircraft either developed indigenously or acquired from Russia. Today, the PLAAF has more than 2,800 total aircraft, excluding unmanned aerial vehicles (UAVs). Among these are approximately 1,400 fighter aircraft, slightly fewer than one-half of which are modern.⁶ Although the PLAAF's inventory still includes a large number of older fighters, it is clearly moving in the direction of becoming a modern air force, one that some Chinese military writers have referred to as a "strategic air force" that is commensurate with China's growing influence and its emerging international interests (see, for example, Zhu Hui, 2009). In addition, the PLAAF is upgrading its older fighters and bombers, improving its capabilities to conduct such missions as airborne early warning and control (AEW&C); aerial refueling; strategic transport; and intelligence, surveillance, and reconnaissance (ISR), and is developing new capabilities, such as fifth-generation fighters and a wide variety of UAVs. The PLAAF is also fielding more capable air-to-air and air-to-surface missiles and upgrading its electronic warfare (EW) capabilities. In addition, it is making impressive improvements in its surface-to-air missile (SAM) capabilities, not only by importing advanced long-range SAMs but also by indigenously producing its own highly capable long-range SAM systems.

For decades after its formation in 1966, PLASAF fielded nuclear missiles that were outdated, few in number, and potentially vulnerable. In the 1990s, however, it assumed a conventional strike mission. PLASAF also began to focus on improving its nuclear deterrent capabilities. It has since progressed to an increasingly sophisticated and much more survivable arsenal of nuclear missiles capable of holding regional and continental U.S. targets at risk and has deployed the world's most numerous, diverse, and comprehensive conventional ballistic and cruise missile force.⁷

⁶ We define *modern fighter aircraft* as those fitting the commonly accepted Western definition of fourth generation and above. This includes the PLA's inventory of J-10, J-11, and Su-30 fighter aircraft. China's own definition of fighter generations is somewhat different.

⁷ For a brief overview of PLASAF developments from a Chinese viewpoint, see Jing Zhiyuan (2010).

Over the past two decades, China has developed impressive space, cyber, and EW capabilities. High-level official statements and a variety of Chinese military publications identify space and the electromagnetic spectrum as arenas in which China has growing national security interests at stake. These are also areas in which Chinese analysts believe China faces serious challenges and threats to its national security.⁸ In particular, Chinese strategists see space as an arena in which military competition is intensifying (Shou Xiaosong, 2013, pp. 178–188), and the PLA has made considerable progress in this area, including launching a range of satellites to support its military operations and developing multidimensional counterspace capabilities.⁹

PLA publications suggest that information dominance is the key to seizing the initiative in and ultimately winning informatized local wars and underscore the role not only of space but also of network and EW capabilities. Accordingly, for the PLA, preserving the ability to operate effectively in space and the electromagnetic spectrum while degrading or denying an adversary's ability to do so is an essential wartime task, and developing its capabilities in these areas serves China's interests by strengthening deterrence. Chinese military media reports frequently highlight the importance of training to operate in a "complex electromagnetic environment," reflecting the PLA's focus on preparing for conflicts in which cyber and EW will play vital roles. In addition, Chinese military publications reflect the view that the struggle for military advantage in cyberspace is growing both in importance

⁸ From a PLA perspective, Chinese military strategists see space and the electromagnetic spectrum as increasingly vital arenas for military competition because of their centrality in modern information-centric military operations. Some describe space as the high ground that both sides will seek to control because of its influence on the struggle for information superiority. Chinese analysts write that space systems serve as key enablers by providing support in such areas as ISR, early warning, communications, navigation and positioning, targeting for precision weapons, surveying and mapping, and meteorological support. Space systems thus serve as force multipliers that support joint operations and enhance the effectiveness of ground, air, naval, and missile forces. (See Pollpeter, 2012.)

⁹ Beijing has at its disposal a variety of capabilities that could be employed against an enemy's space systems. These include "soft kill" capabilities, such as jammers, and a "hard kill" capability in the form of the ground-launched antisatellite interceptor China tested in January 2007.

and intensity, as major military powers devote increasing attention to network reconnaissance, network attack and defense, and network deterrence (Shou Xiaosong, 2013, pp. 188–197).

Along with these impressive improvements in the PLA's hardware, Beijing has also emphasized updating the PLA's doctrine, as reflected by the issuance of "new generation operations regulations" in June 1999, an event that David Finkelstein of CNA Corporation views as a major step forward in what he terms the PLA's "revolution in doctrinal affairs" (Finkelstein, 2005). The PLA also undertook a series of improvements designed to increase the realism and complexity of military training. In addition, China ordered the PLA to divest itself of most of its business interests (Mulvenon, 2001), implemented a wide range of reforms in such areas as military education, and increased the PLA's participation in military diplomacy and other types of international military exchanges,¹⁰ initiatives that were intended to improve the professionalism of the PLA.

These improvements in Chinese military capabilities could pose serious challenges to the interests of the United States and its allies. As former Secretary of Defense Robert Gates observed:

Beijing's investments in cyberwarfare, antisatellite warfare, anti-aircraft and antiship weaponry, submarines, and ballistic missiles could threaten the United States' primary means to project its power and help its allies in the Pacific: bases, air and sea assets, and the networks that support them. (Gates, 2009)

Although the PLA has dramatically improved its ability to perform its assigned missions, including countering U.S. military intervention if necessary, it still faces a number of challenges. These include such problems as widespread corruption, which undermines confidence in the PLA's professionalism and could have negative repercussions for its operational capability, and an outdated command structure that constrains the PLA's ability to execute the integrated joint operations it envisions as crucial to its evolving doctrine for future military cam-

¹⁰ For Chinese perspectives on military exchanges and foreign relations, see Zhang Fang (2014) and Zhang Yingli (2009).

paigns. The PLA itself seems to be well aware that, even though its capabilities have improved dramatically, it still faces a variety of shortcomings. Indeed, PLA publications are replete with references to problems in such areas as personnel, training, education, organization, and logistics and maintenance. Discussions of these problems often highlight what Chinese writers refer to as the “two incompatibles,” reflecting their assessment that the PLA’s capabilities are still incompatible with the demands of winning a local war under informatized conditions and successfully carrying out the PLA’s other missions.¹¹

Likely Trajectory of People’s Liberation Army Modernization Through 2025

Over the next ten years, the PLA is likely to focus on addressing its self-assessed weaknesses and improving its capabilities to protect Chinese national interests at home and abroad. There will also be noteworthy improvements in PLA weapon systems and equipment, particularly in the such priority areas as the PLA’s naval, air, missile, and space capabilities.

PLAN will build new surface combatants to improve area air defense capabilities, a critical requirement for “distant seas” operations.¹² It will also add new submarines, including more Yuan-class air independent propulsion attack submarines and Type 095 nuclear-powered guided missile submarines. These submarines and some PLAN surface ships may have land-attack cruise missiles, which would bolster China’s conventional precision strike capabilities. China will likely make progress with its aircraft carrier capabilities as well, includ-

¹¹ For an overview of these PLA self-assessments, see Blasko (2013).

¹² *Near seas* refers to the Yellow Sea, South China Sea, and East China Sea. *Near seas defense* includes operations in the Yellow Sea, South China Sea, and East China Sea, as well as operations somewhat further afield that may be required to protect Chinese interests in the near seas. *Distant seas* or *far seas* refers to more-distant regions, and examples of distant seas operations include PLAN participation in antipiracy operations in the Gulf of Aden and the dispatch of a PLAN FFG to help escort Syrian chemical weapons destined for destruction. For a further discussion, see Erickson and Strange (2014).

ing embarking a carrier air wing on the Liaoning and developing domestically produced carriers. The PLAN will continue to expand its operations in the Pacific Ocean and the Indian Ocean. In addition, the PLAN will play an increasingly important role in nuclear deterrence as its nuclear-powered ballistic missile submarines (SSBNs) begin patrols (O'Rourke, 2013).

According to DoD, the PLAAF "will likely become a majority fourth-generation force within the next several years" (OSD, 2014, p. 9). It is also developing fifth-generation fighter capabilities, as reflected by its testing of the J-20 and J-31 stealth fighters. Over the next ten years, the PLAAF will likely introduce a number of other new capabilities into its inventory, improving its capabilities in such areas as large transport aircraft and UAVs.

The future direction of China's strategic missile force is likely to include improving its long-range conventional strike capabilities with the deployment of such systems as conventional intermediate-range ballistic missiles (IRBMs) (OSD, 2014, p. 40). PLASAF can also be expected to strengthen its nuclear deterrence posture with the addition of more road-mobile intercontinental ballistic missiles (ICBMs), including new road-mobile ICBMs capable of carrying multiple independently targetable reentry vehicles (MIRVs) (OSD, 2014, p. 7).

China is also likely to emphasize further development of its space and counterspace capabilities. China can be expected to continue expanding its space-based capabilities in such areas as ISR, communications, and navigation and positioning. In addition, China will likely continue to develop counterspace capabilities for strategic deterrence and to attempt to ensure its own ability to use space while limiting or denying an adversary's ability to do the same.

Beyond these force modernization programs, China under Xi Jinping is likely to promulgate its new military strategic guidelines for the PLA and to continue revising and updating PLA doctrine. The PLA can be expected to continue to improve its training and exercises and to strengthen its professional military education system. In addition, the PLA is rumored to be pursuing a major reorganization and restructuring of the command system to better prepare the PLA for future

“informatized” local wars and to help the PLA move toward its goal of being able to conduct “integrated joint operations.”¹³

All these developments are likely to contribute to further improvements in the PLA's overall combat capabilities. They will also make it a more credible force for deterrence and coercive diplomacy. In addition, they will likely improve its ability to conduct military operations other than war (MOOTW), such as counterpiracy, humanitarian assistance and disaster relief (HADR), and noncombatant evacuation operations (NEOs), which will enable the PLA to protect China's growing global interests more effectively.¹⁴

Factors That Could Change the Direction of People's Liberation Army Modernization

Although PLA modernization seems likely to proceed at least roughly along these lines over the next decade, a number of internal or external events could alter its direction. Internal events with the potential to change the focus of PLA modernization could include any number of domestic problems, such as the following:

- *A major slowdown in China's economic growth rate.* Since the 1990s, rapid economic growth has enabled China to increase its defense budget year after year while managing to maintain defense spending at a relatively low percentage of China's gross domestic product. This has allowed Beijing to devote growing resources to national defense without shortchanging other important categories of government spending. If China experiences a major slowdown in economic growth, however, this could create sharper trade-offs between defense spending and the government's other budgetary priorities. Additionally, if domestic problems, such as pollution and its associated health costs, continue to

¹³ For a brief overview, see Mulvenon (2014a).

¹⁴ For PLA perspectives on diversified military tasks and MOOTW, see, for example, Gai Shijin and Zhang Peizhong (2009) and Song Guocai, Shi Limin, and Yang Shu (2009).

get worse, pressure to spend more on these issues could increase, and competition for government budget resources could become more intense.

- *Worsening social instability or an increase in the number or severity of terrorist attacks in China.* If domestic instability increases to a level that the CCP sees as a serious threat to its grip on political power, this could require the PLA to focus much more heavily on domestic security missions. Similarly, increased frequency of terrorist attacks or even a small number of dramatic attacks with numerous casualties or other severe consequences could compel the PLA to devote more attention to domestic counterterrorism activities, potentially diluting its focus on its core deterrence and warfighting missions.
- *Extremely large-scale or serious violence or unrest in Tibet or Xinjiang.* If unrest in China's restive ethnic minority regions, especially Tibet or Xinjiang, increases to a level that exceeds what police and paramilitary forces are capable of handling, this could require large-scale PLA intervention that might need to take place over a prolonged period. This, too, could potentially make it more difficult for the PLA to focus on its external security missions.

Other events with the potential to alter the trajectory of PLA modernization over the next decade could include external developments, such as the following:

- *A sharp downturn in U.S.-China relations that heightens China's perception of the United States as a potential adversary.* China is already concerned that the United States seeks to contain China or otherwise check its rise to ensure that its growing power will not undermine U.S. interests. Chinese perceptions of the United States as a threat to its security could be intensified by a further downturn in the U.S.-China relationship. This could result from a regional crisis over China's maritime disputes with U.S. allies Japan or the Philippines; another incident between U.S. and Chinese aircraft or ships operating in close proximity, such as the 2001 EP-3 incident; or even another entirely unexpected occur-

rence, such as the May 1999 accidental bombing of the Chinese Embassy in Yugoslavia. Such a downturn could convince Chinese leaders they need to further increase spending on capabilities aimed at deterring the United States or countering U.S. military intervention.¹⁵

- *A deepening strategic rivalry with India.* Chinese security analysts tend to be rather dismissive of India's potential to seriously challenge Chinese interests, in sharp contrast to the attention Indian analysts devote to evaluating Chinese capabilities and intentions in the Indian Ocean region. However, such developments as a more confrontational political and diplomatic relationship with India, or unexpectedly rapid advances in Indian defense capabilities that appear relevant to dealing with China could potentially shift China's focus more heavily toward the Indian Ocean or its disputed border with India.
- *A failed attempt to use force against one of China's neighbors.* Although some unofficial Chinese commentators have suggested that a rapid and decisive use of force against one of China's weaker neighbors might bolster the PLA's warfighting capability by giving it more-recent combat experience and might perhaps serve as a useful deterrent to other countries that might otherwise be inclined to challenge Chinese interests, there is no guarantee that such a conflict would go as planned. Failure to rapidly and decisively accomplish its mission or complete failure could embarrass the PLA and potentially motivate even greater investments in defense and accelerated military modernization.
- *A North Korean collapse.* Beijing may very well see North Korea as more of a liability than an asset at this point, but it could not ignore the potential national security ramifications of a North Korean collapse scenario. Depending on how such a scenario played out, it could intensify Chinese security concerns. For example, if Beijing was uncomfortable with the role of U.S. forces in Korea after its unification under Seoul, Chinese perceptions of

¹⁵ In 2001 a PLA J-8 fighter collided with a U.S. EP-3 electronic surveillance plane in airspace over China's 200-km exclusive economic zone.

a more-threatening U.S. military presence along its borders could intensify Beijing's concerns about what it tends to view as U.S. "containment" of China.

- *Peaceful unification with Taiwan.* Even though China-Taiwan relations have improved dramatically since Ma Ying-jeou's victory in Taiwan's 2008 presidential election, the PLA retains a strong focus on preparing for Taiwan-related missions. Peaceful unification with Taiwan appears unlikely to come about in the near term, given the many sensitive and, in some cases, seemingly intractable issues in the cross-strait relationship. Nonetheless, it is a possibility in the future, and its realization could allow the PLA to focus much more heavily on other missions.
- *Change in Russia's strategic orientation.* A major change in Russia's strategic orientation would change China's external security environment in ways that could have important implications for the trajectory of PLA modernization. For example, if China's relationship with Russia became more competitive or even confrontational, it would require the PLA to increase emphasis on deterring or preparing for possible contingencies involving Russia. Another possibility is that escalating tension between Russia and the United States and its North Atlantic Treaty Organization (NATO) allies could lead the United States to devote greater attention to European security issues, potentially changing the PLA's perception of Washington's willingness and ability to sustain the policy of "rebalancing" to Asia.
- *Technological surprise.* The emergence of a major technological surprise could create new challenges for PLA modernization. For example, unexpectedly rapid advances in a potential adversary's development of directed-energy capabilities or hypersonic weapons might diminish the utility of some of the PLA's antiaccess and area denial systems or increase the vulnerability of high-value assets, potentially compelling the PLA to shift its approach to force modernization and change its thinking about future military campaigns.

Missions of the People's Liberation Army

This chapter assesses the missions Beijing has assigned to the PLA. Far from the infantry-centric army of the past that sought to draw invaders deep into Chinese territory to fight a war of attrition, the PLA today performs an increasing number of missions that span the spectrum of conflict and MOOTW both at home and, increasingly, regionally and globally. Although the PLA recognizes that its quest for a high-tech military is far from being fully realized, the sustained modernization drive started in the early 1990s is already paying dividends, allowing it to carry out “diversified military tasks” of increasing scope and scale. Not content to wait until the PLA has fully achieved its modernization goals, Beijing has increasingly called on the PLA to perform various missions both at home and abroad.

The People's Liberation Army's Strategic Objectives

Preservation of the political supremacy of the CCP is almost certainly the PLA's most important strategic objective. Additionally, such official publications as *The Science of Military Strategy* and China's defense white papers indicate that the main strategic objectives of the PLA are to “safeguard China's national sovereignty, national security, and territorial integrity and support China's peaceful development.”¹ Under-

¹ These objectives are regularly referred to in official PRC texts as the PLA's “sacred missions” (Peng Guangqian and Yao Youzhi, 2005, p. 14, and Information Office of the State Council, 2013).

neath these grand strategic objectives are the core missions, which the PLA must carry out to accomplish and/or preserve these grand strategic objectives. These core missions can be categorized, albeit roughly, as either “traditional” or “new” missions.

The traditional core missions of the PLA are ones that have dominated Beijing's threat perceptions and responsibilities since the founding of the PRC. While both the threat environment and the PLA's ability to respond to various threats have changed dramatically since 1949, these broad missions have remained largely constant and include “resisting aggression” from both neighboring countries, such as India and Russia (formerly the Soviet Union), and countries that can project power into China's territorial and maritime domains, such as the United States; “containing separatist forces” in the provinces of Xinjiang and Tibet and deterring Taiwan moves toward independence; and “safeguarding border, coastal, and territorial air security” from intervention or interference from either state or nonstate threats. “Protecting national security interests in space and cyberspace,” while not traditional in the sense of historical focus, is a mission consistent with China's aforementioned strategic goals of national sovereignty, security, and territorial integrity. Indeed, China clearly sees its interests as increasingly extending into these domains, which creates new challenges and opportunities for the PLA (Information Office of the State Council, 2013).

As mentioned earlier, these broad traditional core missions are specifically focused on maintaining China's sovereignty, security, and territorial integrity through the emphasis of PLA's general operational concepts of “active defense” and “winning local wars under informatized conditions” in conflict situations.²

In contrast, the new core missions of the PLA are ones that received official recognition under the rubric of former President Hu Jintao's “New Historic Missions” concept. These missions call on the PLA to

² *Active defense*, a concept first defined by Mao and then later adjusted by Deng, is a set of warfighting principles that “emphasize using precise and well-timed offensive operations, gaining and retaining the initiative, attacking only under favorable conditions, and exploiting an opponent's most vulnerable weaknesses” (Information Office of the State Council, 2013, and OSD, 2012, p. 3).

perform internal and external missions in peacetime and include “participating in emergency rescue and disaster relief,” both internally in China and increasingly internationally; “subduing subversive and sabotage attempts and cracking down on separatist forces” to support anti-terror efforts; “accomplishing security provision and guarding tasks,” both at home and abroad through involvement in United Nations (UN) peacekeeping operations (PKOs); “merchant vessel protection” from nonstate actors and possibly state actors; “evacuation of Chinese nationals” for the hundreds of thousands of overseas workers in countries where security has significantly deteriorated; and “security support for China’s interests overseas,” such as protecting maritime commerce through antipiracy operations.³

These broad new missions focus specifically on the CCP’s evolving conceptions of how the PLA can “support China’s peaceful development,” on which CCP legitimacy is largely based. Furthermore, international perceptions are increasingly important to China as it continues to develop as a great power. China therefore seeks ways to use many of the policy tools at its disposal, including the PLA, to provide global public goods commensurate with its status as a rising power, although it is reluctant to take on more responsibility than it believes serves its interests. As with other militaries charged with participation in similar types of operations, the PLA’s general operational concept for accomplishing most of these missions is MOOTW.

People’s Liberation Army Mission Sets, Relevant Campaigns, and Intended Campaign Effects

To analyze the PLA’s core missions more discretely, we extrapolated broad mission set categories from numerous versions of China’s biannual defense white papers resulting in the following eight mission sets: (1) border missions, (2) periphery missions, (3) Taiwan missions,

³ The PLA has a long history of internal disaster relief involvement within China, but this task is likely being codified as a major mission for China’s armed forces, which also include the People’s Armed Police and the militia (Information Office of the State Council, 2013).

(4) maritime claim missions, (5) HADR missions, (6) NEOs, (7) sea line of communication (SLOC) missions, and (8) strategic deterrence. This section explores the ways (campaigns) and the operational ends (intended campaign effects) to accomplish these mission sets.⁴ The following section explores the PLA's means to conduct these mission sets through 2025.

Border Missions

As territorial integrity, national sovereignty, and national security are core national interests potentially subject to external threat, safeguarding China's border and coastal areas is a fundamental mission of the PLA (Information Office of the State Council, 2013). Border security troops under the People's Armed Police and China's Coast Guard under the State Oceanic Administration are responsible for the day-to-day patrol and guard missions along China's international borders and coastal regions, respectively. However, if necessary, the PLA could be mobilized either to augment existing forces or to independently initiate various border operations.⁵ This would occur if external events, either anticipated or occurring, were to overwhelm the capabilities of the two internal security organs. While active state-based threats to national security are a virtual guarantee of PLA involvement, nonstate-based threats, such as nearby instability or the flow of displaced persons threatening border security or integrity, may also prompt PLA mobilization.

Border and coastal safeguarding missions are characteristically defensive:

- The **positional defense campaign** [阵地防御战役] is the primary defensive campaign concept for ground operations in general, including border defense. The object of this campaign is “to

⁴ Operational ends (i.e., campaign effects) should not be confused with the strategic ends of “national sovereignty, national security, territorial integrity and support China's peaceful development.”

⁵ The People's Armed Police is under the Ministry of Public Security and the State Oceanic Administration, which is under the control of the Ministry of Land and Resources.

hold a specified area . . . effectively checking the enemy's incursion" (Zhang Yuliang, 2006, p. 292). While the PLAA would constitute the main component, air, naval, and missiles units would augment them based on the threat.⁶

- The **urban defense campaign** [城市防御战役] is used in the context of border missions to "hold a [Chinese] city" in the face of enemy assault (Bi Xinglin, 2002, p. 453). Primarily conceived of as an army campaign, it is used to protect cities on or near China's terrestrial borders.
- The **air defense campaign** [防空战役] is intended to "thwart an enemy's air raid" aimed at the destruction of military, political, or economic targets within China (Zhang Yuliang, 2006, p. 602). Various aviation and air defense units (e.g., SAM, anti-aircraft artillery) are used to carry out this campaign.⁷
- The **counterlanding campaign** [抗登陆战役] is a campaign "to resist an enemy's cross-channel landing operations" (Bi Xinglin, 2002, p. 432). Although it is unlikely that another state would conduct an amphibious assault against the PRC mainland, this joint campaign provides the operational concept to defeat such an action if required.
- The **naval base defense campaign** [海军基地防御战役] is "designed to resist an enemy's offensive against a naval base" (Zhang Yuliang, 2006, p. 539). Primarily a naval campaign, this campaign stresses defeating the enemy force before it reaches shore.
- The **joint border counter attack campaign** [边境地区联合反击战役] is an "offensive campaign against local invading armies . . . to destroy and expel the invaded enemy and restore territorial

⁶ Some analysts now refer to the PLA's ground component as the PLAA, while others refer to it as the PLA ground force. We use these terms interchangeably in this report, although we note that China began calling the ground force the PLAA in its 2010 national defense white paper. (See Information Office of the State Council, 2011.)

⁷ This campaign is similar to the anti-air raid campaign (discussed below), with the exception that it does not seek to destroy an enemy's ability to generate air raids, primarily through counterattacking enemy airfields, but rather to limit or ideally halt enemy air raids when they penetrate Chinese airspace.

sovereignty” (Bi Xinglin, 2002, p. 264). This joint campaign is used either under the active defense concept, as mentioned above, to preempt an attack or in reprisal for an assault that has wrested territory from China’s control.

Relevant border campaigns are based on the domain directly threatened (land, air, or sea). Accordingly, the PLA might commence a positional defense campaign; an urban defense campaign; an air defense campaign; a counterlanding campaign; or a naval base defense campaign. It should be further noted that the PLA does not rule out using active defense to preempt an opponent’s impending attack (Information Office of the State Council, 2013). This strategic concept was successfully demonstrated against the Indian Army during the 1962 Sino-Indian Border War. Should China confront a similar threat in the future, the relevant campaign would be the joint border counter attack campaign.

Periphery Missions

For a variety of reasons, the PLA might be tasked to conduct operations emanating beyond China’s borders into disputed territory or the territory of another country, either as an invited guest or as a hostile intruder. While border missions are commonly defensive and designed to maintain China’s sovereignty and territorial integrity, peripheral missions are mostly offensive and undertaken to advance China’s national interests in adjacent regions.

Historically, periphery operations, in which the PLA is invited to assist a friendly neighboring state dealing with external or internal threats, have been one of the main forms of PLA operations beyond China’s borders. North Korea and North Vietnam during the Korean and Vietnam Wars, respectively, sought Chinese assistance in response to U.S.-led operations. Furthermore, PLA assistance operations in neighboring states facing external threats could take the form of offensive operations, as in the Korean War, or defensive operations, as in the Vietnam War. Although there is no historical case in point, China might also support a country facing terrorism or insurgency, as the

Peace Mission exercises held under the auspices of the Shanghai Cooperation Organization appear to emphasize.

China has in the past and may in the future seek to advance national interests in contravention of a neighboring state's wishes. Such actions without an invitation would be intended either to coerce or to take a state's territory, either through conquest or to unilaterally settle territorial disputes. The 1979 Sino-Vietnamese War, undertaken by the PRC to compel Hanoi to reverse its actions in Cambodia, is an example of the former (see Mulvenon, 1995). The PRC's invasion and subsequent annexation of Tibet in 1950–1951 and possibly the 1969 Sino-Soviet Border conflict fall in the latter category. While China has settled a number of territorial disputes amicably with its neighbors (e.g., Russia, Tajikistan, and Vietnam), it still has unresolved disputes with India (over the areas of Aksai Chin/Jammu and Kashmir and of Arunachal Pradesh), Bhutan, Burma, and North Korea (Central Intelligence Agency, 2013).

While campaigns for border missions are based on defense of a specific area, relevant PLA campaigns for periphery missions are generally based on the specific objective to be taken or achieved:

- The **positional offensive campaign** [阵地进攻战役] is the generic army offensive campaign to used to assault “an enemy defending field or fortified positions” (Zhang Yuliang, 2006, p. 426).
- The **maneuver warfare campaign** [动运战战役] is an army offensive campaign “against an enemy that is on the move or has not yet established a foothold” (Zhang Yuliang, 2006, p. 391).
- The **mountain offensive campaign** [山地进攻战役] is an army campaign used to assault an enemy defensive position in a mountainous region (Zhang Yuliang, 2006, p. 391).
- The **urban assault campaign** [城市进攻战役] is an army campaign used to “wipe out or drive out defending enemies, so as to seize and occupy a city” (Bi Xinglin, 2002, p. 292).
- The **airborne campaign** [空降战役] is an air force offensive campaign designed to “achieve specific strategic and campaign goals” by “carrying out operational activities in the depth of the ene-

my's territory" through the use of the PLAAF's paratroop forces.⁸ China is unlikely to prosecute this campaign independently, but rather to support another concurrent campaign.

- The **air offensive campaign** [空中进攻战役] is an air force campaign to "achieve strategic and campaign goals" through the use of air strikes (Zhang Yuliang, 2006, p. 575). This could be an independent campaign or could be prosecuted jointly with a ground offensive.
- The **anti-air raid campaign** [反空袭战役] is a joint campaign that is both offensive and defensive; it seeks to defeat enemy air raids both incoming and at their source through strikes against the air bases prosecuting enemy air sorties (Zhang Yuliang, 2006, p. 331). This campaign stands alone and is prosecuted independently to protect China's territorial sovereignty while other campaigns are waged.

Based on specific circumstances, China would use an airborne campaign, air offensive campaign, and/or an anti-air raid campaign in conjunction with one of the other campaigns, although each of these campaigns could also be prosecuted independently.

Taiwan Missions

Beijing ultimately seeks to reincorporate Taiwan into greater China under the "One-China Principle," and the PLA continues to play a leading role in achieving this strategic objective (Taiwan Affairs Office and Information Office of the State Council, 2000). Through either the threat of violence or the application of limited violence, the PLA might be used coercively to compel the island nation to either undertake or reverse various courses of action. During the Third Taiwan Strait Crisis (1995–1996), Beijing conducted missile tests and military exercises to influence the outcome of an upcoming Taiwanese election. While the aforementioned coercive operations were relatively minor in scale, Beijing may also seek to compel Taiwan on a larger scale by blockading

⁸ Note that the PLA's airborne troops are subordinate to the PLAAF and not the PLAA (Zhang Yuliang, 2006, p. 589).

the island. Alternatively, if coercive actions are considered incapable of achieving important policy objectives, Beijing might decide to commit the PLA to an outright invasion to take control of the island.

The following campaigns might come into play with respect to Taiwan:

- A **conventional missile attack campaign** [常规导弹突击战役] is a “series of conventional missile attacks” to “attack the enemy’s important targets” (Yu Jixun, 2004). Although the PLASAF would take the lead in this campaign, PLAAF and PLAN units would also play important roles. Such a campaign could be used by itself or in conjunction with other campaigns, such as the joint blockade and joint landing campaigns.⁹
- The **joint blockade campaign** [联合封锁战役] is a “protracted campaign” undertaken to “sever enemy economic and military connections” and thereby “compel the enemy to [ultimately] submit to campaign goals” (Zhang Yuliang, 2006, p. 292). The PLA’s naval, air, and conventional missile units would primarily conduct this campaign.
- The **joint island landing campaign** [登岛战役] is a campaign designed to “seize and occupy a whole island or important target.” For this to happen, numerous intermediate campaign goals, such as sea-crossing, destruction of the enemy’s defenses, and securing a beachhead, must also occur (Bi Xinglin, 2002, pp. 225–226).
- As mentioned previously, the **anti-air raid campaign** [反空袭战役] is a joint campaign that is both offensive and defensive; it seeks to defeat enemy air raids both in the skies and at their source through strikes against the air bases or aircraft carriers prosecuting enemy air sorties (Zhang Yuliang, 2006, p. 331).

Relevant PLA campaigns intended to coerce Taiwan include the conventional missile attack campaign and/or the joint blockade campaign.

⁹ A coercive or demonstrative use of conventional missile firepower, such as the series of launches China conducted during the 1995–1996 Taiwan Strait crisis, could also be related to this type of campaign and could escalate to a conventional missile attack campaign if intimidation short of that level fails to achieve the desired objectives.

The primary PLA campaign to seize Taiwan would be the joint-island landing campaign, which likely would be augmented by a conventional missile attack campaign and an anti-air raid campaign. If necessary, the PLA would undertake a conventional missile attack campaign and an anti-air raid campaign to counter U.S. or another country's intervention into a hypothetical Taiwan conflict. These two campaigns form the PLA's core antiaccess and area denial challenge to U.S. military operations in the region.¹⁰

Maritime Claim Missions

Because China claims approximately 90 percent of the South China Sea, Beijing finds itself simultaneously at odds with all other claimants (Vietnam, Malaysia, Brunei, Taiwan, and the Philippines). In the East China Sea, Beijing and Tokyo are at odds over the Senkaku/Daioyu Islands. Similar to the periphery missions mentioned above, maritime claim missions are also generally offensive, although there is always a chance that China might be forced to defend its gains at some future point.

At stake is sovereignty over very small islands, reefs, and features and over waters containing hydrocarbons beneath their depths. Through naval actions against the Republic of Vietnam in 1974, the PLA has already successfully extended China's dominion over the entirety of the Paracel Islands in the northern reaches of the South China Sea. A naval battle almost a decade and a half later over Johnson South Reef (1988) increased China's holdings in the Spratly Islands at the southern end of the South China Sea at Vietnam's expense. In the South China Sea, China currently is engaged in a standoff with the Philippines over Second Thomas Shoal and recently parked an oil rig in Vietnam's exclusive economic zone. In the East China Sea, China contests Japan's control of the Senkaku/Daioyu Islands through various means, including the recent enactment of an air defense identifica-

¹⁰ While antiaccess and area denial is a Western construct, the Chinese clearly plan to counter intervention by a "strong enemy"—a euphemism for the United States—in regional contingencies. Not only has the PLA developed the doctrine, it has also developed the capabilities to attack the primary facet of U.S. power projection: U.S. airpower.

tion zone. The zone covers much of the East China Sea and covers the airspace above the disputed islands.

Relevant PLA campaigns intended for China to make immediate further maritime territorial gains include the following:

- The **sea force group campaign** [消灭敌海上兵力集团战役] is an “offensive campaign . . . to eliminate . . . or inflict heavy losses on the enemy’s . . . large naval formations or battle groups.”¹¹
- The **coral reef offensive campaign** [对珊瑚岛礁进攻战役] is a campaign “against coral island reef areas” (Zhang Yuliang, 2006, p. 535).
- The **sea blockade campaign** [海上封锁战役] is an “offensive campaign to cut off or weaken the enemy’s marine contact with the outside world” (Bi Xinglin, 2002, p. 327).
- The **naval coastal raid campaign** [海上袭岸战役] is a campaign “to attack enemy bases, harbors, and other important coastal targets” (Bi Xinglin, 2002, p. 341). This campaign could be used to destroy a rival claimant’s ability to project power to a disputed area.
- As described previously, the **anti-air raid campaign** [反空袭战役] is a joint campaign that is both offensive and defensive; it seeks to defeat enemy air raids both near disputed areas and at their source through strike against the air bases generating enemy air sorties (Zhang Yuliang, 2006, p. 331). This campaign could be carried out in conjunction with the other campaigns listed above.

A sea blockade campaign, albeit at a low level and applied somewhat unevenly, is likely how China is dealing with Philippine forces stationed in Second Thomas Shoal.¹² This approach is patient compared to the coral island offensive campaign and could also be used in numerous other locations where islands and features are already occupied. Finally,

¹¹ The *Campaign Theory Study Guide* refers to this campaign somewhat differently as the “enemy naval group assault campaign” [进攻敌海上兵力集团战役] (Zhang Yuliang, 2006, p. 523; Bi Xinglin, 2002, p. 254).

¹² The Philippines has met with some success in resupplying its marines stationed in the shoal aboard an intentionally beached amphibious landing ship (Perlez, 2014).

should China seek to strike a dramatic blow against other claimants' abilities to threaten China's maritime claims from their source, the PLA might be tasked to conduct a naval coastal raid campaign.

As with the other missions described earlier, any of these campaigns could be conducted simultaneously with an anti-air raid campaign, should the United States or another third party become involved.

Humanitarian Assistance and Disaster Relief Missions

PLA military diplomacy includes HADR operations. Participation in UN PKOs dates back to the early 1990s, with China contributing peacekeepers, police, and observers. Most recently, China dispatched peacekeepers to support the UN Multidimensional Integrated Stabilization Mission in Mali. Outside the structure of international organizations, the PLA has dispatched its hospital ship, *Peace Ark*, to undertake medical assistance missions in the Indian Ocean and Caribbean, and sent PLAA units to engage with the militaries of Peru and Gabon in multilateral medical exercises. The PLA has been directly involved in international disaster relief over a dozen times, sending PLAA rescue and medical teams; PLAAF aid airlifts; and, most recently, *Peace Ark* to respond to disasters occurring in foreign countries.

PLA doctrinal writings do not describe relevant campaigns for HADR missions. Most likely this is because they are considered independent operations, too small in scale to be properly considered campaigns. It is quite possible, however, that the antiterrorism stability maintenance campaign [反恐维稳作战役] is informed by the PLA's participation in counterterror-focused UN PKO operations, such as the aforementioned UN Multidimensional Integrated Stabilization Mission in Mali operation.¹³

Noncombatant Evacuation Operations

While there have been numerous NEOs of Chinese overseas citizens, including a 2014 NEO in Libya, the PLA regularly does not play an operational role. To date, the PLA has been called to actively support

¹³ The antiterrorism stability maintenance campaign is described as consisting of "operational activities to deter and attack terrorism activities" (Zhang Yuliang, 2006, p. 460).

only one NEO, to Libya in 2011. Instead, the Ministry of Foreign Affairs often singlehandedly directs these operations by arranging for chartered aircraft and passenger ships to take overseas Chinese to safety. However, given the high numbers of Chinese overseas in unstable and remote areas, it seems likely that the PLA will play more of a role in future NEOs. The PLA potentially extends reach into areas that chartered flights might shy away from. This may have been the case with the PLAAF's dispatch of four transports during the 2011 NEO to Sabha, which is in the interior of Libya. Should circumstances warrant, the PLA might also be dispatched to deter acts of violence against overseas Chinese citizens. Overwatch from the PLAN frigate Xuzhou may have played a role in the relatively uneventful exodus of thousands of Chinese workers from Benghazi, Libya, in 2011 aboard chartered cruise ships. The PLA can also be used to enter nonpermissive areas and mitigate or resolve man-made humanitarian crises, should they occur.

As with HADR missions, PLA doctrinal writings do not describe relevant campaigns for NEOs. This is likely because NEOs are generally too small to be properly considered campaigns and are considered independent operations.

Sea Line of Communication Missions

As an export-driven economy and oil importer, China depends on sea lanes that are safe for maritime commerce. For much of recent history, China left maritime security to the oversight of others. This changed at the very end of 2008, when the PLA sent a task force to the Gulf of Aden to mitigate the effects of Somali piracy on its maritime traffic. Since then, the PLAN has continuously operated antipiracy patrols in the region and recently dispatched its 19th task force.

China fully recognizes that ensuring "peaceful development" in a self-help world requires acting individually, if need arises, to protect vital interests. In the Gulf of Aden, Chinese merchant demand for security exceeded multinational supply, and Beijing recognized that it could not continue to free ride, relying on others to provide security, without accepting significant risk. This is certainly not the first time in recent history that Chinese maritime commerce has faced threats.

During the Iran-Iraq Tanker War (1984–1988), at least one Chinese-flagged vessel was struck, even though Beijing declared itself a neutral party (Central Intelligence Agency, 1987).

Two campaigns are of interest here:

- The **sea-line guarding campaign** [海上保交战役] is a defensive campaign “waged to ensure the safety of, and free passage along, sea lines” (Zhang Yuliang, 2006, p. 539).
- As mentioned previously, the **naval coastal raid campaign** [海上袭岸战役] is a “campaign to attack enemy bases, harbors, and other important coastal targets” (Bi Xinglin, 2002, p. 224). This campaign could be used to directly attack a state or nonstate actor’s abilities to disrupt maritime commerce.

The relevant PLA campaign for SLOC missions is the sea-line guarding campaign. At some time in the future, Beijing may wish not merely to guard its maritime commerce and mitigate a particular threat but also actively seek to degrade or destroy an actor’s ability to create the threat. Should the PLA be tasked to undertake such a mission, it likely would do so under the naval coastal raid campaign construct.

Strategic Deterrence

China’s concept of strategic deterrence is a broad one that includes a variety of military and nonmilitary instruments of national power, but a key component of it is resident in a nuclear arsenal that is growing but remains significantly smaller than either the U.S. or Russian nuclear arsenals. Because of its stated no-first-use policy, this arsenal has three general missions.¹⁴ The first is the day-to-day mission of preventing a nuclear strike against China through maintaining a credible nuclear deterrent. Historically China has kept its nuclear forces on low alert, relying on the survival of at least a few missiles and warheads to present unacceptable risks to any would-be attacker after a hypothetical first strike. The second mission is escalation control. Should China enter a

¹⁴ If China did not adhere to a no-first-use policy, it would have an additional fourth mission, not described above, of nuclear attack.

crisis or even outright war with another nuclear power, China's nuclear arsenal serves as a hedge to escalation that might otherwise spiral out to eventual nuclear war. It also prevents the occurrence of nuclear blackmail, whereby an adversary could seek to coerce China to take certain courses of action it otherwise would not choose by threatening nuclear attack. Should deterrence and/or escalation control fail, the third mission is responding to an adversary's use of nuclear weapons. This mission has one relevant campaign:

- The **nuclear counterstrike campaign** [核反击战役] consists of a series of nuclear missile strikes intended to “thwart the enemy's strategic intentions, shake the enemy's will, paralyze the enemy's command systems, retard the enemy's operational activities, weaken the enemy's war potential, and deter the escalation of nuclear warfare” (Bi Xinglin, 2002, pp. 384–385). Such a campaign could involve nuclear strikes against a number of types of targets intended to shake the adversary's will, unhinge its strategy, and diminish its ability to successfully execute its military operations.

People's Liberation Army's Capabilities to Conduct Missions Through 2025

This section briefly analyzes the PLA's means of carrying out the missions just described through 2025. Chapter Five takes a closer look at the weaknesses that might impinge on the successful execution of these missions.

Border Missions

As the largest army in the world, the PLAA constitutes a substantial deterrent to another state's potential incursions. Even if the PLA's modernization trajectory to date were to stop at its current level, it is difficult to see how the PLA would be unable to successfully defend territorial incursions on the Chinese mainland. If modernization continues, the overall efficacy of these operations will continue to be honed, fur-

ther allowing the PLA to respond quickly and even preemptively to challenges that appear.

Periphery Missions

Except against its largest neighbors, Russia and India, the PLA currently possesses substantial but not unlimited ability to conduct missions away from its borders. The PLA's ability to conduct effective offensive actions into neighboring countries is impeded by continuing logistics shortfalls and a lack of substantial power-projection capabilities (such as aerial tankers and airlift).

Taiwan Missions

China has the ability to coerce Taiwan in a number of ways, from missile strikes to blockade operations. It currently lacks the amphibious lift necessary for forced entry in an outright invasion—although this could be rectified by 2025. If the United States were to become involved, China's coercive leverage over the island would diminish, and the PLA's ability to transport and sustain forces on the island would become problematic.

Maritime Claim Missions

With large amphibious ships, such as the Yuzhao-class landing platform dock, the PLAN has the ability to take most islands or features in the South China Sea. In such scenarios, the PLAN could also assert naval superiority over other claimant's naval power-projection capabilities in both surface and subsurface warfare. Furthermore, sea-based air defense, through either ship-based SAMs or, eventually, carrier-based fighters, is generally sufficient against the air threats other South China Sea claimants pose. Currently lacking, however, is long-distance airborne surveillance to find, track, and fix incoming airborne threats. While the absence of these capabilities is unlikely to affect the mission outcome, it could increase losses of PLAN surface ships. Similar to the Taiwan missions, the great equalizer is potential U.S. involvement on behalf of one of the South China Sea claimants. In the East China Sea, China faces a much more difficult task squaring off against Japan and possibly the United States because it could only seek to degrade

rather than destroy either country's power-projection capabilities. Furthermore, fleet air surveillance and air intercept capabilities against an advanced military would be insufficient.

Humanitarian Assistance and Disaster Relief Missions

China's abilities to conduct HADR missions are growing. The PLAN's *Peace Ark* hospital ship is the perfect ambassador for both mission types. It has completed a number of humanitarian voyages and recently aided the Philippines in the aftermath of a typhoon. Future additions to the PLA's airlift fleet will further extend the reach of such aid.

Noncombatant Evacuation Operations

Lack of forward basing and heavy airlift significantly impedes the PLA's ability to participate in NEOs. Large numbers of overseas Chinese workers in countries wracked by instability further exacerbate this problem. Without developing a more globally deployed force, these issues will endure through 2025.

Sea Line of Communication Missions

China's ability to conduct SLOC missions in the Gulf of Aden against nonstate actors (Somali pirates) has taxed the PLAN's at-sea logistics capabilities. Although the PLA is addressing these issues, China would be severely strained to conduct SLOC operations against a state-based threat without possessing access to nearby naval bases for logistics, rearmament, and repair support. Such operations could also require access to nearby airfields to enable airborne surveillance and possibly even the generation of air superiority or air strike sorties to support ongoing SLOC operations.

Strategic Deterrence

Substantial improvements to China's nuclear forces are occurring, including quantitative improvements, such as increasing missile stockpiles, and qualitative improvements, such as enhanced survivability (from mobile launchers) and MIRVs. The main question for China through 2025 is whether these advances will continue to keep pace with the potential threat landscape, which includes continued advances

in conventional precision guided munitions and antiballistic missile systems.

Weaknesses in People's Liberation Army Organization and Human Capital

Chinese military writers, as well as expert foreign observers of the PLA, have noted that many of the PLA's weaknesses stem from problems with organizational structure and human capital. Organizational weaknesses arise from the fact that the PLA, as an organization, is fundamentally a collection of institutional relationships and practices, some of which are poorly suited to its current requirements for historical or political reasons. As a result, the very structure itself can create a system riddled with inefficiencies, stovepiped information, and lack of oversight. By contrast, human capital weaknesses stem directly from the personal characteristics of the individuals who make up the PLA. Some of these weaknesses arise from the pool of potential recruits from which the PLA draws on for its annual conscription efforts, who are often under-educated and/or do not meet physical or even mental health standards. Other weaknesses in human capital affect the careers of PLA members throughout their careers, such as low levels of professionalism.

This chapter first identifies weaknesses and assesses contributing factors in PLA organization and human capital. Next, it evaluates how these weaknesses might affect the PLA's ability to achieve its missions through 2025. Finally, it describes how the PLA is attempting to address these weaknesses and assesses how successful the PLA has been to date or is likely to be in the future.

Potential Weaknesses in People's Liberation Army Organization and Human Capital

Because the identified organizational weaknesses are so numerous, this section further categorizes them according to organizational structure, organizational culture, force structure, and command structure. Fewer identified factors contribute to human capital weakness and are less easy to categorize, so we examine them in a separate subsection on human capital.

Organizational Structure

Party-Military Relations

As the armed wing of the CCP, the Chinese PLA is not the armed forces of the Chinese government or nation but rather the ultimate guarantor of the ruling status, political prerogatives, and perquisites of the CCP. This may affect morale because PLA soldiers and officers are essentially fighting to preserve a system that benefits the approximately 80 million members of the CCP rather than the broader population of 1.3 billion Chinese people. As a consequence, with the growing professionalization of the armed forces and China's increasing integration into the outside world as a result of its economic reform and opening policies, Party officials and PLA leaders have repeatedly admonished officers and enlistees not to heed calls for "getting the Party out of the Army [军队非党化]," "depoliticizing the military [军队非政治化]," or "nationalization of the armed forces [国家化]."¹ To date, no prominent Chinese military officers are known to have publicly advocated for "nationalization," but it is likely that frequently repeated reminders to the force to embrace its existing relationship with the Party and reject the idea of nationalization reflect an awareness of the potential appeal of nationalization within the force. For the CCP leadership, of course, the PLA's status as a Party army is an important strength, not a weakness.

¹ See, for example, Qi Biao (2009). Qi is a researcher with National Defense University's Party History and Party Building Research Center. More recently, CMC Vice-Chairman Fan Changlong has echoed such calls (see "Fan Changlong: Resolutely Resist . . .," 2013).

Civil-Military Relations

Because the Chinese military is not an element of the state, it has no official points of contact with state bodies or state leaders, except in their capacity as officers of the CCP, where they sit on various leading small groups or elite Party committees (such as the Political Bureau of the Party). This has, in the view of some outside experts, resulted in a civil-military gap that leads to problems in coordinating the PLA's activities with China's broader overall foreign and security policies, compounded by what one observer characterizes as "a pattern of hands-off management by top civilians" (Scobell, 2009). Examples have included divergences between the positions of some in the state bureaucracies and the PLA during the April 2001 aircraft collision incident; the 2003 severe acute respiratory syndrome crisis; the 2006 *Kitty Hawk* incident; and the 2007 antisatellite missile test (Scobell, 2009; Gill and Kleiber, 2007).² Another interesting case that revealed some of the challenges inherent in civil-military relations in China was the May 2008 Sichuan earthquake, which exposed what appeared to be a serious rift between Premier Wen Jiabao and CMC Vice Chairman Guo Boxiong over command and control (C2) of the disaster response mission.³ According to one observer, as the disaster demonstrated, "even such a senior cadre as Premier Wen Jiabao had difficulty soliciting the full support of PLA and People's Armed Police divisions in emergency situations" (Lam, 2009; see also Lam, 2008). Specifically, the PLA reportedly refused to colocate its disaster response headquarters, the "PLA Command Group for Resisting the Earthquake and Providing Disaster Relief [军队抗震救灾 指挥组]," with the "State Council Headquarters for Resisting the Earthquake and Providing Disaster Relief [国务院抗震救灾总指挥部]," which was led by Wen.⁴ According to some accounts, Guo insisted that, as CMC vice chair, he was responsible for report-

² For an alternative view of the 2007 antisatellite weapon test that concludes that the Ministry of Foreign Affairs was fully read-in on the PLA's missile shot before it occurred, see Kulacki and Lewis (2008).

³ On civil-military relations following the earthquake, see Nan Li (2010).

⁴ For an assessment of the PLA leadership's response to the earthquake, see Mulvenon (2008a).

ing to CMC Chairman Hu Jintao, not to Wen as China's Premier. The dispute was reportedly resolved only when Hu intervened at Wen's request, and Guo did not appear together publicly with Wen until Hu Jintao arrived on the scene.⁵ It is not entirely clear, however, whether this incident resulted from poor relations among some of the top personalities involved in the disaster relief efforts or reflected a systemic weakness inherent in the PLA's status as a party army and the implications of that status for its ability to coordinate effectively with the State Council and other civilian organizations.

Drawing on interviews with Chinese specialists, some Western experts have described the PLA as functioning as something akin to an "interest group" in Chinese policymaking. Accordingly, it can act to push the country's overall security policy in directions not always in tune with those of the state, a pattern that may become significantly more important during security crises, when the military's informational and expertise advantages give its perspectives additional weight (Jakobson and Knox, 2010). Still, at other times, the PLA appears to have functioned quite effectively together with the state, even under high stress and in crises, such as during the response to the 2008 Sichuan earthquake (Mulvenon, 2008a), the 2008 Beijing Olympic Games security effort (Mulvenon, 2008b), and the 2011 mission to evacuate Chinese civilians from Libya (Collins and Erickson, 2011), despite the civil-military relations challenges discussed above.

Civilian Oversight

A final issue associated with the PLA's status as a Party army is that the Chinese armed forces are characterized by extremely weak civilian control and an almost total absence of oversight. Indeed, at present, the only civilian in the Chinese military chain of command is CMC Chairman Xi Jinping (previously, there were two civilians, when Hu Jintao was chairman and Xi was a vice chairman). Additionally, the Ministry of Defense, a state position, is largely a shell organization with no role in C2, no civilian defense experts who could help refine

⁵ For a report on Hu's arrival that contains photos of the top leaders involved in the C2 of the relief efforts, see "Chinese President Arrives . . ." (2008).

the PLA's combat capabilities or doctrine, and no ability to provide oversight or ensure fidelity between the goals of the national command authority and the actions of the armed forces.

While the PLA's budget is processed as a part of the overall fiscal outlays approved by the legislature, National People's Congress largely rubber stamps it, with no discussion or debate over the levels or allocations of funding; size of the armed forces; strategy and doctrine; or planning, procurement, and acquisition. Although Chinese-written sources do not mention this as a source of weakness, Chinese analysts and experts have mentioned it in interviews with U.S. and other foreign researchers, expressing the view that the absence of a civilian bureaucracy and an empowered legislature that can query the military on its planning and operations limits the PLA's effectiveness and allows it to demand and spend its budget without accountability.

For nearly two decades after its costly border conflict with Vietnam, the PLA was forced to support itself in part through participation in the civilian economy. Over time, this constrained or even further eroded the force's focus on warfighting while fueling corruption, smuggling, and an emphasis on getting rich in the civilian economy rather than on issues of national defense. In the wake of the 1989 Tiananmen Square massacre, the decision was made to begin increasing defense budgets substantially to ensure the loyalty of the force, a trend that was accelerated following the Third Taiwan Strait Crisis (1995–1996) and the 1998 decision to force the PLA to abandon commercial ventures and return its focus exclusively to national defense.

Organizational Culture

A separate subset of organizational weaknesses relates to the PLA's organizational culture. This category includes such issues as

- the high-level corruption that is suspected to plague the PLA as a whole
- low pay levels relative to those that prevail in the civilian economy
- a tendency to elevate all problems to the center and a corresponding reluctance to devolve decisionmaking authority to lower levels

- a culture of engaging in insufficient training, of training in insufficiently challenging or realistic circumstances, and of striving to avoid failure in training by ensuring that success is prearranged through scripted exercises rather than embracing failure as an opportunity to learn
- an organizational history that privileged the PLAA specifically and combat arms over the supporting elements more generally
- a lack of overseas experience and combat experience, resulting in a force that is widely believed to be both relatively xenophobic and ignorant about the outside world and also somewhat naïve about how difficult it can be to control the paths that armed conflict can take.

Corruption

As noted in the previous section, the PLA enjoys an almost absolute immunity from external oversight, budgetary transparency, and/or accountability to the legislature for how it spends its funds and operates. As a consequence, the PLA is believed to be riddled with corruption (Garnaut, 2012). Examples of such corruption abound, from the 2000 arrest of Ji Shengde, Director of Military Intelligence in the PLA's General Staff Department (GSD); to the 2012 detention of the former deputy director of the General Logistics Department (GLD), Lieutenant General Gu Junshan; and culminating in the 2014 arrest and expulsion from the Party of former CMC Vice Chairman Xu Caihou. Xu's co-Vice Chairman, General Guo Boxiong, is also widely rumored to be under investigation for personal and family members' corruption ("Son of Former CMC Deputy . . .," 2014).

There have also been concerns that military awards and commendations have been distributed far too liberally as a way to put an official gloss on corrupt activities, something that the PLA has recently announced efforts to address ("China's New Rules . . .," 2014). Corruption at lower levels also abounds, with widespread stories of PLA officers privatizing their military-assigned housing and selling it on the open market, speeding through traffic with immunity (police will not ticket a military-plated vehicle), parking in illegal spaces, and putting military plates on their personal vehicles to avoid paying highway

tolls and to enjoy free fill-ups at gas stations (military vehicles reportedly do not have to pay for gasoline). Additionally, it is widely believed that positions in and promotions within the PLA can be bought (and often have to be), with disgraced General Gu Junshan alone believed to have sold “hundreds” of commissions, a practice reported to be “widespread” (Lim and Blanchard, 2014). Reports of lavish banquets, red carpet treatment, extravagant travel abroad, and expensive hotel stays are also prevalent (Tejada, 2012), as are reports of abuse of retirement perks to obtain valuable urban property (“Retired Military Officials . . .,” 2014).

Determining the full extent of corruption is not possible because corruption is, by nature, a clandestine activity. Its true extent is almost certainly greater than the number of cases that have been made public. Determining remaining knowledge gaps is probably impossible using only open sources. Given the absence of oversight, it is possible that the PLA suffers levels of corruption equal to or even greater those in the civilian economy; it is also possible, however, that military discipline serves to reduce the level of overall corruption below that of society as a whole. If the assessment that the PLA is highly corrupt is accurate and if the PLA's corruption seriously limits its warfighting capabilities, it may mean that the United States might be inclined to assume China has more sway in international affairs than its actual combat power merits. On the other hand, if the PLA is a highly capable fighting force despite its problems with corruption, the United States might risk overestimating the hollowness of the Chinese armed forces and be insufficiently cautious of confrontation with a PLA that is actually more capable than stories about widespread corruption in the ranks might suggest. It is impossible to judge the impact of corruption with great precision, but it appears likely that it not only undermines attempts to enhance the PLA's professionalism but also negatively influences its combat capabilities.

Compensation

For approximately two decades, from the early 1980s through the early 2000s, the PLA typically provided its staff with levels of compensation and overall benefits lower than in the civilian economy. This not only

made it difficult for the PLA to compete with that economy in recruitment and retention, it also incentivized (together with such other factors as the lack of institutional checks and balances and the rule of law) the spread of corruption within the force.

Operational Initiative

The tendency to avoid decisionmaking at lower levels and push decisions up the chain of command restricts the ability of lower-ranked actors to exercise operational initiative. This may constrain the ability of the PLA's front-line commanders and soldiers to innovate, take the initiative, respond quickly to developments or targets of opportunity in their area(s) of operational responsibility, and/or lead to greater confusion and weaker morale due to frustration at lower levels as they await decisions from above.

Realistic Training

Another tendency is to avoid training sufficiently or under challenging conditions. Often, exercises are seen as failures if "red" (i.e., the PLA) does not win, so exercises are not seen as a chance to identify problems during training that can be remedied before actual wartime operations commence. Additionally, political pressures and a culture of treating exercises and training as opportunities to impress one's superiors further erode the utility of exercises as tools to surface and address problems in military organization, planning, and execution. As one recent report notes, 319 individuals in the Shenyang Military Region were disciplined for misbehavior during military exercises, mostly related to cheating to reduce the difficulty of carrying out field exercises or to ensure that successful results (An Baijie, 2014b).

Information on PLA exercises is widely reported in the Chinese and foreign media, and many exercises are held jointly with third-country militaries. While the overwhelming majority of the PLA's exercises are not major news items in international media outlets, PLA service journals and websites routinely carry at least some information about these exercises. It is possible that the PLA may be seeking to present itself as less capable in some dimensions, to shape potential adversaries' expectations and planning; however, in many aspects it would be hard to have carried out more, and more realistic, large-scale

exercises than are publicly aired. For example, the Stride-2009 and Mission Action 2010 and 2013 exercises, three recent large-scale trans-military region mobility exercises, were widely observed and analyzed by foreign experts. Still, our knowledge of PLA exercises and training in the open sources is constrained by what is reported in the media, which covers a subset of the total exercises and training that the PLA undertakes.

Legacy of Ground Force Domination

The PLA's internal culture is also shaped by its legacy as a force defined from its earliest days by the centrality of ground warfare and extremely strong service branch identities. The dominance of the PLAA on the CMC was complete until 2004, when the chiefs of staff of the PLAAF, PLAN, and PLASAF were promoted to an expanded CMC. In 2012, the PLAAF commander, General Xu Qiliang, was promoted to be the first-ever non-PLAA general to serve as a vice chairman of the CMC; that year also marked the first time that the CMC ever had two serving members (Xu plus his successor as commander of the PLAAF, General Ma Xiaotian) from a service branch other than the PLAA. The cultural preeminence of the army has long constrained the PLA's thinking about armed conflict, power projection, and jointness. Indeed, as research on the PLA's political commissar system has shown, the political commissars of the PLAAF and PLAN have often been transplants from the PLAA, further exemplifying the difficulty of generating genuine advocacy for the roles of air and naval power (Allen, Clemens, et al., 2013).

In addition to the cultural influence of the PLAA and the difficulty of overcoming separate service identities to produce an emphasis on "jointness," it is important to bear in mind that the combat service arms were traditionally seen as more important than the support services, such as maintenance, repair, transport, and logistical support. This pattern, which is only being recognized and addressed in recent years and which is still controversial within the PLA, has resulted in a relative neglect of capabilities that have proven increasingly important as China shifts toward power projection and strives to sustain combat power further and further from its shores while operating increasingly

sophisticated platforms. The relative neglect of training noted above has compounded the weaknesses in maintenance, repair, engineering, transportation, and logistical sustainment. One PLASAF report, for example, explained that, as a consequence of “an enduring peaceful environment and few personnel [having] been assigned to their establishment, some brigades and regiments neglected the training for . . . ‘trivial’ support elements,” such as engineering armament support (Zhao Jinhu, 2008).

Challenges of Developing a Professional Worldview

The final organizational culture area relates to contacts, perceptions, and experience. The PLA, out of a concern over foreign influences affecting the political reliability of the officers in operational control of the force, strongly limits contact between field officers and foreigners (Kaufman and Mackenzie, 2009). This approach reinforces a view of the outside world as threatening, hostile, and alien and may lead PLA field officers to hold exaggerated or inaccurate perceptions of foreign governments, their militaries’ capabilities, and their intentions. This problem is compounded by the firewall within the PLA between commanders with operational or line control over fielded forces and those who serve in foreign affairs and professional military education. One PLA officer who engages with foreigners stated that it is difficult even for him to have contact with officers in the operational chain of command. Such considerations are further reinforced by the absence, until recently, of substantial overseas activities or multilateral military engagements. In addition to lacking overseas contacts and experience, the PLA has not, by and large, experienced modern warfare and may therefore be more cavalier about the prospects for achieving political goals through military means, having few officers with any personal taste of the horrors of combat or direct appreciation of the many sources of friction that can derail the best prepared plans when they are put into practice in a confrontation against a capable enemy. Some PLA officers acknowledge that the PLA’s lack of combat experience since China’s 1979 conflict with Vietnam could present problems for these reasons. Lacking recent combat experience, the PLA can attempt to mitigate these issues at least in part by analyzing the weaknesses or other potential vul-

nerabilities that its growing participation in other types of real-world operation—PKOs, the evacuation of Chinese citizens from Libya, anti-piracy operations in the Gulf of Aden, and the search for the missing Malaysian Airlines plane MH370—have revealed.

The divisions between PLA officers with operational field control and those who are largely academics or tasked with managing relations with foreign militaries are frequently reported in conversations between foreign experts and academic PLA officers. The strictness of the ban on contacts between academic and foreign area officers and operational commanders is difficult to gauge and constitutes a remaining information gap in Western understandings of the PLA. The implications, however, are that military-to-military engagements with the PLA are unlikely to result in substantial change in PLA-wide views of U.S. or foreign militaries. Neither are personal ties and contacts built up between foreign and PLA counterparts likely to have much influence on operational behavior.

Force Structure and Personnel Enablement Policies

Another broad group of organizational challenges for the PLA is related to force structure. These include the size of the overall armed forces; issues of recruitment, retention, and post-demobilization life; weaknesses in the noncommissioned officer corps; a surfeit of commissioned officers; and the role political commissars play in the force.

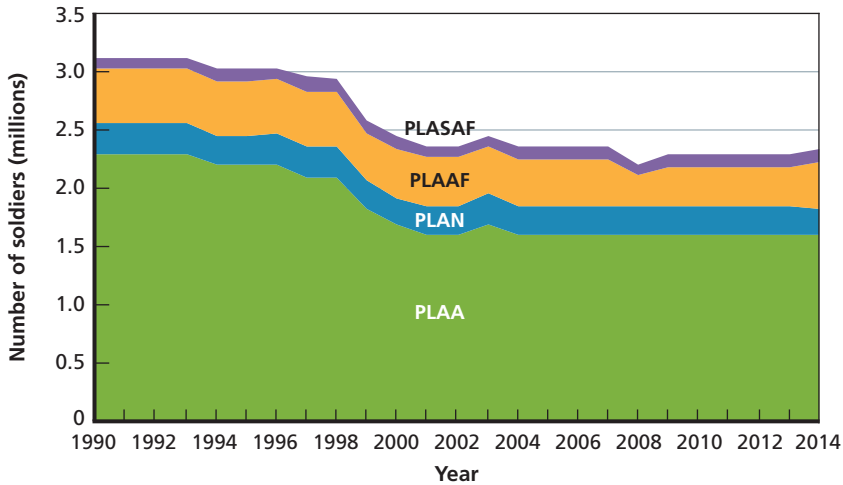
Size of the People's Liberation Army

The overall size of the PLA—roughly 2.3 million men and women under arms—is an enormous burden on the country's defense budget. It takes massive administrative and logistical efforts to feed, clothe, house, care for, and manage this force. While the PLA has significantly reduced its overall force size since 1990 (see Figure 4.1), many analysts believe it is still too large (Kamphausen and Scobell, 2007).

Recruitment, Retention, and Veteran's Benefits

The PLA has had and continues to have trouble recruiting and retaining qualified personnel, especially for technical positions. It has also experienced widespread dissatisfaction within the community of active and retired PLA forces over their (anticipated or actual) postservice

Figure 4.1
PLA Manpower, 1990–2014



SOURCE: IISS, various years.

RAND RR893-4.1

treatment in terms of employment and benefits. Such considerations as housing, salaries, food, opportunities for personal development, and post-PLA service life can all weaken the force by depriving it of high-quality recruits and weakening the morale of those who do join the PLA. Anecdotally, it appears that many PLA recruits are dissatisfied with having to serve in remote areas, where hardship is a part of life. Competition for educated recruits has grown more challenging as wages rise in coastal urban areas, making it more attractive for young Chinese to join the civilian economy rather than serve in the PLA. Although we were unable to locate specific data on attrition rates, they are reportedly high for midcareer soldiers, in part because of the limited range of opportunities the PLA provides for professional development, continuing education, and acquisition of skills that will serve the soldier after he or she returns to civilian life. Similarly, retired soldiers have repeatedly been at the center of protests and calls for better veterans' benefits and pensions, a development that is almost certainly noted by and worrisome to currently serving PLA soldiers and offi-

cers still looking ahead to their own demobilizations (Hancock, 2014; Kuhn, 2010).

Noncommissioned Officer Corps

The Chinese armed forces have been seeking to develop a noncommissioned officer (NCO) corps, especially technologically adept NCOs, because this has been an area that internal PLA assessments have evaluated as constituting a critical weakness. The PLA has striven to raise its qualification and training levels for NCO recruitment in recent years, putting in place more valuable remuneration packages and raising training and educational opportunities ("China Reveals Plan . . .," 2009). Separately, China tends to use its NCOs primarily in technical capacities but not for small-unit leadership. Given the role the political commissars play in the force and the cultural proclivity to push decisionmaking up, rather than down (both discussed further later), the prospects of making the most of the NCO corps in a unit leadership capacity appear limited (McCauley, 2011).

Force Composition

The PLA has been seeking to shift its internal structure for some time, with some observers assessing that the PLA's force structure is too bottom heavy (too many two-year conscripts) and too top heavy (too many officers and civilian administrative cadres at the higher-headquarters level) with not enough backbone forces (such as NCOs) (NASIC, 2010).

Role of Political Commissars

Many foreign military analysts regard the role the political commissars play in the force as a weakness that hampers military effectiveness by taking time away from training to focus on the study of Marxism-Leninism, the latest policy line from the top leadership, and loyalty to the CCP. Allen, Chao, and Kinsella (2013) notes that the political commissars' role is to implement CCP decisions in the military, to instill Party discipline among the military, to provide political education to the troops, and to work with other components of the political system. Srikanth Kondipalli (2005) adds to this an emphasis on enhancing troop morale and providing entertainment, as well as con-

stant assessment of the political thinking of the force and tracking the articulated positions of its various members. Still another important aspect is the role political commissars play in promotions, which could have broad implications for the professionalism and operational competence of the PLA.

Because of the critical role the political commissar system plays in ensuring the PLA's institutional role as a Party army, the CCP and PLA generally see the system as a necessary institution, not a weakness. In contrast, many foreign observers regard it as a distraction from considerations related more directly to operational military effectiveness, with Easton (2014) assessing that political meetings consume as much as 15 hours out of a 40-hour workweek. While the role of the political commissars has changed substantially since the late 1970s, moving toward a greater focus on ensuring the political reliability of the force and providing for its entertainment and morale, there are still elements of this institution that will likely take time away from purely operational and C2 decisions.

Command Structure

This subsection discusses weaknesses in the nontechnical aspects of PLA C2; possible technical challenges confronting PLA C2 are discussed elsewhere in this report. PRC and foreign observers of the PLA have identified a substantial number of problems associated with the nontechnical side of C2 over the PLA, including the role of the CMC and the four general departments; the PLA's military region-based national command structure; and the use of the PLA's GSD to serve as PLAA staff headquarters.

Central Military Commission

Command authority is exercised within the PLA through the 11-member CMC, rather than through a single minister advising the national command authority, as in many other countries.⁶ The system

⁶ As of mid-2014, the CMC of the PLA consisted of the chairman, Xi Jinping; two vice chairmen, PLAA General Fan Changlong and PLAAF General Xu Qiliang; the minister of national defense, PLAA General Chang Wanquan; the director of the GSD, PLAA General Fang Fenghui; the director of the General Political Department, PLAA General Zhang

cumbersome, especially because it involves not only decisionmaking but also operational control and implementation, under the PLA's four general departments (Wortzel, 2003, p. 6). To improve this system, China announced in late 2013 that the

leadership system of the army will be reformed, and the function and institution settings of the CMC will be optimized . . . [and] joint operation command authority under the CMC, and theater joint operation command system, will be improved. ("China to Optimize . . .," 2013)

Military Regions

The operational PLA is divided up into seven military regions (Shenyang, Beijing, Jinan, Nanjing, Guangzhou, Chengdu, and Lanzhou) that cluster large provinces and urban areas together but bear little relationship to regional affairs or power projection. PRC-based military analysts and foreign observers alike assess that the military region system, as currently structured, contributes little to the PLA's ability to generate combat power and may, in fact, hamper decision-making and effective action. For example, PLAN officer Hua Xiaoping has argued that "military region leadership organizations cannot say that they are a real command organization, and this makes it difficult to meet the needs of commanding multidimensional operations under high technology conditions" (Pollpeter, 2010, p. 210). See Table 4.1 for more on the relevant history.

General Staff Department

The PLA has tended to use the GSD as an unofficial service headquarters for the PLAA, meaning that—in addition to managing military operations, training, mobilization, intelligence, EW, communications, training, cartography, meteorology, military affairs and foreign affairs, and running the national main and alternate C2 systems—the GSD

Yang; the director of the GLD, PLAA General Zhao Keshi; the director of the General Armament Department (GAD), Zhang Youxia; the commander of the PLA Navy, Admiral Wu Shengli; the commander of the PLAAF, General Ma Xiaotian; and the commander of PLASAF, General Wei Fenghe.

Table 4.1
Major PLA Organizational Changes

Year	Organizational Change
1949	PLAN, PLAAF established.
1955	Number of military regions increases to 13.
1958	Number of general departments decreases to three (General Political Department, GLD, GSD).
1966	PLASAF established.
1969	Number of military regions decreases to 11.
1985	Number of military regions decreases to 7 (Shenyang, Beijing, Nanjing, Guangzhou, Jinan, Chengdu, Lanzhou).
1998	Number of general departments increases to 4 (GAD established).
2013–?	China reportedly planning PLA organizational structure reforms (possibilities include reductions in military region numbers, creation of ground force headquarters).

SOURCES: Nan Li, 1999; Allen, 2002; “Full Text of 18th CPC Central Committee 3rd Plenum Communiqué,” 2013.

has to worry about Army-specific considerations. Seen from another angle, this means that Army-specific considerations are highly likely to shape and color overall PLA approaches to the issues that the GSD is responsible for managing, thereby potentially constraining the influence of the PLAN, PLAAF, and PLASAF and making jointness more difficult to achieve. This issue reflects considerations discussed above under the section on PLAA cultural and institutional dominance within the PLA as a whole. Observers tend to agree that it is an imbalanced arrangement that shapes the PLA’s overall institutional culture and effectiveness in directions that tilt away from jointness and efficient generation of combat power.

Human Capital
Quality of Recruits

As the PLA has sought to mechanize and subsequently to informationalize [信息化], the skill sets its recruits require have expanded substantially. Operating increasingly sophisticated weapon platforms in a

combined arms and eventually (aspirationally) a joint arms approach to combat requires highly qualified recruits. While education levels have increased in China, many recruits are still drawn from rural areas with limited education and training and insufficient exposure to advanced technologies to master and maintain complicated equipment.

Mental and Physical Health

The mental and physical health of its force is another challenge for the PLA. While all militaries have to ensure that their soldiers are physically and mentally fit for combat and military operations, the PLA appears to face somewhat unique challenges in this regard that stem from the growing levels of development in Chinese society and Chinese demographic policies. For example, air pollution levels and modern sedentary lifestyles have reportedly reached such serious levels that health and lung strength are impaired for broad swaths of society, even among what would normally be expected to be healthy segments of the population. To meet recruiting goals, the PLA has reportedly

lowered the minimum height requirement for recruits, raised the maximum weight limit, reduced eyesight standards . . . [and even] removed mental illnesses, including schizophrenia, depression, and bipolar disorder, as barriers to recruitment. (Zheng Xin, 2013)

To some extent, the changes seen in China's recruits today merely reflect a maturing, increasingly urbanized, and wealthy industrial society. As Xinhua reported in early 2014, a recent study by the GAD had determined that

the average Chinese soldier is two centimeters taller and their waistline five centimeters larger than 20 years ago . . . [meaning that] a soldier with a normal body figure can even feel "cramped" in some commonly used tanks, with the vehicle designs based on average physiques 30 years ago . . . [Additionally,] firearm stocks that are too short can also affect firing accuracy. ("Chinese Soldiers Outgrowing . . .," 2014)

Professionalism

The final set of human capital weaknesses has to do with corruption, low morale, and shortcomings in professionalism, including difficulties accepting military discipline and maintaining operational security. Many of these problems come from underlying issues or trends in Chinese society, such as the “little emperor” phenomenon of spoiled children stemming from the one-child policy, which produces recruits who may not be tough enough to withstand military discipline. Highlighting this issue, one recent report notes that Senior Colonel Liu Mingfu of PLA National Defense University has related that “at least 70 percent of PLA soldiers were from one-child families, and the figure rises to 80 percent among combat troops” (“Soldiers of the One-Child Era . . .,” 2014).

Impact on the People's Liberation Army's Ability to Achieve Its Missions

Unlike the following chapter looking at PLA weaknesses in combat capabilities, it is difficult to tie identified organizational or human capital weaknesses directly to the success or failure of any of the various PLA missions mentioned. Instead of increasing mission risk substantially or even more dramatically preventing a mission from being carried out, these weaknesses generally erode the PLA's abilities to carry out missions equally.

As a result, the identified organizational weaknesses—organizational structure, organizational culture, force structure, and command structure—constitute Type 3 weaknesses that degrade the efficiency of the PLA to carry out its missions. The various subissues, such as corruption, leadership, and training, at the very least tax the resources used to develop modern forces. At worst, they constrain the ability of the PLA to capably accomplish its missions. However, it is possible that, in a hypothetical protracted war, some of the friction documented earlier in this chapter might lead to a breakdown of civil-military relations. As a result, organizational structure might constitute a Type 2 weakness under certain extreme contingencies.

The identified human capital weaknesses—quality of recruits, mental and physical health, and professionalism—likely constitute Type 3 weaknesses. Certainly, developing a force to deter and win wars and accomplish “diversified military tasks,” while using “informatized” equipment in a “complex electromagnetic environment,” as the PLA seeks to do, requires officers and enlisted personnel who can conceive of, plan, and execute complicated missions under challenging and potentially rapidly changing circumstances.

How the People's Liberation Army Is Attempting to Address These Weaknesses

This section looks at how the PLA is attempting to address its organizational and human capital weaknesses to the extent observable. Where possible, this section also seeks to provide some analysis of how successful the PLA will be by looking at the earlier aspects related to the PLA's organization (organizational structure, organizational culture, force structure, and command structure) and human capital.

Organizational Structure

Party-Military Relations

Determining how effective the PLA has been at addressing the issue of popular sentiment within the force favoring nationalization is a difficult challenge. The frequently repeated calls from Chinese military officers and Party leaders for the PLA to reject nationalization can be read as evidence that the CCP and the PLA leadership regard the issue as a serious challenge and one that probably cannot be “solved” so much as “managed.” It is not clear that the PLA's attitude toward China's political system will necessarily change in any fundamental ways between 2014 and 2025. If global trends toward democracy and increased access to information and social networking continue, the pressures on the PLA to move away from its current role as defender of the Party's prerogatives will probably grow. On the other hand, if CMC Chairman Xi Jinping's drive to emphasize nationalism and socialism through a substantial anticorruption drive paired with the promotion of a “China

dream” are broadly embraced within China, it is more likely that the PLA may continue (or increasingly come to) embrace its status as the ultimate guarantor of the CCP’s political power and interests.⁷

Civil-Military Relations

As the differing assessments of foreign observers of the importance of the disconnect between the PLA and the bureaucratic organs of the state testifies, expert analysts differ on whether (and if so, how much) this gap matters to the production of effective military power and response capabilities. If the assumption that the PLA suffers from challenges in coordinating with the state is inaccurate, it would imply that China’s coordination of a response to any damages inflicted during the course of a conflict might be faster and more effective than anticipated, giving the country additional resilience. Chinese sources rarely mention this issue as a weakness, and the PLA does not appear to be trying to address this weakness. Out to 2025, as China’s interests become more global, as the number of actors participating in or affected by Chinese foreign and security policy decisionmaking expands, and as the PRC’s citizenry comes to expect its military to protect it from threats both at home and abroad, it is possible that effective coordination between the PLA and the state will grow in importance. It is too early, however, to state definitively that the Chinese military cannot effectively use its existing ad hoc or Party-based coordination channels or develop new ones, such as the National Security Commission formed in late 2013.

Civilian Oversight

As noted earlier, Chinese military writers do not address this as a weakness, and there is little evidence that the PLA (or broader PRC system) is seeking to develop a cadre of civilians who can provide oversight or advice. There also do not appear to be plans to add civilians to the CMC chain of command (although the successor-designate to Xi Jinping in 2022 could conceivably be added sometime in the 2017 time frame to allow him to gain experience with and build contacts among the military). Finally, there are no signs that the National People’s

⁷ The China dream is a concept championed by Xi Jinping that “envision[s] a strong nation with a strong military” (Swaine, 2013, p. 10).

Congress will become more active in exercising budgetary or policy oversight over the PLA. As one U.S. expert discussing these and other indicators of enhanced civilian oversight and control concluded, “such developments are unlikely to occur in the near future” (Scobell, 2009, p. 20).

Organizational Culture

Corruption

Since Xi Jinping came to power in late 2012, the PLA has appeared, much like the rest of the PRC, to have come under heavy and sustained pressure to clean up corruption. The PLA reportedly established an internal “auditing group” in 2012 dedicated to monitoring “expenditures of large amounts of money, such as construction projects, housing management, procurement and the operation of military hospitals” and is also tightening up auditing and accounting procedures and regulations (An Baijie, 2014a). Anecdotally, banquets, gift-giving, and abuse of military perquisites are down substantially in the wake of CMC Chairman Xi’s calls to avoid displays of ostentation. Xi’s call to focus on core military competencies to prepare to “fight and win wars” appears at least partially designed to clean up and combat corruption in the armed forces to improve their ability to project military force and generate effective combat power. Xi’s ability to curb corruption without undertaking structural changes that demand greater transparency, accountability, and civilian oversight seems likely to be constrained, and it remains an open question whether fear, disciplinary inspections, and hortatory calls alone will suffice to produce long-lasting changes that will outlive Xi Jinping’s time in office. Importantly, Xi’s emphasis on and extension of anticorruption efforts at senior levels of the PLA, as reflected by the recent expulsion from the CCP of former CMC Vice Chairman Xu Caihou, could be part of an effort to further consolidate Xi’s control of the military and accomplish key reform and restructuring goals (for example, Tiezzi, 2014). Little if any information is available to evaluate this hypothesis, but it is a possibility that appears to merit further analytical attention.

In addition, if the PLA initiates a genuine house cleaning on corruption, this too carries certain risks for morale within the force,

resentment over corruption as it is revealed, and suspicion that pockets will persist. It could also conceivably lead to the removal of officers who, while corrupt, are also competent and/or creative commanders, thereby cleaning up but also weakening the force.

Compensation

In recent years, the PLA has reportedly raised salaries quite substantially and appears to be planning to do so for many years to come. It is also seeking to provide troops with better food, clothing, barracks living accommodations, and entertainment (“People’s Liberation Army to March . . .,” 2009; “Fifth-Generation Barracks . . .,” 2012; Guo Renjie, 2014). Even so, a 2011 report noted that the average PLA officer’s annual income was only about U.S. \$9,900, or about U.S. \$3 more per day than the median income of a Beijing resident (“Chinese Military Officers’ Wages . . .,” 2011). While the PLA now reportedly pays its officers and soldiers better than in the past, many of the benefits of service in the PLA have reportedly come in the form of nonsalary compensation (clothing, housing, etc.), and yet others may stem from the opportunity to engage in corruption of varying levels of value.

Realistic Training

Out to 2025, the PLA will increasingly need to be able to operate in difficult environments—far from home, in bad weather, and potentially against adversaries that innovate and take courses of action that PLA planning constructs have not anticipated. While the PLA has begun to train in more-realistic geographic settings, incorporating opposing force units whose tactics and operational practices more closely mimic potential real-world adversaries, in poor weather conditions, at night, in complicated electromagnetic environments, and in spite of breakdowns in machinery, the PLA is still only beginning to adopt a more-realistic and more-effective training and exercise regimen (“PLA Kicks Off . . .,” 2014). Still, it is likely that, by 2025, the PLA will have made further progress in training under more-realistic and challenging conditions. This has been a consistent area of emphasis in PLA training guidance for many years and appears likely to remain a high priority for the PLA over the next decade.

Army-Centric Force

PLA sources generally do not discuss the prominent role of service identities as a weakness, but foreign experts are widely agreed on this point and also report that Chinese observers agree with this assessment in private conversations, even if they are not at liberty to argue so in print. Moreover, the transformation of the CMC over the past decade (adding the service branch chiefs in 2004 and promoting an air force general to the vice chairmanship in 2012) would appear to be driven at least in part by a desire to respond to concerns about the needs for jointness and increased input from the PLAAF, PLAN, and PLASAF that will be important for projecting power farther away from China's shores and for executing more-complex, joint operations.

While the PLAA has dominated the PLAAF and PLAN for decades, the PLAAF and PLAN have nonetheless been gaining increasing influence and a deeper sense of their own service identities in recent years. China appears to be moving from an era when one service predominated to one in which service identities as a whole are growing stronger, even as the PLA appears to realize operationally that what it needs to accomplish most urgently is to transition to an era of genuine "jointness." Recent PLA moves to address this concern may be coming in the form of a new "joint operational command system" that would "result in more coordinated and combat-capable forces" that could respond more efficiently to crisis (Zhao Shengnan, 2014).

Force Structure and Personnel Enablement Policies

Size of the People's Liberation Army

The PLA is believed to be planning additional force reductions as it transitions toward an increasingly professional force, investing more in high-technology platforms for power projection, rather than remaining a force designed primarily for garrisoning the country's borders and preparing to counter a ground invasion. In late 2013, the Third Plenary Session of the 18th Central Committee reportedly reached a decision to continue to "optimize" the PLA's size and structure and to adjust other aspects of the PLA's C2 ("China to Optimize . . .," 2013). At present, no information has come to light about the exact size of the force reductions or which service branches will be affected. Thus,

information about the ultimate planned size of the PLA remains a key gap in our understanding of the forces that the PLA is likely to field out to 2025.

Recruitment, Retention, and Veteran's Benefits

In response to these concerns, the PLA has sought to increase patriotic sentiments in society at large—for example, through normative or hortatory calls to military service and production of nationalistic video games designed to appeal to young potential recruits (Dewey, 2013)—while also increasing the material benefits for those who serve, such as better food, clothing, and recreational and educational opportunities. At the same time, there have been continuing efforts to encourage localities to provide jobs and living stipends to retired PLA officers and NCOs, attempting to address at least part of their concerns. Some retired NCOs have been brought back in to share insights and experiences and provide continuing leadership and technical expertise. How effective these actions have been and how widespread dissatisfaction over living standards, professional development opportunities, and postservice life are remain difficult to assess in the absence of systematic survey data. The PLA's efforts to address these issues appear likely to make at least some headway out to 2025. While unlikely to fully resolve these issues, these efforts may help manage the challenges we identified in the realms of standard of living, professional development, and postservice life.

Noncommissioned Officer Corps

Information gaps continue to exist with respect to the challenges arising from insufficient numbers in or quality of the NCO corps. Given China's commitment to making progress on this issue, it seems reasonable to suspect that it will make at least some progress in addressing the issue of the NCO corps by 2025, although this too is likely to be an area in which the PLA is constantly striving to make improvements and managing the consequences of the issue, rather than "solving" the problem.

Command Structure

Central Military Commission

While appearing to view the CMC-led system as being open for further refinement, China does not appear primed to move away from the system in any fundamental way or to regard it as something that is a critical constraint on the ability to generate military power. For this reason, even as the PLA contemplates the reform of its organizational structure, there is little reason to believe the PLA is planning fundamental changes in the CMC system. Any such changes would most likely driven by the personal decisionmaking style and preferences of the top leader, whose stamp is placed on the functioning of that body (albeit with certain constraints coming from the factional rivals he and his allies must bargain with).

Military Regions

A reorganization of the PLA, possibly accompanied by a reduction in the number of military regions from seven to five, has been discussed for some time, most recently in early 2014 (Zhao Shengnan, 2014). While rumors of such reorganization have been around for years, Xi Jinping may be able to exert sufficient leadership strength to succeed where his predecessors have failed. If so, this would potentially take place along with other potential changes to the military strategic guidelines we discussed earlier in this report. Looking out to 2025, the need for changes to the C2 structure to facilitate complex joint operations both within and beyond China's borders is apparent. Premised on internal geographical divisions within the Chinese state, the current system of C2 will increasingly be seen as a constraint on the effective generation of military power and the control of such power, thus further fueling calls for changes.

Human Capital

Quality of Recruits

According to *China Daily*, the PLA is trying to address the weaknesses in the educational levels of its force by recruiting more high school graduates and college degree holders ("China's Army Eases Curbs . . .," 2014). PLA recruiters in 2014 have reportedly been specifically ordered

by the Ministry of National Defense to “take in more college students than in 2013” (“China Army Wants . . .,” 2014), and the age limit for bachelor degree holders has been raised from 23 to 24 to expand the pool of potential recruits (“China Army Recruitment . . .,” 2014). Education levels among officers are also something that the PLA is hoping to raise, although the pressures to do so are also fueling some concerns about false or sham educational credentials.

Mental and Physical Health

The PLA is making an effort to accept conscripts with lower entry-level physical and mental aptitude scores and train them up, although how well this will pan out is not yet clear. It is not clear how a foreign military could take advantage of such weaknesses on the part of the PLA.

Professionalism

To address the emotional and psychological needs of its service personnel, the PLA has reportedly implemented a special training program for “spoiled boys and girls” to strengthen their fighting capability, with one PLA soldier interviewed by the *South China Morning Post* reporting that “recruits usually need two years to adjust to life within a unit through tough routine training and psychological counseling” (“Soldiers of the One-Child Era . . .,” 2014).

Weaknesses of People's Liberation Army Combat Capabilities

This chapter addresses weaknesses in the PLA's combat capabilities through the lens of the “two incompatibles,” a concept Chinese publications often use to highlight what the PLA perceives as a gap between its current capabilities and its goals. The chapter consists of six sections. The first section discusses the concept of the two incompatibles in greater detail. The second evaluates weaknesses in the land domain. The third addresses weaknesses in the maritime domain. The fourth reviews weaknesses in the air domain. The fifth reviews weaknesses in space, cyberspace, and the electromagnetic spectrum. The sixth assesses potential weaknesses in China's approach to nuclear deterrence.

The Two Incompatibles and the Two Gaps

The PLA is acutely aware that weaknesses persist in army-building efforts to date and that the sustained modernization drive of the last two and a half decades has yet to achieve its goals. Specifically, the PLA's own weakness assessments revolve around a concept alternately referred to as *two incompatibles* [两个不相适应] or the *two gaps* [两个差距].¹ Originally promulgated by former President Hu Jintao (“Firmly Grasping . . . ,” 2006), the two incompatibles are

¹ Both terms connote the same concepts but are used to highlight slightly different aspects, as we will explore later.

- The *modernization levels* of China's armed forces have yet to meet the requirements of winning local wars under informatized conditions.
- The *military capabilities* of China's armed forces have yet to live up to the historical missions.

Specifically, the PLA recognizes incongruities between the envisioned development of military capabilities and current realities. The first incompatible acknowledges that the PLA's ability to capably fight wars is insufficient, especially against modern information-age opponents that have incorporated advances from recent revolutions in military affairs (Fan Zhenjiang and Lou Yaoliang, 2009). The second incompatible acknowledges that the PLA's ability to conduct MOOTW also falls short of the levels the CCP desires.

Although the two incompatibles and two gaps reference the same concept, the literature uses them to highlight different aspects. Mentions of the two incompatibles are intended to state what the problem is, while mentions of the two gaps seek to diagnose why the problem exists and, often, how to solve it. According to CMC member and PLAN commander Wu Shengli, the two incompatibles and two gaps serve a dual role, as official problem recognition and as the basis for the PLA's attempts at "scientific" problem solving (Wu Shengli, 2010, p. 1). Far from empty rhetoric, the two incompatibles and two gaps thought has permeated every general department, service, military region, and fleet as hundreds of PLA articles and speeches by CMC members attest. Indeed, these terms can be considered the capstone concept of Party guidance directing the PLA's continued development because they are considered the "principle contradiction" in PLAA building and military training (Tang Xiaohua and Li Jie, 2012).

What are the problems identified with the first incompatible, PLA's lack of modernization? The available literature denotes several areas that are broad and endemic to the force in the realms of training, organization, human capital, force development, and logistics as being particularly problematic:

- Training has not kept pace with modernization, according to one commenter, as old training practices have not changed “in line with the new mode of generating combat power . . . and current training is not sufficient for training under informatized conditions” (“Promoting the Scientific . . .,” 2011).
- Organizationally, China's armed forces are not prepared to address continued “problems related to administrative structures and mechanisms” and remaining “institutional obstacles and structural conditions” (Peng Bo, 2008, p. 11). The PLA's human capital is an issue because the “quality of officers and soldiers is incompatible with the requirements imposed by their duties and missions” (Wang Jianping and Yu Linxiang, 2014). More specifically, “existing staffing of China's armed forces cannot fulfill the requirements of informatized war” because “the quality of [information technology, or IT] personnel does not match the requirements for the development of combat effectiveness” (Peng Bo, 2008, p. 11; “Major Initiatives . . .,” 2011).
- Force development suffers because the PLA, according to one commenter, is not an informatized force but a 20th-century mechanized force (“Promoting the Scientific . . .,” 2011). Other commentators are even harsher in their assessments. According to CMC Vice Chairman Xu Qiliang, although the PLA seeks to become an informatized force, it is not fully mechanized (Xu Qiliang, 2013, p. 6). Beyond modernization levels, the PLA faces structural challenges to force development that are due to “dispersed resources, redundant construction, and low efficiency” (“Putting Greater Emphasis on Reform, Innovation . . .,” 2011). The PLA also recognizes that it has a long way to go to become a joint force, in which all the services can act together. One journal article stated that the “military's foundation for integrated joint operations was still relatively weak” (Fan Zhenjiang and Lou Yao-liang, 2009).
- Logistics is also cited as an area of weakness, specifically being at an “insufficient . . . modernization level . . . to win informatized local wars” (Zhao Jianwei and Tang Xiangdong, 2008).

What problems are identified with the second incompatible, the inability of the PLA to fully carry out the new historic missions? The available literature points to similar problems of training, organization, and logistics, but interestingly appears less focused on force development:

- Training for the new historic missions is “insufficient” because “traditional ideas and habitual practices have not been drastically changed” (“Firmly Grasping . . .,” 2006).
- The organizational aspects, specifically human capital, are also an issue; “the overall level of talented personnel in our army does not meet the requirements for fulfilling its historic mission in the new century” (“Major Initiatives . . .,” 2011).
- The “construction and development” of PLA logistics are “not meeting the requirements” because there is “insufficient support capability for the requirement of fulfilling the historical missions” (Tang Xiangdong and Fan Juwei, 2007, p. 1; Zhao Jianwei and Tang Xiangdong, 2008).

As mentioned earlier, the literature switches from using the phrase *two incompatibles*, which is a statement of what the problem is, to the phrase *two gaps* when it seeks to explain why the problems exists and how the problems can be addressed.

Why is the first incompatible, PLA's level of modernization in fighting informatized wars, problematic? According to a speech CMC Vice Chairman Xu Qiliang delivered to the Third Plenum in 2013, this is because a “substantial gap” endures between the PLA “and the advanced militaries of the world . . .” (Xu Qiliang, 2013, p. 6). According to Xu, this is of particular concern because the PLA may one day find itself “left behind” (Fan Zhenjiang and Lou Yaoliang, 2009; “New Year Message . . .,” 2008). At least one Chinese PLA scholar has further diagnosed why the PLA is relatively underdeveloped, stating that it is the result of China's intentional focus on other areas of Chinese society, most notably building the economy (Yang Yi, 2006). Far from being an abstract issue, the PLA's current lack of modernization is considered to have significant implications for China's national sovereignty and secu-

rity today. Because of the gaps in modernization, the PLA cannot fully defend China's national sovereignty through the "protection of oceanic rights and security in space and electromagnetic domains" (Yang Chunchang and Wang Hanshui, 2009). Furthermore, "actual and potential threats" already exist on China's "periphery, especially in the maritime direction . . ." that are either unaddressed or underaddressed because of PLA's weaknesses ("Persistently Direct . . .," 2013, p. 1).

Why is the second incompatible, PLA's military lack of capabilities to prosecute the historic missions, problematic? Commentators recognize that "there is still a gap between the current military power of our military and the requirement of fulfilling the historic mission" ("Making a Firm Effort . . .," 2006, p. 1). Specifically, the PLA "cannot fulfill . . . domestic and international demands . . . to perform the nontraditional missions of counterterrorism, upholding stability, and peacekeeping" (Peng Bo, 2008, p. 11). In particular, "a wide gap between . . ." the "organization and command of forces to respond to a variety of threats and complete diverse military tasks" remains ("Building High-Quality . . .," 2008, p. 1).

How does the PLA seek to generally address problems the two incompatibles raise? First and foremost, the PLA seeks to investigate "prominent contradictions and problems" and resolve these problems by "implementing scientific development" ("Attaining Greater . . .," 2010, p. 1; "More Resolutely . . .," 2012, p. 1). Commenters have further pointed to the need for new policies and administrative structures to oversee these changes ("Attaining Greater . . .," 2010, p. 1). Specifically, they have emphasized strengthening defense technology, deepening training reform, and accelerating modernization as the major means of solving the two incompatibles. Defense technology must also be strengthened by building a research and development system that is more capable and that is endowed "with Chinese characteristics" to "spur new innovations" (Liu Sheng, 2013, p. 3). At least one commenter considers training reform to be the "basic path to resolving" the two incompatibles ("Promoting the Scientific . . .," 2011, p. 1; Tang Xiaohua and Li Jie, 2012). Finally, the PLA has set a goal for itself to become a fully mechanized force by 2020 while simultaneously working to become more informatized by keeping "a tight grip," a likely

euphemism for high-level oversight of modernization efforts (Wu Jieming, 2014; Zhang Qinsheng, 2011).

The rest of this chapter will assess the weaknesses presented in PLA sources, the majority of which mention the problems framed by the two incompatibles, and/or PLA sources that mention the two gaps and therefore address why these problems exist and how to deal with them. We will address these issues for the land; sea; air; space, cyber, and electromagnetic warfare; and nuclear domains.

The Land Domain

Through focusing specifically on the available “two incompatibles/two gaps” literature, this section looks at potential weaknesses in the land domain, how they might affect the PLA’s ability to achieve its missions, and how the PLA is attempting to address weaknesses in the PLAA and the conventional units of the PLASAF.² These forces bear the brunt of responsibility for campaign operations in the land domain.

Potential People’s Liberation Army Army and People’s Liberation Army Second Artillery Force Weaknesses

People’s Liberation Army Army

The Chinese sources often discuss shortcomings in a disaggregated, laundry-list fashion and do not necessarily link their tactical problems to the overarching operational and strategic problem of achieving joint operational capabilities. Nonetheless, many Chinese strategists identify the inability to conduct integrated joint operations as the central problem China needs to solve to be able to project combat power beyond its land borders.

Chinese sources highlight several problems that contribute to the PLA’s shortcomings for conducting integrated joint operations. Overall, they suggest there is still a large gap with developed countries’ militaries, especially the United States (Feng Aiguo, 2013; Li Yuming,

² As a result of the deployment of the DF-21D ASBM, PLASAF also has an important role in the maritime domain, at least in scenarios that involve U.S. military intervention.

2014; “Fully Understand . . . ,” 2014). According to one source, the “gap between the modernization level and national security demands is still very large, and the gap with advanced military levels around the world is also still very large” (“12 Questions . . . ,” 2013). Chinese sources attribute this gap to a number of problems.

Ideological Thinking

One roadblock the PLA must overcome is conceptual, or what are described as problems in ideological thinking. PLA sources blame this for everything from parochialism between the services to a structural or systemic problem to the equipment level (Li Dongxing and Tao Lianpeng, 2014, p. 5). The implication appears to be that correct thinking should be able to solve any of these problems. One potential complicating factor here is that this may reinforce the perspective of the preeminence of Party ideology over professional military thinking.

Personnel

Another challenge highlighted in PLA publications is the quality of personnel. For many years, the PLA has attached a high priority to improving the level of its personnel. One frequently cited formulation that underscores the importance of talented personnel is: “[W]e would rather have talent and wait for equipment than have equipment and wait for talent” (Zhang Yang, 2009). Yet PLA publications suggest that the PLA still faces problems in a number of areas. One is education and training (Fang Guangfeng, 2013; Zhou Ruifeng, 2012). Another is achieving sufficient discipline within the service to follow orders and procedures and to enforce standards (“Cheerful Sight . . . ,” 2013). As one source puts it: “We must clearly acknowledge that the thinking of some officers and men with regard to supporting war is still not firmly established and that problems still exist in . . . training, exercises, and testing in an improper, insubstantial, or lax manner” (Zhang Jianshe, 2013).

Still another personnel problem the PLA has identified concerns its senior leaders' leadership abilities. According to one report, the “capability for fighting modern warfare is still insufficient, and the capability of cadres at all levels for commanding modern warfare is also still insufficient” (“12 Questions . . . ,” 2013). Some PLA sources link

this to insufficient understanding of modern operational art. This is traced to insufficient comprehension of what is important and what is merely peripheral (Wu Zhiwei, Pan Linjun, and Zhang Wei, 2013) and to a peacetime mentality (Fu Biao et al., 2013) that reportedly prevails because China has not been in a major conflict since its 1979 war with Vietnam and has not been involved in sustained combat for over 50 years, since the Korean War.³

Some PLA publications also lament an inability to use new equipment properly (Wang Ning and Chen Hao, 2012), which could be because the PLA has been receiving so much new equipment so quickly (Fu Wenwu, Zhang Jianhui, and Yang Yongjun, 2012). According to one source, “one can only end wars by having the capability to fight It is a very slow and hard chore to get results from combat power building [It is] a ‘lonely long-distance run’ by generations of soldiers in a relay struggle on training ground” (“Preparing to Go . . . ,” 2013).

PLA publications also lament resistance to change to support modernization (You Chengfeng et al., 2012) and inadequate problem-solving ability (Wang Zhuang, 2013) and adaptability (Wu Zhiwei, Pan Linjun, and Zhang Wei, 2013). Additionally, PLA sources state that China still has a long way to go to realize its goal of building a modern and professional corps of NCOs on par with those of the world's most advanced militaries. PLA sources cite such problems as insufficient numbers, rate of rotation out of military, and training and education levels (Yu Hequan, Yan Xiaohui, and Jiang Honglin, 2012; Chen Xiang, 2014; Lan Guohong, Zhang Fang, and Ouyang Zhimin, 2012).

Finally, PLA publications highlight personnel challenges associated with an emerging generation gap and the resulting age and experience issues (Yu Xiangxi, Zhang Meng, and Zhang Shengtao, 2013; Feng Chunmei, Liu Yi, and Wang Renfei, 2013; “Strive to Fulfill . . . ,”

³ Zhang Youxia, director of the GAD, was quoted as saying that “forgetting war will certainly bring about dangers. Only by getting ready for war fighting will one be able to fight and win [A]lways maintain strategic alertness, resolutely overcome peacetime inertia and bad habits” (Fu Biao et al., 2013).

2014). The gap between younger personnel and older cadre is becoming more acute, and the limitations of an older, less technologically inclined leadership will make it difficult to realize combat potential for a modern battlefield.

Training

PLA publications also highlight continuing shortfalls in training, despite years of efforts to make training more realistic and more valuable in terms of addressing shortcomings and improving the PLA's operational capabilities. According to some reports, training is sometimes still too formalistic and does not focus on strengthening combat effectiveness (Fu Biao et al., 2013; Wang Xueping, 2011; Xu Longkui, 2012; Zhong Wei, 2013; Sun Weiguo, 2013). Other challenges cited in PLA publications include lack of appropriate training materials, equipment, and standards of performance (Zhang Wei, Li Yong, and Ren Xingzhi, 2013); lack of "suitable training grounds" (Li Dayong, Cai Bo, and Huang Tengfei, 2013; Zhang Jun, 2014; Wang Xuefeng et al., 2012); and insufficient night training (Zhao Xihong, 2013; Liu Shilong et al., 2013).

Informatization

Even though the PLA has made dramatic improvements in its ISR and communications capabilities in recent years, Chinese military publications suggest that the PLA still has a long way to go to improve its level of informatization enough to meet its broader objectives.

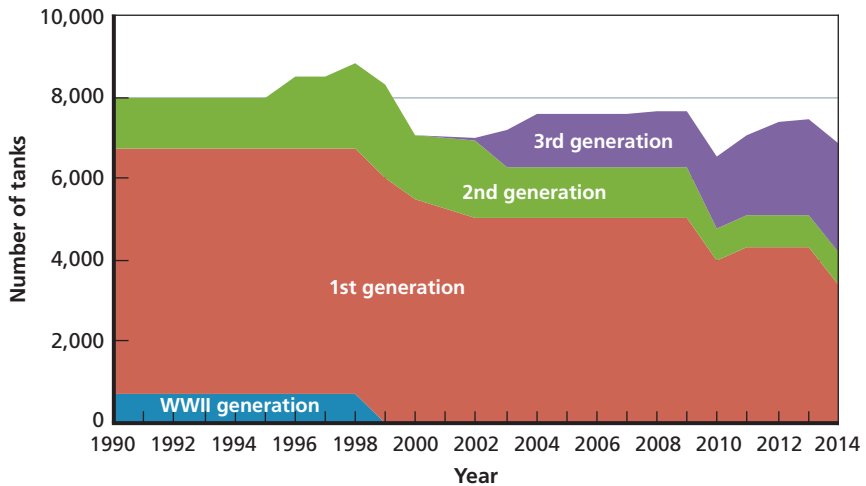
PLA publications highlight a limited number of trained and experienced personnel throughout the force. They also point to lack of training materials and standards of performance (Fu Wenwu, Zhang Jianhui, and Yang Yongjun, 2012) and suggest that some personnel are not following proper procedures and adhering to standard IT operating procedures (An Weiping, 2013). Additional problems highlighted in PLA newspapers and journals include design and effectiveness of equipment, integration of systems across the force, lack of "up to date data and management" (Zhang Xiaozhan, 2013), and access to geopoisonal and operational information. Some Chinese analysts also question the effectiveness of "system of systems" and IT equipment and cite what they see as a lack of a sufficiently innovative and robust IT indus-

try base to support the PLA, which results in too much dependence on foreign IT (Ministry of Industry and Information Technology of the People's Republic of China, 2012).

Weapons and Equipment

PLA sources that discuss weaponry and equipment shortfalls affecting the PLAA focus on such issues as training of personnel to operate and repair the equipment (Wang Wenzhui, Zeng Zhengxiong, and Luo Hong, 2013), limited amounts of new equipment to train on (Ma Qichao, 2013), and difficulties linked to integration of various types of new and old equipment (“Winning Battles . . .,” 2014). This is corroborated in open-source publications. For example, Figure 5.1 shows that the PLA's main battle tank fleet in 2014 continues to consist overwhelmingly of first- and second-generation tanks. Although modified,

Figure 5.1
Numbers of PLA Main Battle Tanks, by Generation, 1990–2014



SOURCE: IISS, various years.

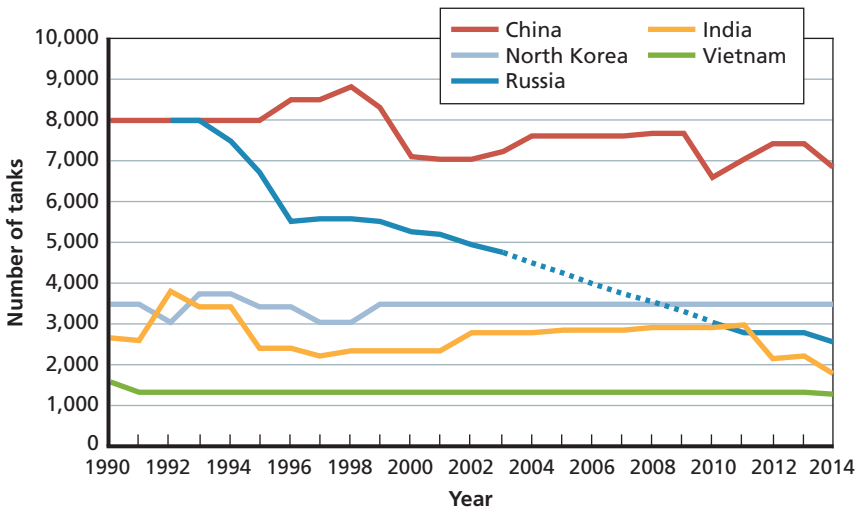
NOTE: China defines its tank generations differently, but for our purposes, the World War II generation consists of T-34 tanks; the first postwar generation of T-54, Type-59, and Type-69 tanks; the second generation of Type-79, Type-80, Type-85, Type-88, and all subvariant tanks; and the third generation of Type-96, Type-98, Type-99, and all subvariant tanks.

RAND RR893-5.1

certain first-generation tanks, such as the Type-59, were initially produced in the 1950s (Jane's Information Group, 2014b).

How do these numbers compare with those of China's immediate neighbors? While it is beyond the scope of this report to take into account the full range of qualitative differences in tank types and operating concepts and make a holistic system-of-systems comparison, Figure 5.2 shows that China maintains a significant quantitative advantage over its immediate neighbors in main battle tanks and has so for quite some time. Although not depicted, India maintains an arsenal of approximately 900 third-generation main battle tanks, although over two-thirds of its force consists of second-generation T-72 tanks (IISS, 2014, p. 242). Vietnam's army consists solely of first- and second-generation main battle tanks, with the T-62 as its premier tank (IISS,

Figure 5.2
Comparison of Main Battle Tank Inventories Possessed by China's Neighbors, 1990–2014



SOURCE: IISS, various years, and RAND estimates.

NOTES: Does not include main battle tanks thought to be in storage. This affects the totals for India and Russia, which have had up to approximately 1,000 and 20,000 tanks in storage, respectively, during many of the periods examined. IISS, 2014, reports only total numbers for Russia from 2003 through 2010, including tanks in storage. We therefore made a straight-line estimate for this period (dashed line).

RAND RR893-5.2

2014, p. 287). Finally, although Russia's operationally ready force consists of only 2,500 main battle tanks, it has another 18,000 in storage (IISS, 2014, p. 181).

Logistics Support

The PLAA also faces persistent challenges in support, as reflected by frequent discussions of shortcomings in logistics and maintenance capabilities that appear in PLA newspaper reports and journal articles. As one publication states, logistics challenges include such issues as "scattered logistic disposition, few mobile support forces, insufficient informatized logistic equipment, and weak long-distance delivery" (Wang Kun, 2013). Maintenance problems addressed in PLA articles and newspaper reports include shortcomings related to IT equipment (Fan Jingzhi and Yan Jiaji, 2013), army aviation (helicopters) (Ouyang Hao and Ye Jianjun, 2013), emergency repair (wartime) capability (Fu Biao et al., 2013), and high-tech equipment maintenance capacity (Zhang Pengcheng and Chen Jincai, 2013; Feng Tao, 2013; Liu Yun, 2013).

Mobilization

The PLA has emphasized mobilization capabilities but is still dissatisfied with the level of civil-military integration, problems with support (Sheng Haipeng, Chai Junwei, and Nie Feng, 2012), and what some sources identify as a relatively low level of IT integration (Lai Bing and Sun Shaojian, 2013). Notwithstanding emphasis on reserve force building, some sources suggest reserve forces still suffer from lax preparation, standards, and enforcement (Zhang Xicheng, Ji Hongwei, and Sang Shixin, 2010), resulting in a considerable gap between requirements and performance (Xu Bin, 2013).

People's Liberation Army Second Artillery Force

PLA publications suggest that, from a Chinese point of view, PLASAF still suffers from a variety of weaknesses. Indeed, PLASAF and other PLA publications highlight a number of what they characterize as key elements of PLASAF's shortcomings. One area that a number of the Chinese sources discuss is perceived shortfalls in the quality of missile force personnel. According to articles in PLA official newspapers, these

challenges reportedly include problems in management capabilities (Yang Hongpeng and Yang Hua, 2011); problems in leadership ability, including an unmet need for modern war skills and knowledge (Shan Quan, 2012); “softening” of warfighting thinking caused by “habits formed in peacetime” (Li Hongjun, 2013); and insufficient attention to evaluation of personnel. Some sources state that PLASAF has developed adequate standards to evaluate personnel only recently (Chen Guodong and Ge Song, 2013) and lament lack of discipline and lax attitudes, low morale, and formalism and superficiality (Lu Chunfu, 2012; Shan Quan, 2012). Still others emphasize shortcomings in the development of PLASAF NCOs (Xu Yeqing, Yu Wenwu, and Zeng Yuan, 2011) and lack of sufficiently high levels of professionalism. In addition, some sources criticize officers for having shallow knowledge and emphasize the need for continuous self-study to correct this problem (Yang Hongpeng and Yang Hua, 2011).

Joint Operations

PLA sources note that one set of challenges relates to PLASAF participation in joint operations, coordination, and information sharing. Specific problems that are mentioned in military media reports include formalism during joint exercises and the lack of interaction and coordination between the branches (Liu Quan and Li Jianwen, 2013). Another challenge relates to logistics training, which one article in *Rocket Force News*, PLASAF’s official newspaper, criticizes as compartmentalized; this training is also said to be lacking because it emphasizes functions rather than joint operations support (Jia Ziguo, 2013).

Training

PLASAF’s newspaper and other Chinese sources suggest that PLASAF training has been improved by making it more challenging and more similar to actual wartime conditions but still note some persistent problems that continue to require attention. Chinese reports highlight the following issues: neglect of deficiencies, wishful thinking, and the lack of sense of urgency (“Are We Able . . .,” 2013); incompatibility between the needs of the force and actual training provided at academies (Cao Fan and Liu Yidai, 2013; Zhang Yanhe, Xia Bo, and Tian Liang, 2013); problems related to the application of remedial training

(Liu Zhongjiu and Ding Rongzhen, 2012); and the problem of formalism, which one source refers to as “training just for muddling through tests, for demonstration, or just for fancy shows” (Zha Xianfa, 2014).

Weapon Systems

PLASAF clearly feels as though it has made important strides in the development and deployment of modern weapons and equipment, but this, too, is an area that is sometimes highlighted as one in which the missile force still faces challenges. PLASAF has received some advanced equipment, and this is seen as a sufficient foundation but not enough to meet all the force's requirements. There is also a shortage of self-reliance and innovation and a limited number of trained personnel to operate advanced equipment (Wu Xun, 2013).

It is also possible that, even with an impressive number of conventional missiles, PLASAF might not have enough weapons to execute its mission successfully, especially in a long-duration campaign against a technologically advanced adversary. Some Chinese publications hint at this problem when they note that the limited number of conventional missiles in PLASAF's inventory requires discretion in the rate of their expenditure (Yu Jixun, 2004).

Logistics

Chinese military publications also note shortcomings in PLASAF logistics (Wang Haitao and Song Weigang, 2008). According to one report, the PLASAF still has not built a comprehensive logistics network. It is still operating at a lower level than desired because the degree of informatization is limited and because the focus is mainly on transportation and storage; further limitations include the logistics facilities, logistics equipment, and the quality of logistics personnel. Additional problems reportedly include the following:

- The system suffers from scattered management, with multiple decisionmakers involved.
- There is an unhelpful subdivision of specialties.
- No dedicated agency is in charge of emergency logistics (internal emergency management at each level is organized relatively soundly, but the system is staffed by heads and relevant opera-

tional personnel on a part-time basis who are drawn from other departments).

- A large number of emergency support plans are in place, but comprehensive exercises are rare.
- In such areas as mechanization, automation of loading and unloading, and technical logistics equipment, especially in supporting accessories, there is a significant gap between PLASAF and military units in other advanced countries.
- For most logistics activities, it is still impossible to operate in a paperless mode. As a result, logistics efficiency is very low.
- There is a lack of talent, especially senior professional personnel.
- As far as the degree of “social support” (outsourcing of some support functions to civilian enterprises) is concerned, the scale of joint efforts with civilians is still small. Some joint logistics activities between individual agencies and individual logistics enterprises have been initiated, but the scope of application is rather narrow. Basically, social support is stalled in the stage of technology introduction and academic exchange.
- The operating mode is insufficiently regulated and unified.
- Warehouse utilization efficiency is low. In some cases, warehouses are empty.

How People's Liberation Army and People's Liberation Army Air Force Weaknesses Affect the People's Liberation Army's Ability to Achieve Its Missions

This subsection briefly examines how the weaknesses affect the PLA's ability to achieve its various missions through 2025. These missions and their associated campaigns are discussed in greater detail in Chapter Three. Table 5.1 uses our earlier definitions of military weakness by type—(1) outright inability to perform a mission, (2) high risks of mission failure, or (3) inefficiencies that result in degraded mission outcomes—to present a snapshot of the identified weaknesses and their likely effects on the various missions relevant to the land domain. We next discuss this further by mission.

Table 5.1
The Impact of Identified Land Domain Weaknesses on PLA Missions

	Missions			
	Border	Periphery	Taiwan	HADR
Ideological thinking ^a	Type 3	Type 3	Type 3	Type 3
Personnel ^a	Type 3	Type 3	Type 3	Type 3
Training	Type 3	Type 3	Type 3	Type 3
Communications ^a	Type 3	Type 3	Type 3	Type 3
Weapons and equipment	Type 3	Type 3	Type 3	Type 3
Logistics	Type 3	Type 2	Type 1	Type 3
Joint operations ^b	Type 3	Type 3	Type 2 or 3	N/A ^c
Mobilization ^a	Type 3	Type 3	Type 3	Type 3

^a Data on identified weakness pertain only to PLAA.
^b Data on identified weakness pertain only to PLASAF.
^c The identified weakness is unlikely to affect the mission.

Border Missions

As the largest army in the region, the PLAA is more than a match for any potential external force that may seek to infringe on Chinese territorial integrity, national security, or national sovereignty. The PLAA and PLASAF weaknesses we have noted might contribute to inefficiencies in combat operations, such as lack of jointness, but are likely to constitute relatively low-level, Type 3, weaknesses.

Periphery Missions

Operations beyond China's borders would stress the PLA's logistics system, very likely resulting in Type 2 weaknesses that constitute severe risks to mission success. Such other concerns as mobilization and personnel constitute Type 3 weaknesses resulting in inefficiencies.

Taiwan Missions

Logistics, or lack thereof, could severely hamper PLAA involvement in the joint island landing campaign, resulting in a Type 2 weakness. Similarly, PLASAF involvement in the various Taiwan missions involves

its participation in the conventional missile attack campaign. Lack of jointness could also hamper PLASAF effectiveness, again a Type 2 weakness. However, lack of amphibious lift, an aspect we will look at in the “Sea Domain” section, is currently a Type 1 weakness, likely inability to perform the mission, for the joint island landing campaign.

Humanitarian Assistance and Disaster Relief Missions

It is unlikely that weaknesses for these missions will constitute anything more than a Type 3 weakness, provided that these missions are either in China or in nearby countries, such as Pakistan.

How the People's Liberation Army Is Attempting to Address Weaknesses in the People's Liberation Army Army and People's Liberation Army Second Artillery Force

Training

The PLA is attempting to address its training weaknesses by taking such measures as improving in training to make it more realistic and more closely linked to real war conditions, improving ideological education, and fielding new equipment (including IT) to the PLAA. Although the PLAA continues to intensify its attempts to improve, some changes have been largely incremental.

PLASAF and PLA newspaper articles underscore the need for remedial action to address these problems. With respect to training, for example, Chinese military publications highlight the need for PLASAF missile units to train in a complex and difficult environment to improve combat capabilities (Sun Jinming, 2013) and to raise the level of realism (Shi Xiangyang, 2014) and strictness (Wei Fenghe, 2014) of training.

Weapon Systems

To deal with land domain weaknesses, the size, diversity, and sophistication of PLASAF's conventional ballistic and cruise missile force have grown dramatically since fielding of conventional missiles in the early 1990s. Today, PLASAF fields well over 1,000 conventional short-range ballistic missiles and conventional medium-range ballistic missiles (MRBMs), including the world's first ASBM, along with an impressive arsenal of conventional land-attack cruise missiles. PLASAF continues

to strengthen its conventional missile capabilities, which will eventually include conventional IRBMs that will allow it to attack targets as far away as Guam with conventional weapons.⁴ PLA publications are replete with references to PLASAF's accomplishments in improving the quality of training and personnel and modernizing its command, control, and communications capabilities. China's conventional missile force is clearly emerging as the cornerstone of the PLA's long-range strike capability and is giving China options for conventional strikes against a wide range of regional targets in support of deterrence, coercive diplomacy, or a variety of PLA campaigns, whether as part of a joint campaign or as a standalone conventional missile strike campaign.

Comparison of People's Liberation Army Publications and External Assessments of Land Domain and People's Liberation Army-Wide Issues

The following list compares PLA assessments of weaknesses in PLAA and PLA-wide capabilities with outside analyses of such issues as informatization, weapons and equipment, joint operations, mobilization, and logistics:

- **Informatization:** Although its difficult to find analyses from DoD publications on the exact weaknesses related to informatization, a report from OSD mentioned "almost all of the PLA's 2013 exercises focused on operating in 'informationized' conditions" (OSD, 2014, p. 10). The focus here is obviously on either gaining proficiency or increasing overall proficiency.
- **Weapons and Equipment:** Although identified weaknesses were not specifically analyzed, a recent OSD publication noted that the "PLA is investing heavily in its ground forces" and noted improvements were made to its "armored, air defense, [and] aviation . . ." capabilities (OSD, 2014, p. 12).
- **Joint Operations:** The PLA's self-assessment that is has a long way to go before it will be ready to seamlessly conduct "integrated

⁴ Historically, PLASAF has been able to target Guam with the nuclear-armed DF-3 (CSS-2) IRBM, which entered service in the early 1970s, but it has not had a conventional ballistic missile with a range sufficient to strike targets on Guam.

joint operations” tracks closely with the observations of independent observers. For example, according to DoD’s most recent Chinese military power report, the PLA is emphasizing this goal, as suggested by recent joint exercises, such as Mission Action 2013 (OSD, 2014, pp. 12, 34, 53), but achieving China’s aspirations will require further progress in a number of areas. As DoD analysts Wanda Ayuso and Lonnie Henley found in a recent assessment of the PLA’s joint operations capabilities, the PLA has yet to achieve its ultimate goals in this crucial area: The PLA “continues its long transition toward truly integrated joint operations [一体化联合作战] but has made less progress to date than Chinese military leaders would wish,” and although the PLA continues to work toward making this transition, “these efforts are not producing rapid results” (Ayuso and Henley, 2014, p. 171). In conclusion, they assessed that China is putting in place some of the pieces required to achieve its objectives, but achieving them is likely to remain a long-term objective (Ayuso and Henley, 2014, p. 191).

- **Mobilization:** This identified weakness related to mobilization of the reserves is not specifically analyzed in publicly available DoD publications.
- **Logistics:** Somewhat surprisingly, DoD and other external publications have devoted relatively limited attention to logistics weaknesses related to the land domain. However, a recent report from OSD mentioned that the PLAA is “emphasizing the ability to deploy campaign-level forces across long distances quickly” (OSD, 2013, p. 8).

The Sea Domain

The PLA’s combat capabilities in the sea domain reside almost entirely within the PLAN.⁵ Through focusing specifically on the available “two incompatibles/two gaps” literature, this section looks at potential

⁵ It should be noted that the PLA’s ASBMs are under the control of PLASAF.

PLAN weaknesses in sea domain, the impacts these weaknesses have on the PLA's ability to achieve its missions, and what the PLAN is doing to overcome these weaknesses.

Potential People's Liberation Army Navy Weaknesses

The PLAN has successfully deployed an increasingly modern fleet over the last decade, used to conduct missions that range ever farther from China's shores. While the PLAN's new combatants and submarines boast impressive capabilities comparable with those of a modern world-class navy, they present challenges that must be addressed for successful deployment. Chief among these challenges is the integration of increasingly complex modern weapons and equipment platforms. Equally important is the training of PLAN personnel who are not currently fully prepared to operate or maintain them, which appears to be a major concern for the Chinese navy, given the volume of PLA literature published on this issue. Other challenges include the mastery of such capabilities as antisubmarine warfare (ASW) and amphibious operations, where the PLA has significant limitations.

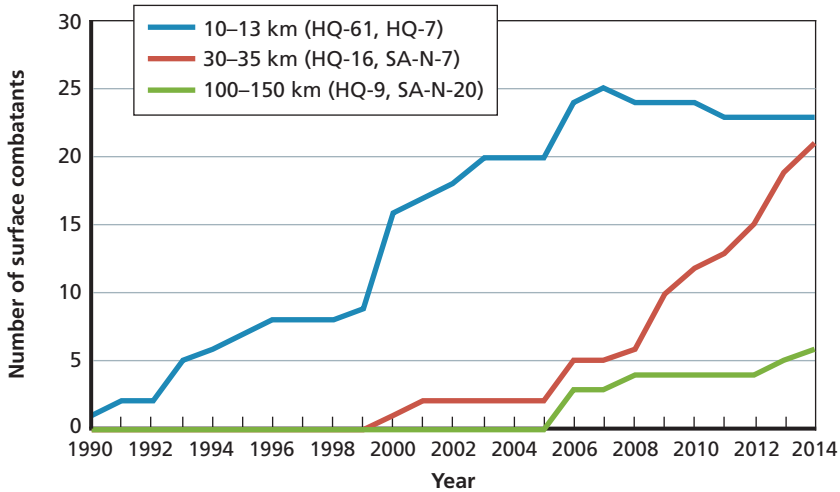
Fleet Air Defense

The PLAN knows that fleet air defense is essential to protect blue-water fleets and conduct carrier operations, and has upgraded several of its destroyers and frigates with an Aegis-like capability.⁶ The most numerous of these ships include the Luyang II-class Type 052C DDG, which is based on the stealthy Type 052B platform and features a phased array or planar radar designed to be used in conjunction with a SAM vertical launch system for air defense missiles (see Figure 5.3).⁷ This

⁶ Aegis-like capabilities center on radar that provides 360-degree air surveillance coverage and is integrated with a shipboard SAM system to protect against airborne threats. This system itself is often further integrated into a larger surveillance network of other sea, air, land, and space sensors.

⁷ Compared to previous launching systems, in which an single above-deck missile launcher was fed by a below-deck magazine, today's shipboard vertical launch systems offer a number of advantages. This includes allowing ships to be fitted with a mix of missile types best suited to mission needs, reducing the ship's radar cross-section, allowing all missiles to be immediately ready for launch, and providing the scalability to serve as a launch platform for future missile types (Jane's Information Group, 2013a).

Figure 5.3
Numbers of PLA Air Defense Surface Combatants by SAM Range,
1990–2014



SOURCE: IISS, various years.

RAND RR893-5.3

system, the HQ-9 SAM, indigenously developed and capable of far greater range than previous onboard air defense systems, represents a major technological leap for the PLAN. A follow-on to the Type 052C, the Luyang III-class Type 052D destroyer features upgraded radar and a new vertical launch system capable of housing surface-to-air, surface-to-surface, and antisubmarine missiles (O'Rourke, 2012, pp. 155–156; see also Jane's Information Group, 2013b). Another ship that the PLAN currently deploys is the Jiangkai II-class Type 054A FFG, which features a similar type of “mini-Aegis” system designed to augment the PLAN's fleet air defense capabilities.⁸

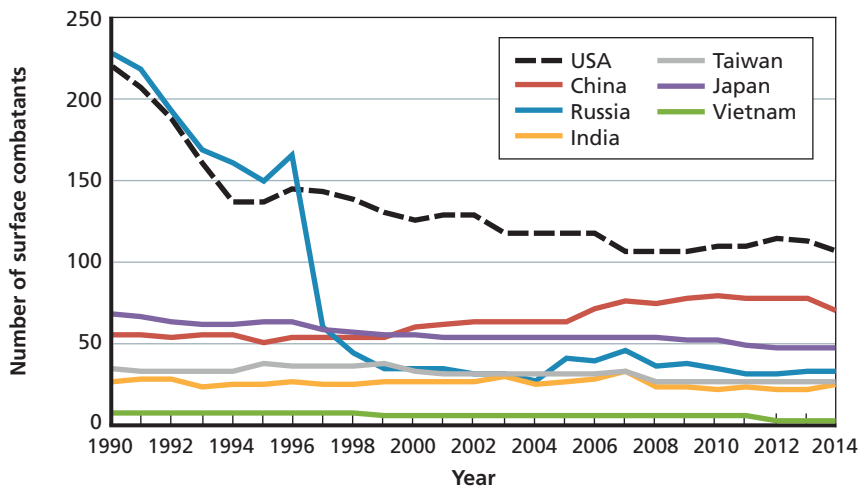
How do the numbers of principal surface combatants compare to the navies of China's immediate neighbors? Although the full range of qualitative differences in surface ship types and operating concepts and a holistic system-of-systems comparison are beyond the scope of this

⁸ “China's Intensive . . .,” 2013; “Service Conditions of the Type 054A Finally Revealed,” n.d.

report, Figure 5.4 suggests that China has maintained a quantitative advantage over its immediate neighbors in surface ships since 2000. The figure does not depict the numerous qualitative improvements the PLAN fleet has undergone since the early 1990s, which we will discuss later.

While the Type 052C/D and the Type 054A represent an exponential improvement in the quality and capability of the PLAN's force, there are some limitations to what they can do with regard to air defense. For example, although the Type 054A is considered a "mini-Aegis" type, the Chinese nonetheless recognize the limitations of the concept. Because these ships are small, they cannot carry enough long-range missiles to give an actual area defense capability or deal with saturation attacks from antiship missiles. The ships would have to carry 100 or more long-range ship-to-air missiles, while most "mini-Aegis" types typically carry only 30 to 50, or even fewer, such missiles.

Figure 5.4
Comparison of Principal Surface Combatants Possessed by China's Neighbors, 1990–2014



SOURCE: IISS, various years.

NOTE: *Principal surface combatants* are defined as aircraft carriers, cruisers, destroyers, and frigates and do not include corvettes, amphibious ships, patrol craft, submarines, logistics ships, and support ships.

RAND RR893-5.4

In addition, such ships lack the power plant necessary to consistently sustain Aegis radars at full capacity, further limiting their capability. Together, the small size and lower power of mini-Aegis systems necessitates placing their antennas as high above the waterline as possible, which affects stability and seakeeping.

The effectiveness of an Aegis-like system is substantially enhanced when it is integrated into a broader ISR system of systems. However, a small fleet of radar-equipped aircraft and lack of sea-based ISR aircraft diminish the PLAN's air defense capability far from China's shores. Even a full-scale Aegis system's detection range against sea-skimming missiles is usually barely a dozen miles (about 25 km). Finally, placing such large and numerous radar and computer systems in comparatively small hulls severely limits capacity for future upgrades, which is especially problematic when using mini-Aegis-type vessels as backbone surface combatants, as the PLAN does. Thus, in the Chinese view, the present Type 054A and the Chinese Aegis system aboard the Type 052C destroyers remain limited designs deficient in face of the supersonic and hypersonic antiship missiles that potential adversaries have developed and are developing, which will enter their arsenals in increasing numbers in the decades ahead (Xiao Feizhu, 2011).

Logistics Support

Logistics support remains a key obstacle preventing the PLAN from operating more extensively beyond its coastal waters, which is a concern for China's ability to protect such critical interests as SLOCs in distant seas. China has made good use of its naval relationships in this regard. For example, the PLAN has effectively built a network of commercial ports in the Gulf of Aden to support its counterpiracy mission and is looking to establish more partnerships in the Indian Ocean. This is not to suggest that China's success to date in brokering agreements with local ports in the Gulf of Aden can be easily repeated for future expeditionary missions. Operations that require greater numbers of ships; regular consumption of high-tech parts or ordnance, such as missiles; or confront the likelihood of damage would be severely strained by this approach. Most civilian ports cannot accommodate such warfighting needs. Furthermore, foreign capitals are likely to be

reticent about foreign military use of their infrastructure and territory for operations that involve combat.

This weakness, and how to remedy it, is widely discussed in PLA literature. Some Chinese military analysts note that China simply does not have the projection capabilities (i.e., bases and aircraft carriers) to be able to guarantee passage through critical SLOCs. Arguing that China must build overseas bases, PLA Colonel Dai Xu notes: "Because the Chinese Navy lacks the modern protective power of aircraft carriers, completely unarmed commercial vessels are normally forced to travel long distances and periods in a state of insecurity" (Dai Xu, 2009).

Interestingly, some less-prominent official publications indicate some debate at higher levels about the need to expand China's overseas presence to protect SLOCs. A late 2011 article on escorts off the coast of Somalia in *Friends of Party Members and Cadre*, a publication aimed at Party cadres, repeated the familiar refrain that the PLAN does not have enough adequate ships for its foreign missions and revealed that there is still some debate over whether or not China should establish bases abroad. The author, Liu Weidong, cited the case of Major General Yin Zhuo, who has advocated building "independent logistics bases" [独立后勤基地] on foreign coasts to reduce military supply costs in escort missions (Liu Weidong, 2011).⁹

Some Chinese policy analysts also express concern over China's ability to maintain open SLOCs, particularly those critical for energy transportation. In a 2012 *Study Monthly* piece, Shanghai Institute of American Studies fellow and Fudan University professor Zhou Yunxiang wrote that China is dependent on Southeast Asian maritime routes for energy but cannot guarantee the safety of these SLOCs, let alone ensure the flow of oil from the Persian Gulf (Zhou Yunxiang, 2012). Zhou is hardly alone in his views: In a 2010 *Journal of the University of International Relations* article, University of International Relations

⁹ The Liu article does not explicitly state that Yin advocates building bases overseas, but a quick review of Chinese newspapers from that period reveals that this is in fact what Yin originally proposed. After the Western media sounded the alarm over the possibility of the Chinese building bases abroad, Yin was quick to point out that he was in fact calling for overseas "replenishment points" [补给点]. See "Chinese General Publicly Clarifies . . . , 2010.

professor Wu Hui and Zhang Dan of the State Oceanic Administration also argue that it is critical for the PLAN to improve “far seas” defense capabilities and logistics support to protect energy and trade routes (Wu Hui and Zhang Dan, 2010).

Finally, no matter how many aircraft carriers and surface ships China ultimately produces, the PLAN's ability to deploy force beyond neighboring waters will remain severely limited unless it has a sufficient number of fleet replenishment oilers (O'Rourke, 2013). These ships allow surface action groups to travel far distances by replenishing fuel, food, and water while en route and at station. The PLAN currently possesses only five replenishment ships, three of which are relatively new and have contributed to the Gulf of Aden antipiracy missions. These regular counterpiracy missions, plus exercises near Japan and in the South China Sea, have stretched the oiler fleet beyond its capacity.

Antisubmarine Warfare

Along with logistical support, another limitation the PLAN faces in its operations, particularly those away from coastal waters, is its lack of an ASW capability. Until recently, the PLAN has not placed much emphasis on ASW, perhaps because it was more focused on antiaccess than on expeditionary deployments and because its fleet was not mature enough to warrant such capabilities. Now that the PLAN has a good number of large, modern combatants, it appears to be addressing its lack of ASW capabilities. For example, numerous articles in Chinese naval publications have called on the PLAN to address its lack of ASW capabilities, including addressing crew training—proficient ASW operations requires technical expertise, coordination of sophisticated weapon systems, and operational experience (for example, You Min, 2013).

Training

One of the most frequently discussed gaps in the PLAN's capabilities is the lack of crewmember training, including technology, armaments, maintenance, and combat readiness over long distances. Problems with lack of crewmember training include not having enough knowledge to properly operate and maintain the modern equipment and weapon systems aboard today's newest PLAN ships, discomfort operating

advanced armaments (one submarine unit was reluctant to operate armaments because its personnel were worried whether the armaments were “really okay or not”), and general lack of combat training at sea under realistic conditions (Gao Yi, 2009; “With Good Training Style . . .,” 2013).

Chinese experts also recognize that the PLAN’s naval combat training needs to be brought up to standard. One article quotes a flotilla commander in an East Sea Fleet training mission as stating that training was being “regularized”: “All the warships carried full loads of munitions according to actual combat standards, and the weapons and equipment were turned on 24 hours a day, with the personnel being on combat duty 24 hours a day” (Li Lin, 2012). Another article notes that the PLAN is increasing training intensity and simulating real-life enemy situations, including seizure of Chinese territory in disputed waters (Hou Rui and Liu Yuxun, 2014).

Impact of People’s Liberation Army Navy Weaknesses on the People’s Liberation Army’s Ability to Achieve Its Missions

This section briefly examines the impacts of the weaknesses on the PLA’s—specifically, the PLAN’s—ability to achieve various missions in the sea domain. These missions and their associated campaigns are discussed in greater detail in Chapter Three. Referring to the earlier definition of military weakness by type, Table 5.2 presents a snapshot of the identified weaknesses and how they are likely to affect the various missions relevant to the land domain. We next discuss these by mission.

Taiwan Missions

Substantial stress on the at-sea logistics system during a joint blockade campaign likely represents a Type 2 weakness (severe risk). Should the United States become involved, other Type 2 weaknesses would appear in the realms of fleet air defense and ASW. If an island landing campaign were enacted, the PLAN would face a Type 1 weakness because it lacks amphibious lift sufficient to transport sufficient ground units to Taiwan’s shores. This could be remedied between now and 2025, and

Table 5.2
The Impact of Identified Sea Domain Weaknesses on PLA Missions

	Missions				
	Taiwan	Maritime Claims	HADR	NEO	SLOC
Fleet air defense	Type 2	Type 2 or 3 ^a	N/A ^b	N/A ^b	Type 2 ^c or N/A ^b
Logistics support	Type 1 or 2 ^d	Type 2 or 3 ^a	Type 3	Type 3	Type 2 or 3 ^e
ASW	Type 2	Type 2 or 3 ^a	N/A ^b	N/A ^b	Type 2 ^c or N/A ^b
Training	Type 3	Type 2 or 3 ^a	Type 3	Type 3	Type 3

^a Type 2 weakness if United States or Japan is the adversary; otherwise, Type 3 weakness.

^b The identified weakness is unlikely to affect the mission.

^c Type 2 weakness if state-based threat is present; otherwise, the weakness is unlikely to affect the mission.

^d Type 1 weakness if island landing campaign is prosecuted; otherwise, Type 2 weakness.

^e Type 2 weakness if state-based threat is present; otherwise, Type 3 weakness.

the PLA could also ameliorate the weakness by increasing the capacity to deliver more forces by air or special operations means.

Maritime Claim Missions

When dealing with the other claimants in the South China Sea, the PLAN's naval superiority likely mitigates the weaknesses of air defense, logistics support, ASW, and training in prosecuting the various campaigns. As a result, these could be seen as Type 3 weaknesses. If the United States were to become involved or if the adversary were Japan, all identified weaknesses would become Type 2.

Humanitarian Assistance and Disaster Relief Missions

Because these missions occur in a benign environment, the weaknesses of logistics and training identified constitute Type 3 weaknesses. The identified weaknesses of fleet air defense and ASW for these missions are not applicable and so do not constitute a weakness in these missions.

Noncombatant Evacuation Operations

The identified weaknesses of training and logistics may constitute a Type 3 weakness, although NEOs are often over quickly, and naval vessels often play only a supporting role. It is difficult to identify plausible NEO scenarios that would involve the identified weaknesses of fleet air defense or ASW.

Sea Line of Communication Missions

Against nonstate threats, the identified weaknesses of training and logistics constitute Type 3 weaknesses, especially in distant waters. For state threats to SLOCs, all identified weaknesses, including fleet air defense and ASW, constitute potential Type 2 weaknesses.

How the People's Liberation Army Navy Is Attempting to Address Weaknesses

This section describes some efforts the PLAN has made to address noted gaps and weaknesses. The PLAN is aware of all the weaknesses cited in this chapter, and in some cases, the solutions to issues are under robust debate, as shown in the literature. However, truly filling these gaps will take time, money, and expertise. The PLAN has made some headway on such issues as combat and technical training and air defense but appears to be just starting to address ASW and logistical support. Resolving the former issues is essential for the PLAN to be a regional naval power; addressing the latter two issues would indicate that the PLAN is potentially looking to build greater expeditionary capabilities. The PLAN's priorities will determine which gaps it focuses on addressing over the next five years.

Fleet Air Defense

PLA sources note that improvements to the next iteration of stealth frigates, the Type 054B, would focus on the electronic equipment used in the combat information command system and on changes to the weapon configuration. This could indicate that the Type 054B will be equipped with new air defense and antiship missiles.¹⁰ In addition,

¹⁰ "China's Intensive Construction of the Type 054A Frigate—First Type 054B Soon to Be Launched," 2013; "Service Conditions of the Type 054A Finally Revealed," 2013.

the PLAN has started commissioning its new-generation Type 052D destroyers. These ships feature a large actively electronically scanned array, a new type of vertical launch system similar to those on Western destroyers, and stealth naval guns (Zhang Junshe, 2014). With these improvements, the ship will have stronger area air defense capabilities than its predecessors and could feasibly be deployed as part of a carrier battle group or to protect amphibious assault ships during a beach landing. As one article notes,

the new type of destroyer may become the “patron saint” of first choice. It can also act as the core of formations, complementing small-scale formations, such as escort vessels and replenishment vessels, and independently carrying out tasks, thereby enlarging at-sea defensive depth and improving the Chinese Navy’s operational capabilities to carry out distant sea maneuvers. (Zhang Junshe, 2014)

However, with technological advances comes the need to improve training on the new ships, a problem the PLAN leadership recognizes:

China’s new generation of destroyers still has a relatively long way to go. Modern destroyers are equipped with every kind of air defense, antisubmarine, and antiship weapons and equipment. They are complex systems that integrate numerous weapon platforms. Much of the equipment still has to be repeatedly broken in and validated after deployment, and only then can their operational potential be exploited. In addition, informatization standards have not yet been improved; the degree of technical maturity is still insufficient; the number of weapons units is relatively few; and so forth. (Zhang Junshe, 2014)

Another example discusses the intense training program the crew of a South Sea Fleet Type 052C DDG underwent to properly operate the ship:

[The crew]’s skills were widely varied and the new equipment highly technical, so they started the “sailor night school,” established military-civilian joint training mechanisms, and studied

basic educational materials that covered ten specialties, such as radar, communications, and engineering, all in the first year after receiving the ship. (Xiao Yong, Hou Rong, and Gao Yi, 2013)

While we discuss training issues specific to the PLAN in more detail later, it is clear from the above examples that the lack of technical proficiency in the PLAN has real operational consequences.

Logistics Support

Last year, to bolster fleet logistics support, the PLAN commissioned two new oilers, upgraded Qiandaohu-class Type 903s, and plans for more replenishment vessel construction are under way (Jane's Information Group, 2013c). The two new oilers could be used to support carrier operations for the *Liaoning*; however, the dearth of replenishment ships will likely be a constraining factor for PLAN out-of-area operations for some time to come.

Antisubmarine Warfare

The PLAN has recently fielded some capabilities to address its weaknesses in ASW. These include the new Type 056 corvette (also called a "light frigate"), which has not been equipped with the standard Chinese rocket and depth-charge launchers but instead possesses two three-unit mount torpedo launch tubes for more accurate and long-range antisubmarine capabilities. The Type 056 has been in rapid production since its introduction in 2012 (Wang Jin, 2012).

Additionally, the PLAN, which has lacked sufficient numbers of shipborne helicopters and maritime patrol craft to conduct ASW, has fielded the Y-8 maritime patrol aircraft since 2011. The patroller is equipped with a surface search radar, an infrared sensor, a magnetic boom for detecting submerged submarines, and a bomb bay for torpedoes and other weapons. Finally, some Western analysts point out that China is deploying an ocean surveillance network of fixed acoustic arrays to strengthen its antisubmarine capability.¹¹

There is also evidence that the PLAN has been training to improve its ASW proficiency. One example from PLA literature cites a recent

¹¹ For an excellent description of this, see Goldstein and Knight (2014).

antisubmarine training exercise by a destroyer flotilla in the East China Sea, which simultaneously commanded three types of shipborne helicopters for the first time. The commander stated that the drill practiced such critical phases as command processes, communications organization, electromagnetic integration, and operational patterns between ship and helicopter (Zhang Qian, Ju Zhenhua, and Wang Zhipeng, 2014). Other articles note that the PLAN's combatants have been undergoing "combat readiness distant seas training," which sometimes includes ASW training, more frequently than in the past (Ni Guanghui and Liu Qian, 2014).

Training

The PLAN is taking the development of technical expertise seriously. In 2011, the PLAN introduced the Navy-wide "Surface Ship Crew-member Maintenance Skills Competition," recognizing the technical skills of individual sailors from across the three fleets (Jing Enyan and Li Xiao, 2013). In 2013, the East Sea Fleet established crew member training centers in the Shanghai, Zhejiang, and Fujian shipyards, so that when ships dock at the shipyards, the sailors receive hands-on experience repairing the ships (Gao Yi, 2009). The PLAN is also investing in virtual training systems that can be used for training crews on various types of combat ships. For example, one article states that a research institute under the PLAN Headquarters Armament Department recently developed a "virtual maintenance training system for the propelling unit of a certain type of comprehensive landing ship." The system can also be used in maintenance training of a particular model of landing craft and can be modified for maintenance training for other types of ships (PLAN Develops . . . , 2014).

In addition, as the PLAN deploys further from China's shores, it is increasingly relying on automated equipment diagnostics to augment crew capabilities. For example, the newest Luyang-class destroyers and likely the Jiangkai II-class frigates are outfitted with electronic equipment-management systems, and such systems will likely be stan-

dard on all future PLAN surface combatants.¹² These systems monitor and collect key equipment parameters, such as oil quality, bearing vibration, noise, temperature, and rotation rate. The collected maintenance history files are used to provide feedback to equipment manufacturers (Qiao Changchao and Xiao Delun, 2011). Shore-based equipment technical support groups can also access this information electronically and thus manage the maintenance requirements of key pieces of shipboard equipment from afar. Other solutions to boost technical expertise include more civil-military integration and more use of civilian experts.

Comparing People's Liberation Army Publications and External Assessments of Weaknesses in the Maritime Domain

The following list compares PLA assessments of weaknesses in naval capabilities with outside analyses of such issues as fleet air defense, logistics support, ASW, and training:

- **Fleet air defense:** U.S. government (USG) publications from ONI and OSD have recognized the PLAN's "historically weak" air defense capabilities but point to recent production of the Luyang III-class DDG and Jiangkai II-class FFG as attempts to address this shortfall (ONI, 2009, p. 1; OSD, 2014, p. 8).
- **Logistics support:** OSD (2014, p. 38) observes that the PLA lacks necessary logistics support including overseas bases for more extensive extraregional operations. The PLA also lacks replenishment ships and necessary amphibious lift to prosecute its missions, including the joint island landing campaign against Taiwan (OSD, 2014, pp. 55–56).
- **ASW:** OSD (2014, p. 32) observes that the PLA faces challenges with regard to ASW, stating that "PLA's deep-water antisubmarine warfare capability seems to lag behind its air and surface warfare capabilities."

¹² "China's Intensive Construction of the Type 054A Frigate—First Type 054B Soon to Be Launched," 2013; "Service Conditions . . .," 2013.

- **Training:** While not detailing the training shortfalls highlighted in PLA assessments, such as lack of technical expertise, armaments, maintenance, and combat readiness, USG publications do seem to agree that training weaknesses in general do exist. Specifically, one report from ONI points to the “more complex and realistic [training] scenarios . . .” that the PLAN has undertaken in recent years, presumably to address training weaknesses (ONI, 2009, p. 34).

The Air Domain

The PLA's combat capabilities in the air domain reside chiefly within the PLAAF and the PLAN Air Force (PLANAF).¹³ Through focusing specifically on the available “two incompatibles/two gaps” literature, this section looks at potential PLA weaknesses in the air domain, how these weaknesses affect the PLA's ability to achieve its missions, and what the PLA is doing to overcome these weaknesses.

Potential Weaknesses in People's Liberation Army Air Force and People's Liberation Army Navy Air Forces Force Structure

Numerous weaknesses in the PLA's ability to conduct combat in the air domain are immediately apparent from the structure and composition of its various aviation fleets. “Software” weaknesses that could constrain China's ability to effectively employ its air domain capabilities are perhaps less evident to an outside observer than the more obvious shortcomings in PLAAF and PLANAF hardware, but they may be no less important. As a result, we have relied on Chinese sources for insights on various other issues, such as training and personnel, that might otherwise be relatively opaque.

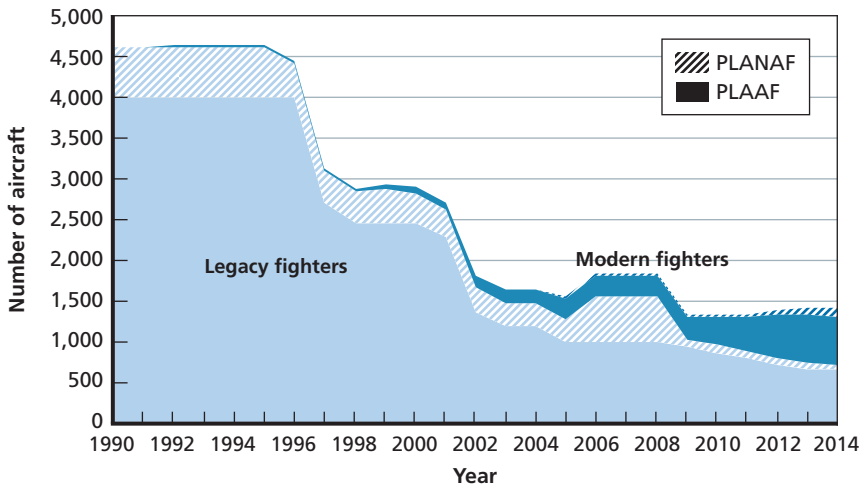
As Figure 5.5 shows, the PLA has substantially trimmed its outdated fleet of legacy fighter aircraft since mid-1990s and simultane-

¹³ While the PLAA possesses a variety of helicopters and appears to be increasing its emphasis in this area, we discussed these capabilities earlier, in the Land Domain section.

Although some analysts now identify the PLAN's air component as PLA Naval Aviation, we continue to use PLANAF in this report.

ously increased the numbers of modern fourth- and 4.5-generation aircraft. How do the numbers of PLA fighter aircraft compare to the air fleets China's immediate neighbors? While the full range of qualitative differences in aircraft types, operating concepts, and a holistic system-of-systems comparison is beyond the scope of this report, Figure 5.6 shows that China has maintained a significant quantitative advantage over its immediate neighbors in fighter and fighter ground attack aircraft for virtually all periods. The figure also shows that modern fourth-generation-and-above fighter aircraft depicted in Figure 5.5 constitute slightly less than one-half of China's entire fighter fleet. However, significant numbers of legacy (second- and third-generation) fighters remain, undercutting the quantitative advantage. Although Russia

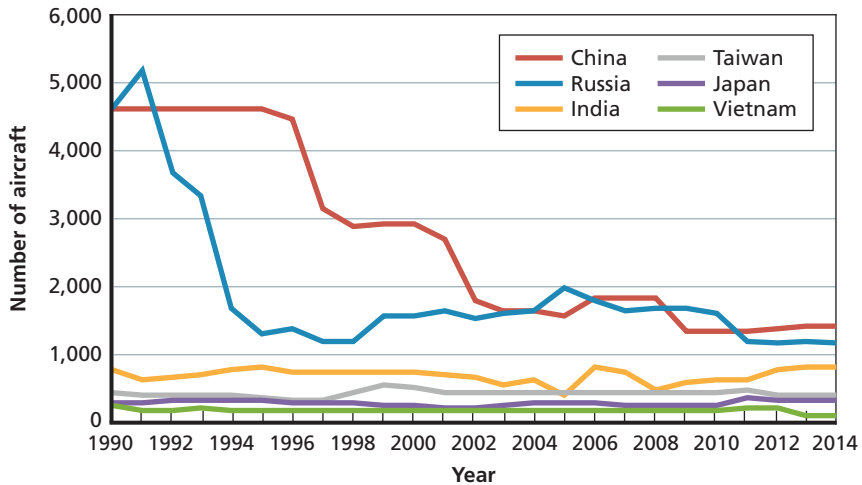
Figure 5.5
Numbers of Modern and Legacy PLA Fighter Aircraft, 1990–2014



SOURCE: IISS, various years.

NOTES: *Modern fighters* are fighter aircraft in the PLAAF or PLANAF inventories that fall under the Western convention of fourth-generation or above and include the fourth-generation J-10 and Su-30 and the 4.5-generation J-11. *Legacy fighters* are fighter aircraft within the Western convention of third generation or below. For the periods examined, these include the first-generation J-5, the second-generation J-6 and some J-7 variants, the third-generation J-7 variants, and the J-8. The PLA has its own convention for numbering fighter generations. Under the PLA's own convention, the J-10, J-11, and Su-30 are considered third-generation fighter aircraft (NASIC, 2010, p. 25).

Figure 5.6
Comparison of Fighter and Fighter Ground Attack Aircraft Possessed by China's Neighbors, 1990–2014



SOURCE: IISS, various years.

RAND RR893-5.6

maintains the second largest fleet of fighters, it currently possesses a likely qualitative advantage over China because virtually all the fighters in its inventory are fourth generation. Japan and Taiwan's fighter fleets also consist of fourth-generation fighter aircraft, although both are less than one-third the overall size of China's fighter inventory. India and Vietnam's fleets are still riddled with legacy fighter aircraft.

Multiple Generations of Aircraft

The PLA's fleet is aging and contains multiple generations of aircraft. Most obviously fighter aircraft inventories of the PLAAF and PLANAF are still majority second- and third-generation aircraft consisting of J-7 and J-8 fighters.¹⁴ These aircraft, originally produced in the 1950s, 1960s, and early 1970s, are simply not capable platforms

¹⁴ We are using the U.S. definitions of fighter generations, not the Chinese construct. For more information about the Chinese application of fighter generations, see ONI (2007, pp. 47–48) and NASIC (2010).

against modern fourth- and fifth-generation fighters.¹⁵ As Figure 5.5 shows, the PLA is seeking to change this balance by growing its fleet of fourth-generation (J-10) and 4.5-generation (J-11) aircraft. The J-10 is indigenously designed and produced, while the J-11 is an indigenously produced Russian Su-27. Furthermore, the PLA still relies on the Q-5 aircraft, another aircraft initially produced in the 1950s, for its attack roles—although the PLA is increasing numbers of the more-advanced JH-7 and JH-7A aircraft. Recognizing the problems that the aging fleet poses, PLAAF Commander and CMC Member Ma Xiaotian stated in early 2014 that the “contradiction of multiple generations of equipment is becoming more prominent” (Ma Xiaotian, 2014).

China's bomber fleet is improving its long-range strike capabilities but still faces potentially serious challenges. Perhaps most importantly, China's limited aerial refueling capacity could require its bombers to conduct long-range strike missions without fighter escorts, increasing their vulnerability and potentially decreasing their ability to carry out some regional strike missions effectively. Moreover, China's current bombers are derived from 1950s-era Soviet designs, although they have been upgraded in many respects. Chinese military publications highlight the need for a bomber capability that would allow China to conduct long-range conventional strikes against targets out to the Second Island Chain (Shou Xiaosong, 2013, pp. 223–224). Moreover, some Chinese military officers have called for bombers capable of reaching targets in the South China Sea, Central Asia, and the Indian Ocean and stated that the aircraft should have stealth and EW capabilities sufficient to penetrate enemy air defenses (“Senior Officer . . .,” 2013).

Special-Mission Aircraft

Special-mission aircraft are in short supply in the PLA. Although special-mission aircraft are a combat multiplier for modern air forces, both the PLAAF and PLANAF have few special-mission aircraft. Indeed, the PLA possesses only 13 aerial tankers, which are converted H-6 bomber aircraft (IISS, 2014, pp. 235–236). The ability of

¹⁵ These aircraft types could still be useful if the counterair threat were minimal or if the PLA sought to saturate the skies with fighters in an attempt to frustrate the ability of a potential adversary's to conduct offensive counterair missions effectively.

these aerial tankers to extend the range and time on station of combat aircraft is further diminished by their inability to refuel the PLA's Russian-made or -designed aircraft (i.e., J-11, Su-27, and Su-30). Similarly, few AEW&C aircraft are available to assist in the detection of enemy aircraft, which limits the PLA's situational awareness and its ability to coordinate a response to deal with incoming air threats. Further limiting situational awareness is that the UAV fleet is small and continues to lack capability. The PLA operates ISR UAVs that have either high-altitude (WZ-5 Chang Hong and Chang Kong 1) or long-endurance (BZK-005) capabilities but appears to lack a platform that has both, as the U.S. RQ-4B Global Hawk does (Jane's Information Group, 2014a).

Airlift

The PLA continues to lack substantial airlift capability. When the PLAAF was tasked to send transports to Libya in 2011 to conduct a NEO, the four aircraft dispatched constituted 40 percent of the PLA's entire heavy lift fleet. At present, that fleet consists only of Russian-made Il-76 transports. Medium airlift is also limited, with a fleet of fewer than 50 turboprop transports.¹⁶

Potential People's Liberation Army Air Force and People's Liberation Army Navy Air Force Weaknesses Related to Training

Military hardware is, of course, just one aspect of combat capabilities in the air domain. Another is the quality of PLA training. By its own admission in numerous professional articles and speeches by high-ranking officers, the PLAAF does not believe its training prepares its pilots and other personnel for actual combat. The acting deputy chief of staff for the Nanjing Military Region Air Force, Ni Wenxin, recognizes this problem to consist of "unrealistic, lax, and easy training [in the PLA]" (Ni Wenxin, 2013). Ni even has a name for this malady, identifying it as the "peace disease" (Ni Wenxin, 2013). The peace disease—unrealistic training—manifests itself in multiple of ways that affect the PLA's combat capabilities in the air domain.

¹⁶ This consists of approximately 44 Y-8 transport and 1 Y-9 transport (IISS, 2014, pp. 235–236).

Close Air Combat

Because of safety concerns, close air combat has been underemphasized in training and, when it has occurred, is unrealistic. Instead, training has emphasized either “middistance attack” or scripted close air combat that uses “parallel maneuver” while opposing aircraft maintain different altitudes (Xu Tongxuan, 2013). The PLA recognizes that this is a problem, that there is a gap between the skills of Chinese pilots in this area and those of pilots in “the air forces of powerful nations” (Xu Tongxuan, 2013). Furthermore, to the extent that close air combat training has occurred, it has regularly emphasized confrontations between single aircraft and ignored combat between larger aircraft formations (Huang Ziyue, 2013). Lack of realistic air combat training may have played a role in a recent incident that a Pentagon spokesperson characterized as a “dangerous intercept” of a P-8 Poseidon aircraft in August 2014 by a PLA aircraft in which the pilot “made several close passes” and came “within 30 feet.”¹⁷

Sustained Operations

PLAAF and PLANAF training for sustained flight operations is a relatively recent occurrence. The generation of multiple air sorties, 24 hours a day, for multiple days is a facet of modern warfare. While the PLA recognizes this, only recently did training begin to incorporate these features. For example, the Nanjing Military Region Air Force held its first training for 24-hour flight operations in March 2013 (Qian Renyuan and Ouyang Chao, 2013).

Safety

The peace disease also affects air safety. Without providing either empirical data or specific examples, a *Air Force News* (the PLAAF's newspaper) article implored commanders to “reduce the number of accidents” that were occurring due to “training not being organized correctly . . . standards not [being] adhered to . . . training that emphasized the wrong subjects” and lack of attendance at important training events (Lin Lusuo and Zhu Zhanghu, 2014). The article further

¹⁷ In a press conference, U.S. Navy Rear Admiral John Kirby also characterized the incident as “unsafe and unprofessional” (“Pentagon . . .,” 2014).

pointed out the root causes of many of these safety issues as being “manmade factors,” such as “improper command, insufficient planning, careless preparations” (Lin Lusuo and Zhu Zhanghu, 2014).

Pilot Instruction

Finally, the ability of instructor pilots within the PLA is recognized as being poor. In early 2014, PLAAF Political Commissar Tian Xiusi called out the “chief instructor contingent” for being the “weakest point” in the basic fight training of the PLA (Xu Tongxuan, 2014). Specifically, Tian pointed to diminished “combat power . . . and flight safety” resulting from the “weak capability and poor quality” of the flight instructors.

Impact of People's Liberation Army Air Force and People's Liberation Army and People's Liberation Army Navy Air Force Weaknesses on the People's Liberation Army's Ability to Achieve Its Missions

Weaknesses in the air domain continue to impede the PLA's overall combat capability. Echoing the significance of the two incompatibles as they apply to the PLAAF, PLAAF Commander and CMC Member Ma Xiaotian in 2013 stated “there is still a big gap in comparison with the requirements of the Air Force's missions and tasks” (Guo Hongbin and Su Xiao, 2013). He also goes on to mention that the big gap also exists “in comparison with the air forces of advanced nations” (Guo Hongbin and Su Xiao, 2013).

This section briefly examines the how these weaknesses affect the PLA's ability to achieve its various missions in the air domain. Chapter Three discussed these missions and the associated campaigns in greater detail. Referring to the earlier definition of military weakness by type, Table 5.3 presents a snapshot of the identified weaknesses and their likely effects on the various missions relevant to the air domain.

Border Missions

The multiple aircraft generations and insufficient special-mission aircraft constitute Type 3 weaknesses against many of China's neighbors with weaker militaries but might constitute Type 2 weaknesses against a regional power, such as India or Russia, in an air defense campaign. Similarly, the concerns about close air combat and sustained operation

Table 5.3
The Impact of Identified Air Domain Weaknesses on PLA Missions

	Missions				
	Border	Periphery	Taiwan	Maritime Claims	
Multiple aircraft generations	Type 2 or 3 ^a	Type 2 or 3 ^a	Type 3	Type 3	N/A ^b
Special mission aircraft	Type 2 or 3 ^a	Type 2 or 3 ^a	Type 2	Type 2 or 3 ^c	N/A ^b
Airlift	Type 3	Type 2	Type 3	N/A	Type 1 or 2 ^e
Close air combat	Type 2 ^f or N/A ^b	Type 2 ^f or N/A ^b	Type 2	Type 2 or 3 ^c	N/A ^b
Sustained operations	Type 2 ^f or N/A ^b	Type 2 ^f or N/A ^b	Type 2	Type 2 or 3 ^c	N/A ^b
Safety	Type 3	Type 3	Type 3	Type 3	N/A ^b
Pilot instruction	Type 3	Type 3	Type 2	Type 2 or 3 ^c	N/A ^b

^a Type 2 weakness if adversary is a regional power; otherwise, Type 3 weakness.

^b N/A, or not applicable, denotes that an identified weakness is unlikely to affect a particular mission.

^c Type 2 weakness if U.S. or Japan is the adversary; otherwise, Type 3 weakness.

^d Type 3 weakness if state-based threat is present; otherwise, N/A.

^e Weakness type based on scale of mission.

^f Type 2 weakness if adversary is a regional power; otherwise, not applicable.

weaknesses constitute Type 2 weaknesses against regional powers but may be not applicable against other adversaries. Airlift, safety, and pilot instruction are Type 3 weaknesses.

Periphery Missions

As with border missions, multiple aircraft generations and insufficient special-mission aircraft constitute Type 3 weaknesses against many of China's neighbors with weaker militaries but might constitute Type 2 weaknesses against a regional power, such as Russia or Japan, in an air offensive campaign or anti-air raid campaign. The concerns about close air combat and sustained operations constitute Type 2 weaknesses against regional powers but may be not applicable against other adversaries. Lack of airlift poses a Type 2 weakness. Safety and multiple generations of aircraft constitute Type 3 weaknesses.

Taiwan Missions

The categories of special-mission aircraft, close air combat, pilot instruction, and sustained operations constitute Type 2 weaknesses against Taiwan and the United States, should it enter the conflict, when prosecuting the anti-air raid campaign or supporting a joint blockade or island landing campaign. Airlift, safety, and multiple generations of aircraft constitute Type 3 weaknesses.

Maritime Claim Missions

The categories of special-mission aircraft, close air combat, pilot instruction, and sustained operations constitute Type 3 weaknesses against South China Sea claimants. They constitute Type 2 weaknesses for a mission carried out against Japan or if the United States were to become involved. Safety and multiple generations of aircraft constitute Type 3 weaknesses.

Humanitarian Assistance and Disaster Relief Missions

Because these missions often occur in a benign environment, airlift constitutes a Type 3 weakness.

Noncombatant Evacuation Operations

Typically lack of heavy airlift constitutes a Type 2 weakness for the PLA in NEO. However, if the situation is dire and numerous overseas

Chinese workers are in imminent danger in a country far away from China, this might approach a Type 1 weakness.

Sea Line of Communication Missions

The insufficient special-mission aircraft and close air combat training may constitute Type 3 weaknesses against state-based SLOC threats.

How the People's Liberation Army Air Force and People's Liberation Army and People's Liberation Army Navy Air Force Are Attempting to Address Weaknesses

Multiple Generations of Aircraft

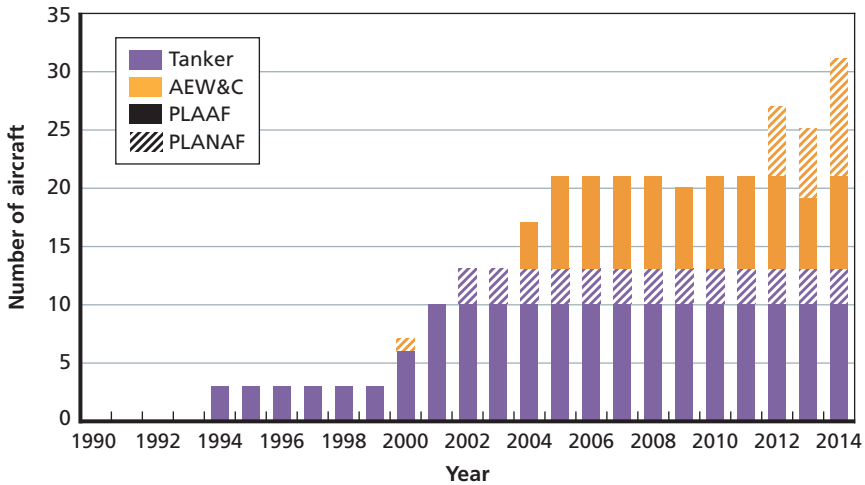
The PLA is abundantly aware of its weaknesses in the air domain. While it has much to do, the PLA is rapidly shedding its second- and third-generation fighter aircraft while producing increasing numbers of fourth- and 4.5-generation fighters. However, PLAAF Commander Ma Xiaotian's observation that a big gap still exists "in comparison with the air forces of other advanced nations" recognizes that these efforts alone are ultimately not sufficient to keep pace (Guo Hongbin and Su Xiao, 2013). The United States has already fielded one fifth-generation fighter (the F-22), and another (the F-35) is under development. Other countries, such as Russia, are in the process of developing such fighters (the Sukhoi T-50). In response, China has begun its own fifth-generation fighter program, with the J-20 (maiden flight in 2011) and J-31 (maiden flight in 2012) prototypes already garnering significant international attention (OSD, 2014, p. 67).

China is continuing to upgrade its H-6 bombers to improve its strike capabilities (OSD, 2014, pp. 9, 33), and Chinese and other regional media reporting suggests China is developing at least one new long-range stealth bomber that could address the shortcomings of its current bomber fleet and strengthen the PLAAF's ability to project power, at least regionally (for example, Zhang Ming'ai, 2013).

Special-Mission Aircraft

It is not entirely clear how the PLA is attempting to resolve its lack of special-mission aircraft. While this fleet remains small in absolute terms, as can be seen in Figure 5.7, aircraft numbers for certain special-mission roles are increasing moderately, while others have not

Figure 5.7
Numbers of PLA Special-Mission Aircraft by Role, 1990–2014



SOURCE: IISS, various years.

RAND RR893-5.7

increased. Numbers of PLA AEW&C aircraft have increased, largely through PLANAF acquisitions, although numbers of aerial tanking aircraft have been stagnant for quite some time. Part of this may be due to the PLA waiting for the Y-20 heavy transport to become operational. Variants of the Y-20 are expected to be developed that will provide the PLA further aircraft for aerial tanking and AEW&C roles (OSD, 2014, pp. 10, 36). In the meantime, China is acquiring IL-78 tankers from Ukraine to help improve its limited aerial refueling capabilities, although this is likely a stopgap measure rather than a real solution, such as the Y-20 portends to provide (for example, Lin and Singer, 2014). In the ISR role, “China is incrementally advancing its development and employment of UAVs,” which includes developing stealthy UAVs (OSD, 2014, p. 33).

Airlift

Seeking to overcome its weaknesses in airlift, the PLA is developing the aforementioned Y-20 heavy transport and the Y-9 medium transport. Assuming the Y-20 is eventually produced in significant numbers, it will provide the PLA with substantial long-range and heavy-airlift

options for missions ranging from humanitarian assistance and para-drop to power projection. Although the range and payload are more modest than the Y-20, adding Y-9s to the fleet could also support all the above missions while providing the PLA with a transport comparable to the C-130 (Jane's Information Group, 2014c).

Close Air Combat

To deal with weaknesses in training, including the peace disease, PLAAF Commander Ma Xiaotian stated that, when the PLAAF trains, it must “train for battle” instead of “doing things for show . . . [or] going through the motions” (Guo Hongbin and Su Xiao, 2013). To enhance close air combat skills, the PLAAF has developed an annual fighter confrontation competition; participating “top pilots” are selected to hone their skills in “free form air combat training” (Xu Tongxuan, 2013). Furthermore, “new requirements” for close air combat were proposed mid-2013 (Huang Ziyue, 2013).

Safety

For issues related to safety, one article suggests greater accountability, calling for investigations into the command leadership up to two levels above the unit when “consecutive serious accidents” occur (Lin Lusuo and Zhu Zhanghu, 2014).

Pilot Instruction

According to Nanjing Political Commissar Tien, to improve pilot instruction, the PLA should “make great efforts to cultivate high-caliber new-type military personnel” (Xu Tongxuan, 2014). It is not clear from Tien's statements in the article in *Air Force News* what these efforts might consist of.

Comparison of People's Liberation Army Publications with External Assessments of Weaknesses in the Air Domain

This following list compares PLA assessments of weaknesses in PLAAF capabilities with outside analyses of such issues as multiple aircraft generations, special-mission aircraft, airlift, close air combat, sustained operations, safety, and pilot instruction:

- **Multiple aircraft generations:** OSD and NASIC publications have observed that the PLAAF and PLANAF are still riddled with early generation aircraft. OSD (2014, p. 9) mentions that the PLAAF possesses only 600 modern combat aircraft, while NASIC (2010, p. 8) states that the transition from older- to newer-generation aircraft “has been one of the more daunting challenges facing PLAAF air units.”
- **Special-mission aircraft:** OSD (2014, p. 36) observes that the PLAAF “is continuing to improve its ability to conduct . . . early warning and reconnaissance missions,” and ONI (2009, p. 25) states that the PLANAF “is expanding its inventory of Airborne Early Warning” aircraft. While the reasons for these capability improvements are not mentioned, this is ostensibly to deal with weaknesses related to these missions. NASIC (2010, p. 7) mentions that the PLAAF “has only a limited aerial refueling capability.”
- **Airlift:** OSD (2014, p. 35) states that the PLAAF has a “strategic airlift deficiency.” One think tank has provided actual estimates of both long- and medium-lift transports that further demonstrate the paucity of these aircraft in the PLA’s inventory (IISS, 2014).
- **Close air combat:** Official DoD publications do not appear to assess the potential weaknesses of PLAAF and PLANAF close air combat capabilities. However, many publications do mention the increasing complexity of pilot training and the emphasis on “actual-combat” scenarios, which would ostensibly include close air combat (for example, NASIC, 2010, pp. 62–63; ONI, 2007, p. 49).
- **Sustained operations:** Official USG publications do not appear to assess the potential weaknesses of PLAAF and PLANAF sustained combat operations. However many of these publications do mention the increasing complexity of training and emphasis on “actual-combat” (NASIC, 2010, pp. 62–63) and “real-war situation” scenarios that include “longer flying periods” and “training events that . . . [continue] without rest” (ONI, 2007, pp. 49–50).

- **Safety:** While official USG publications do not appear to specifically assess safety issues, this weakness possibly does not comport with general analysis on trends within the PLA. Indeed, ONI (2007, p. 91) and NASIC (2010, p. 62) both mention movements away from the “excessive” safety considerations that were thought to have previously undermined more realistic training.
- **Pilot instruction:** Although it does not assess pilot instruction as a weakness, NASIC (2010, p. 132) provides possible rationales for it. For example, rather than being chosen from the ranks of veteran pilots who have logged substantial flight hours, instructor pilots are chosen from the pool of pilots who have just graduated from flight school.

The Space, Cyber, and Electromagnetic Domains

This section provides an overview of Chinese military capabilities and weaknesses related to space, cyberspace, and the electromagnetic spectrum. It outlines the space, cyber, and EW concepts and capabilities the PLA is developing to protect Chinese interests in space and the electromagnetic spectrum, potential weaknesses in China's capabilities, factors contributing to these weaknesses, and the steps China is taking to address what it perceives as the key problems in these areas.

Chinese Space, Cyber, and Electronic Warfare Capabilities

In keeping with the emphasis in Chinese military publications on the importance of space systems in contemporary military operations, China is making major strides in the development of its military space capabilities. With the launch of numerous new satellites in recent years, China is enhancing its space-based ISR, navigation and positioning, communications, and meteorological capabilities. China also continues to develop a variety of counterspace capabilities. According to OSD (2014, p. 11), “China is developing a multi-dimensional program to improve its capabilities to limit or prevent the use of space-based assets by adversaries during times of crisis or conflict.” These capabili-

ties include direct-ascent kinetic kill, directed energy weapons, and satellite jammers (OSD, 2014, p. 32).

The PLA is also focusing on training under what it refers to as “complex electromagnetic conditions.” Moreover, the PLA is devoting considerable attention to the development of its cyber and EW capabilities. This would be especially important in a conflict against a high-tech adversary, such as the United States. As OSD (2014, p. 35) points out, the “PLA believes [EW] is one method to reduce or eliminate U.S. technological advantage . . . PLA EW strategy focuses on radio, radar, optical, infrared, and microwave frequencies, in addition to computer and information systems.” The PLA sees EW as a potentially decisive factor during modern military operations and is developing and training with jamming equipment that could be used against multiple types of targets, including communication systems, radars, and the Global Positioning System (OSD, 2014, p. 32). In addition, the PLA could employ its cyberwarfare capabilities for intelligence collection, to delay an adversary’s response to its actions, or as a “force multiplier” alongside kinetic strikes (OSD, 2014, p. 35).

Potential Weaknesses in Space, Cyber, and Electronic Warfare Capabilities

The PLA also faces some potential weaknesses in terms of its ability to protect Chinese interests in space and the electromagnetic spectrum and to operate successfully in these areas to support military campaigns in which information dominance would be essential. Indeed, although the PLA has made major strides in its capabilities in these areas in recent years, its own assessments indicate that its ability to protect Chinese interests in space and the electromagnetic spectrum still has potentially serious shortcomings. Multiple Chinese reports assert that, in these areas, among others, organization, personnel, and capabilities fall short of what the PLA needs (for example, Peng Bo, 2008, and Yang Chunchang and Wang Hanshui, 2009, pp. 98–99).

Additionally, some Chinese sources suggest the PLA recognizes that China’s dependence on space will increase along with the expansion of its own space capabilities (Shou Xiaosong, 2013, pp. 278–288). Indeed, as China places more and more satellites in orbit, the PLA

is becoming more dependent on space capabilities for such important functions as ISR, navigation and positioning, and communications. Chinese military publications suggest that the PLA still sees itself as less dependent on space than the U.S. military is but also recognizes, albeit largely implicitly, that increasing reliance on space brings greater vulnerability (Shou Xiaosong, 2013, pp. 278–288). Moreover, PLA writers appear to see space as a largely offense-dominant domain, in which it will likely be much easier for an attacker to exploit an adversary's space systems and supporting capabilities than it will be for the target of any such attacks to protect its satellites, ground stations, and communication links (for example, Zhao Xinguo, Hou Yingchun, and Cao Yanhua, 2007).

Many Chinese analysts believe that China's space systems face a variety of potential threats. Some Chinese strategists appear to believe that other countries are actively developing counterspace capabilities that could threaten Chinese satellites, given what they characterize as a long history of antisatellite weapon research, development, and testing in the United States and Russia dating back to the Cold War (for example, Yuan Liwei, Yang Jianjun, and Yang Jiahong, 2004). Consequently, these strategists contend that the PLA needs to be better prepared to protect its space assets through defensive measures or deterrence.

China also sees itself as potentially vulnerable in the electromagnetic spectrum. One area in which this concern has been particularly pronounced is the PLA's perception of Chinese cybersecurity weaknesses (Mulvenon, 2009). Although most attention devoted to Chinese cyberactivities focuses on Chinese cyberespionage and the theft of intellectual property, PLA analysts actually view China as potentially very vulnerable to enemy cyberactions.

Another potential weakness for China in this general area may exist in the need to integrate all the PLA's disparate ISR capabilities and incorporate them into the targeting process. Indeed, shortcomings in China's C4ISR capabilities, which could be both organizational and technological, could hamper the speed, reduce the reliability, or otherwise diminish the effectiveness of the PLA's over-the-horizon targeting capabilities. Problems with the potential to limit the effectiveness of

Chinese C4ISR and targeting could include not only technical challenges associated with integrating such a variety of new technologies and complex systems but also procedural weaknesses, such as insufficient coordination among numerous intelligence organizations, operators, and higher-level decisionmakers.

Still another potential weakness in China's approach to space, cyber, and EW that Chinese analysts do not appear to have addressed in great detail at this point is the possibility of unintended effects or inadvertent escalation. As Kevin Pollpeter has pointed out, PLA analysts appear inclined to "accentuate the positive offensive outcomes of information warfare while ignoring its limitations and unintended consequences," a troubling tendency, especially when coupled with the emphasis the analysts place on seizing the initiative in the struggle for information dominance (Pollpeter, 2012, p. 162).

How the People's Liberation Army Is Attempting to Address Weaknesses in Space, Cyber, and Electronic Warfare Capabilities

The PLA sees space, cyber, and EW capabilities as increasingly vital aspects of its ability to deter or, if necessary, defeat a technologically advanced adversary in a future informatized local war, whether over Taiwan or the Senkaku/Diaoyu Islands, maritime territorial disputes in the South China Sea, or elsewhere. Accordingly, the PLA places a high priority on addressing its perceived weaknesses in space and the electromagnetic spectrum and can be expected to focus significant resources on continuing to improve its capabilities in both areas.

Chinese publications suggest China will want to improve the survivability of its satellites. Chinese authors discuss a wide range of measures to enhance satellite survivability, such as signature reduction; hardening and other protective measures; electromagnetic protection; satellite maneuverability; improving space situational awareness; and leasing foreign space systems, which might raise the diplomatic costs of any attack by dragging third parties into a conflict (Qi Xianfeng, 2005). Chinese publications also highlight the importance of addressing the vulnerabilities of communication links and satellite ground stations. In addition, China continues to develop new heavy lift capabilities to support its space program, and the development of at least two

different rapid space launch systems could enable China to quickly augment its space constellation or replace damaged satellites in the event of a conflict (OSD, 2014, p. 10–11).

China can also be expected to continue developing its counter-space capabilities. Chinese analysts view counterspace capabilities as useful not only for disrupting an adversary's military operations by exploiting the potential vulnerabilities of its space systems but also as an important contribution to strategic deterrence (Shou Xiaosong, 2013, pp. 178–179, 181–182, 186). The threat of retaliation against an enemy's space systems might deter that enemy from attacking China's satellites. According to Bao Shixiu, "under the conditions of American strategic dominance in space, reliable deterrents in space will decrease the possibility of the United States attacking Chinese space assets" (Bao Shixiu, 2007). More broadly, the threat of damage to space systems that are essential, expensive, and not easy to replace could deter an enemy, especially one that is heavily reliant on space, from engaging in or escalating a conflict against China.

Given that Chinese strategists view operating successfully in the electromagnetic spectrum, including through cyber and EW, as an essential component of the PLA's ability to deter and win wars, this is another area that is likely to be a high priority for PLA modernization. This is true for all PLA components, including ground, air, naval, and missile forces. With respect to the PLAAF, for example, one Chinese analyst cautions that, if a country pays attention to building up its kinetic strike capabilities but neglects computer network attack and EW capabilities, it will be unable to build a modern strategic air force (Ruan Kexiang, 2009, p. 69). Accordingly, China has focused substantial resources on upgrading the PLAAF's EW capabilities. These trends can be expected to continue as the PLA seeks to further improve its ability to protect China's growing interests in space, cyberspace, and the electromagnetic spectrum.

In the cyber and electromagnetic arenas, the PLA clearly views itself as occupying a relatively disadvantageous position because of its perceived inferiority in the key aspects of "network military struggle," which include cyber reconnaissance, cyberattack and defense, and cyberdeterrence. According to Shou Xiaosong (2013, p. 196), "com-

pared to the main strategic adversary, overall **China remains at a disadvantage in network confrontation.**" This problem may become more pressing as the PLA increases its reliance on systems that will help enable it to become more informatized but that are also a potential weakness. **This problem is likely to prove impossible to resolve completely, given that China sees offense as much easier than defense in the network warfare domain, as is the case in space.** Consequently, as the PLA becomes more and more networked, it will **become increasingly dependent on technology that is vulnerable to disruption, thus creating a potential weakness that an adversary could exploit.**

Nuclear Deterrence

While not a domain per se, the PLA's potential weaknesses in the realm of nuclear deterrence warrant their own discussion. Accordingly, this section provides an overview of Chinese concepts and capabilities for nuclear deterrence. It focuses primarily on China's nuclear deterrent force but also touches on other capabilities that Chinese strategists identify as making important contributions to the broader concept of strategic deterrence. It outlines Chinese nuclear deterrence concepts and capabilities, potential weaknesses in China's capabilities and factors contributing to the shortcomings, and steps China is taking to address what it perceives as the key problems in this area.

Chinese Strategic Deterrence and Nuclear Deterrence Concepts

Chinese military publications highlight the importance of deterrence as a means of protecting China's national security interests, including safeguarding what Chinese leaders have defined as an important "period of strategic opportunity" for China's development in the early part of the 21st century. According to Shou Xiaosong (2013, p. 134), PLA "preparations for military struggle" must not only improve the PLA's ability to win future local wars but also enable it to "establish and strengthen a military deterrence system and military deterrence capability to contain the outbreak of war and prevent the escalation of war." To this end, it is important to note that China views strategic

deterrence as a broad concept that encompasses nuclear, conventional, space, and cyber capabilities, as well as certain nonmilitary elements of national power. According to Chinese military publications, these are all essential elements of a credible strategic deterrent posture (Shou Xiaosong, 2013, pp. 135–136).

Within this broader context, nuclear weapons are seen as playing an indispensable role. The cornerstone of China's approach to nuclear weapons, ever since its first nuclear test in 1964, has been its no-first-use policy. Chinese writings on military strategy and missile force campaigns are generally consistent with this approach. For example, in *China Strategic Missile Force Encyclopedia* (2012, p. 66), the entry that discusses planning for a nuclear counterattack assumes China has been attacked with nuclear weapons first and is preparing to conduct retaliatory strikes.

Beijing has indicated in such official documents as its biannual defense white papers that it is determined to deploy a “lean and effective” nuclear force, which it views as required to meet China's national security needs (Information Office of the State Council, 2011). Importantly, this concept does not impose specific numerical limits on Chinese nuclear forces. As Yao Yunzhu (2010) notes, “to keep the arsenal lean, China has to exercise restraint in developing nuclear weapons; to keep the arsenal effective, China has to modernize it to ensure credibility after a first nuclear strike.” As this description indicates, *lean* suggests a relatively modest level of forces and underscores China's desire to avoid costly arms race but does not impose any specific quantitative boundaries. The second adjective, *effective*, emphasizes the importance of survivability and striking power sufficient to make nuclear deterrence credible in the eyes of potential adversaries.

The most recent edition of *The Science of Military Strategy* (Shou Xiaosong, 2013) also emphasizes the importance of a “lean and effective” nuclear retaliatory force, which it describes as an essential component of the PLA's broader “deterrence system.” The concept of effectiveness that volume and other more recent publications highlight can be traced back to earlier works, such as the 1987 edition of *The Science of Military Strategy*, which underscored the point that “China's

nuclear counterstrike must take effectiveness as the foundation” (Gao Rui, 1987, p. 116).

Taken together, the concept of a “lean and effective” nuclear force suggests something of a sliding scale, one that is based on such factors as threats to the survivability of Chinese nuclear forces and adversary missile defense capabilities. It is a general concept, but one that can be clearly linked to desired capabilities. For example, according to former PLASAF deputy commander Zhao Xijun (2005, p. 78), to ensure China will have a credible deterrent, it must continue to improve the survivability, rapid response capability, penetration capability, and striking power of its strategic missile force. Similarly, Shou Xiaosong (2013, pp. 233–234) highlights the importance of strengthening nuclear deterrence effectiveness. It mentions increasing the number of ICBMs, improving survivability, and strengthening penetration capability.

Chinese Nuclear Deterrence Capabilities and Weaknesses

China is modernizing and expanding its nuclear force, but it remains small compared to those of the United States and Russia. Hans Kristensen and Robert Norris estimate that China’s current nuclear stockpile includes a total of about 250 nuclear weapons.¹⁸ China’s deployed nuclear force consists of MRBMs and IRBMs for regional deterrence missions, silo-based ICBMs, road-mobile ICBMs, and an emerging SSBN and submarine-launched ballistic missile (SLBM) capability. China releases very little information about its nuclear weapons, but outside experts assess China’s older missile systems carry multimegaton warheads and that the more-modern road-mobile ICBMs have yields of several hundred kilotons (for example, Kile, Schell, and Kristensen,

¹⁸ Others have argued that China might have a much larger nuclear arsenal. For example, retired Russian military officer Viktor Yesin has stated that China could have as many as 1,600–1,800 nuclear warheads. However, these higher estimates do not track with publicly available estimates from DoD sources. For example, in August 2012, General Robert Kehler, then Commander of U.S. Strategic Command, disagreed with the higher estimates, stating: “I do not believe that China has hundreds or thousands more nuclear weapons than what the intelligence community has been saying, . . . [but] that the Chinese arsenal is in the range of several hundred.” For the estimate that China has about 250 nuclear weapons, see Kristensen and Norris (2013). For a report that cites Viktor Yesin’s assessment, see Gertz (2012). For a report that highlights General Kehler’s statement, see Kristensen (2012).

2012). Although its nuclear force is relatively small, China is not standing still. Indeed, its nuclear posture has been evolving to meet the country's changing national security needs (Roberts, 2008).

China currently maintains the DF-3 (CSS-2) IRBM and DF-21 and DF-21A (CSS-5 Mod 1 and CSS-5 Mod 2) MRBMs for theater nuclear deterrence and strike missions. China still has about 5 to 10 DF-3 launchers (NASIC, 2013, p. 17), but many observers expect it will likely retire these older systems in the near future (OSD, 2009, p. 24). According to NASIC (2013, p. 17), PLASAF deploys a total of fewer than 100 launchers for its nuclear-armed DF-21 and DF-21A MRBMs.

China's ICBM force consists of older, limited-range DF-4 (CSS-3) ICBMs, silo-based DF-5 (CSS-4) ICBMs, and road-mobile DF-31 (CSS-10 Mod 1) and DF-31A (CSS-10 Mod 2) ICBMs. China currently deploys about 20 silo-based DF-5 ICBMs (NASIC, 2009, p. 21) and is "enhancing its silo-based systems" as part of the modernization of its nuclear missile force (Burgess, 2012). Kristensen and Norris (2011) estimates that China has deployed a total of about 20 to 40 road-mobile ICBM launchers. This estimate is roughly consistent with NASIC (2013, p. 21), which states that China has deployed about 5 to 10 DF-31 road-mobile ICBM launchers and more than 15 DF-31A road-mobile ICBM launchers.

China is also moving toward a sea-based nuclear deterrent capability. Beijing's long-standing pursuit of such a deterrent is also aimed at enhancing the survivability of its nuclear force, and it is getting closer to achieving an operational capability. Although most observers assess that the first-generation Xia-class SSBN has never conducted a deterrent patrol, China's submarine-based nuclear deterrent finally is taking shape with the Type-094 (Jin-class) SSBN and the JL-2 SLBM. OSD (2013, p. 31) indicates that China has delivered three JIN-class SSBNs to the PLAN, with "as many as two more in various stages of construction." The PLAN is expected to begin conducting deterrence patrols with its Type-094 SSBNs sometime in 2014 (Karotkin, 2014). This will undoubtedly represent a major improvement over China's ill-fated first-generation SSBN, but it almost certainly falls short of the ultimate goals for a future sea-based nuclear deterrent. Indeed, an unclas-

sified chart released by ONI suggests the Type 094 is comparable to older Soviet SSBN designs in terms of its quieting and vulnerability to detection (ONI, 2009).¹⁹ In addition, China would likely prefer a new SLBM to have a range longer than that of the JL-2 SLBM.

China most likely perceives the credibility of its nuclear deterrent as increasing along with these advances in capabilities, but Chinese strategists identify what they characterize as a number of potentially serious challenges. Specifically, Chinese military writings and assessments by Chinese civilian scholars and arms control experts indicate that China views advances in adversary ISR, conventional precision strike, and missile defense capabilities as potential threats to the credibility of its nuclear deterrent.

PLA publications warn that China faces a “complex nuclear security environment” (Shou Xiaosong, 2013). According to Shou, the main nuclear adversary China must take into account is the United States, but other countries, including India, are emerging as possible challenges. From a technological perspective, the same volume highlights not only missile defense but also conventional prompt global strike as serious concerns for Chinese planners. In particular, it identifies conventional prompt global strike as a potential conventional strike threat against Chinese nuclear forces and warns that this development could put China in a “passive position” (Shou Xiaosong, 2013). Moreover, Shou also warns that it has the potential to “greatly influence China’s nuclear counterattack capability” and “weaken China’s nuclear deterrent function.”

Chinese Attempts to Address Perceived Shortcomings

China’s focus on enhancing the striking power and survivability of its nuclear missile force and improving its ability to counter missile defense systems is giving China a more credible nuclear deterrent. Looking to the future, Chinese military publications highlight increasing the number of ICBMs, improving survivability, and enhancing the ability to penetrate enemy missile defenses as important means of further

¹⁹ For an assessment of the Type 094 that relies on the unclassified ONI chart and other open sources, see Lewis (2009).

strengthening China's nuclear deterrent (Shou Xiaosong, 2013). In line with these assessments, China is enhancing its silo-based ICBMs and deploying more survivable road-mobile ICBMs. Looking to the future, the DF-41, a new mobile ICBM possibly capable of carrying MIRVs, is currently under development (OSD, 2014, p. 7). The PLAN is expected to conduct its first nuclear deterrent patrol with the Type-094 SSBN and JL-2 SLBM sometime in 2014, and China is planning a follow-on Type-096 SSBN and a new SLBM to enhance the sea-based component of its nuclear deterrent. In particular, China likely intends its next-generation SSBN to improve on the Type 094, which is relatively noisy. In addition, China appears to be conducting research on hypersonic glide vehicles to counter missile defenses (Keck, 2014).

Weaknesses in China's Defense Industry

This chapter evaluates the weaknesses of China's defense industry and considers their potential implications. China's defense industry has made tremendous progress in terms of its ability to deliver advanced weaponry and equipment to the PLA, especially since the 1998 defense industrial reforms, which resulted in the establishment of the GAD, among other changes. At the same time, however, China's defense industry continues to suffer from a number of problems that have yet to be fully addressed. Indeed, China's defense industry is still in transition from central planning to a more market-oriented system, and China still faces many major obstacles, such as widespread corruption, lack of competition and entrenched monopolies, delays and cost overruns, quality control problems, bureaucratic fragmentation, an outdated acquisition system, and restricted access to foreign technology and expertise.

China's Improving Defense Industry Capabilities

China's defense industry was once largely unable to produce weapons and equipment that met PLA requirements.¹ In large part, this

¹ The Chinese defense industry is defined as including civilian firms that are engaged in defense-related and dual-use civil-military research, development, and production; civilian regulatory agencies overseeing defense industrial matters; and the PLA research, development, and acquisition apparatus that is involved in the management and conduct of military-related science, technology, and industrial activities.

was because inefficiency, stovepiped bureaucracy, and a yawning gap between its level of technological sophistication and world standards plagued it. Yet, while previous attempts to reform the defense industry failed to yield the desired changes, the defense industrial reforms Beijing implemented in 1998, which included such important organizational adjustments as the establishment of the PLA's GAD, have produced much more meaningful results. Since the 1998 reforms, Beijing has enacted further organizational changes, most notably the creation of the State Administration for Science, Technology, and Industry for National Defense as the successor to the Committee for Science, Technology, and Industry for National Defense as part of a broader government-restructuring plan enacted in 2008 (Cheung, 2009; Mulvenon and Tyroler-Cooper, 2009; Medeiros et al., 2005).

Recently however, China has made considerable headway in modernizing its defense science, technology, and industrial capabilities and has achieved impressive results in a number of areas since the turn of this century. Generational improvements have been made in the development and production of a growing array of weapons, from warships to combat aircraft, although the Chinese defense industry overall still lags technologically one or two generations behind the global frontier. Sharply increased funding for research and development, sustained high-level leadership attention, and the absorption of advanced foreign technologies, especially from Russia, are some of the major reasons for these gains.²

Weaknesses of China's Defense Industry

This progress, however, has papered over deep-seated cracks that are serious impediments to China's efforts to become a world-class defense industrial power. These weaknesses stem from the developmental foundations of the Chinese defense industry and its uncertain efforts to overcome the corrosive legacy of its difficult history. The institutional and normative foundations and workings of the Chinese defense

² For an overview of recent developments, see Cheung (2014).

industry were copied from the former Soviet Union's command defense economy and continue to exert a powerful influence to the present day. The PLA and defense industrial regulatory authorities are seeking to replace this outdated top-down administrative management model with a more competitive and indirect regulatory regime, but strong vested interests do not want to see any major changes.

Senior Chinese military leaders have identified the replacement of the existing management system for weapon research, development, and acquisition (RDA) as one of the most important steps to addressing the obstacles to defense industrial modernization. General Zhang Youxia, the director of the PLA GAD said in January 2014 that the primary "bottleneck issue for armament development is no longer the shortage of funds or technology. Instead, institutional systems and mechanisms have become the greatest hurdle to the PLA's armament building and development" ("Speech by Zhang . . .," 2014). If the PLA was unable to remove these structural obstacles, Zhao said future progress in weapon development "may just be empty talk."

One of the biggest hurdles PLA and civilian defense acquisition specialists point out is the defense industry's monopoly structure.³ Little competition exists to win major weapon systems and defense equipment because each of China's six defense industrial sectors is closed to outside competition and is dominated by a select handful state-owned defense corporations. Contracts are typically awarded through single-sourcing mechanisms to these corporations. Competitive bidding and tendering takes place for only noncombat support equipment, such as logistics supplies. An effort in 1999 to inject more competition by splitting each company into two did little to curb monopolistic practices because these firms focused on different areas of business in their domains, and there was little direct rivalry.

A second serious weakness that has seriously handicapped the effectiveness of Chinese defense economy is its bureaucratic fragmentation. This is a common characteristic of the Chinese organizational system (Lieberthal and Oksenberg, 1988, pp. 35–42) but is especially

³ Interviews, Beijing and Changsha, November 2011 and June 2012.

virulent within the large and unwieldy defense sector.⁴ A key feature of the Soviet approach to defense industrialization that China imported was a highly divided, segmented, and stratified structure and process. There was strict separation between the defense and civilian sectors and between defense contractors and military end users, compartmentalization between the conventional defense and strategic weapon sectors and among the different conventional defense industrial sub-sectors, and division between research and development entities and production units. Key reasons for this excessive compartmentalization included an obsessive desire for secrecy and the powerful influence of the deeply ingrained Chinese model of vertical functional systems [条条] that encouraged large-scale industries, such those in the defense and supporting heavy industrial sectors (e.g., iron and steel and chemicals), to become independent fiefdoms.

This severe structural compartmentalization is a major obstacle to the development of innovative and advanced weapon capabilities because it requires consensus-based decisionmaking that requires extensive negotiations, bargaining, and exchanges. This management by committee is cumbersome and risk-adverse and results in a lack of the strong ownership that is critical to ensuring that projects are able to succeed the thicket of bureaucratic red tape and cutthroat competition for funding.

When Chinese authorities began to pursue the development of strategic weapons programs in the late 1950s, such as nuclear weapons and ballistic missiles, they recognized that the fragmented nature of the defense industrial economy represented a potentially fatal weakness, so they designed a special high-level leadership arrangement called the Central Special Committee (CSC) to provide the decisive leadership support needed for high-priority strategic projects (Cheung, 2012). The CSC played a central role in ensuring the successful development of China's strategic weapons capabilities, so much so that the Chinese authorities resurrected this leadership group in the late 1980s to oversee the initial development of key strategic programs. The CSC played an important role in the early development of the Shenzhou manned

⁴ See also Lieberthal and Lampton (1992) and Lampton (1987).

space project, for example, and has been mentioned in other major strategic technology programs, such as nuclear submarine development and other space projects.

The CSC's continued existence shows the lack of institutional development and maturity of the Chinese defense science, technology, and industrial system. The CSC represents an old-fashioned technonationalist response by an industrial latecomer that emphasizes the central role of the state, massive mobilization of capabilities and resources, and an underlying Cold War mentality driven by worries over external threats and the need for an wholly indigenous response. The United States used a similar state-led, top-down organizational model at the beginning of its development of the atomic bomb with the Manhattan Project but subsequently established effective bureaucratic institutions to run strategic technology projects, such as the national laboratories and the National Aeronautics and Space Administration, that did not require constant high-level leadership interference.

This entrenched bureaucratic fragmentation is a prominent feature of the armament management system. Although the GAD is one of the PLA's four general headquarters departments with a seat on the powerful CMC, it is responsible for managing the armament needs only of the ground forces, People's Armed Police, select space programs, and the militia (Mao Guohui, 2012, p. 46). The navy, air force, and PLASAF have their own armament bureaucracies, and competition is fierce for budgetary resources to support the projects each of these services favors. This compartmentalized structure intensifies parochial interests and undermines efforts to promote joint undertakings.

Coordination gaps and bureaucratic rivalry are also problematic between the GAD and the GSD and GLD in such areas as policy planning, resource allocations and drafting of longer-term development plans (Mao Guohui, 2012, p. 45). This led to the creation of the Strategic Planning Department (SPD) in 2011, to be housed in the GSD, with the role of "strengthening the strategic management functions of the Central Military Commission," according to CMC Vice Chairman Gen. Guo Boxiong ("Chairman Hu Jintao . . .," 2011). However, the nascent SPD is struggling to assert itself because of the GAD and GLD

are reluctant to allow any diminution of their authority and influence in key management, budgetary, and planning issues.⁵

The RDA system also suffers from compartmentalization along many process segments. Responsibilities for research and development, testing, procurement, production, and maintenance are in the hands of different units, and underinstitutionalization has meant that linkages among these entities tend to be ad hoc, with major gaps in oversight, reporting, and information sharing (Liu Hanrong and Wang Baoshun, 2009). The fragmented nature of the RDA process may help explain why Hu Jintao was apparently caught by surprise by the first publicized test flight of the J-20 fighter aircraft that occurred during the visit of U.S. Defense Secretary Robert Gates in January 2011 (Pomfret, 2011; Bumiller and Wines, 2011).

A third major weakness is that the PLA continues to rely on outdated administrative tools to manage projects with defense contractors in the absence of the establishment of an effective contract management system. The PLA did implement the use of contracts on a trial basis in the late 1980s, introducing a contract responsibility system (Cheung, 2009, pp. 83–85). These are administrative contracts, however, and have few legal rights because the defense industry lacks a developed legal framework. Consequently, contracts are vague and do not define contractual obligations or critical performance issues, such as quality, pricing, or schedules. Contracts for complex weapons projects can be as short as one to two pages, according to analysts.⁶

Moreover, many of the tools and management approaches the PLA acquisition apparatus uses are backward compared to those of its counterparts in the United States and other advanced military powers. It has yet to adopt total life-cycle management methods, for example, and many internal management information systems are on stand-alone networks that prevent effective communication and coordina-

⁵ Interviews with PLA officers who have interacted with the SPD within the first six months of its establishment, Beijing, June 2012.

⁶ Interview with PLA acquisition specialist, Beijing, November 2011.

tion. One analyst said that this often meant that the only way for project teams to exchange information was through paper transactions.⁷

A fourth serious weakness is the lack of a transparent pricing system for weapons and other military equipment, representing a lack of trust between the PLA and defense industry. The existing armament pricing framework is based on a “cost-plus” model that dates to the planning economy, in which contractors are allowed 5-percent profit margins on top of actual costs (Mao Guohui, 2012, pp. 158–159). This model has a number of drawbacks that hold back efficiency and innovation. One is that contractors are incentivized to push up costs because this also drives up profits. Another problem is that contractors are not rewarded for finding ways to lower costs, such as through more streamlined management or more cost-effective designs or manufacturing techniques. Contracts rarely have performance incentives, which discourages risk-taking and any willingness to adopt new, innovative approaches. Yet another issue is that contractors are dissuaded from making major investments in new technological capabilities or processes because of the low 5-percent profit margin that is available.

To address this long-standing problem, the PLA, Ministry of Finance, and the National Development and Reform Commission held a high-level meeting on armament pricing reform in 2009. They concluded that the outdated pricing system had seriously restricted weapon development and innovation (Zong Zhaodun and Zhao Bo, 2009). A number of reform proposals were put forward, including (1) provide incentives to contain costs, (2) switch from accounting procedures that focus on *ex post* pricing to *ex ante* controls, and (3) expand from a single pricing methodology to multiple pricing methods. Some of these ideas were incorporated in a document issued after the meeting entitled “Opinions on Further Pushing Forward the Reform of Work Concerning the Prices of Military Products.”

At the beginning of 2014, the GAD announced that it would conduct and expand on pilot projects on equipment pricing. These reforms include strengthening the pricing verification of purchased goods; improving cost controls; and shifting from singular to plural

⁷ Interview with PLA acquisition specialist, Beijing, November 2011.

pricing models, from “after-purchase pricing” to “whole process pricing,” and from “individual cost pricing” to “social average cost pricing” (“Armament Work . . . ,” 2014). These represent modest steps in the pricing reform process, but the PLA will continue to face fierce opposition from the defense industry on this issue.

A fifth impediment is corruption, which appears to have thrived with the defense industry’s uncertain transition from centralized state planning to a more-competitive and indirect management model.⁸ PLA leaders have highlighted the RDA system as one of a number of high-risk areas in which corruption can flourish; other areas included the selection and promotion of officials, the enrollment of students in PLA-affiliated schools, funds management, and construction work.

At the PLA’s annual conference on military discipline inspection work in January 2014, CMC Vice-Chairman General Xu Qiliang, who heads the PLA’s anticorruption efforts, pointed out that armament research, production, and procurement was one of two areas that required “better oversight” (“CMC Vice Chairman . . . ,” 2014). The other area was construction projects, which has been plagued by a number of high-profile corruption scandals in recent years, including the case of GLD Deputy Director Lieutenant General Gu Junshan, who amassed a huge fortune from lucrative real estate kickbacks (“How a PLA General . . . ,” 2014).

The almost complete absence of public reporting on corruption in the defense industry and RDA system means that the extent of the problem is not known. Military authorities justify this lack of transparency by pointing out that many of the cases are likely to involve classified programs. The latest anticorruption crackdown, which began with Xi Jinping’s ascent to power at the 18th Party Congress in November 2012, has produced only a handful of cases of defense industry executives being arrested on corruption charges (for example, “Wu Hao, Deputy General Manager . . . ,” 2014).

⁸ *Corruption* is defined broadly in China as covering the improper behavior of state, party, or military officials, but the more common Western definition is the abuse of public office for personal gain in violation of rules.

Potential Impact of Weaknesses in China's Defense Industry

This discussion of the weaknesses of the defense industry shows how much of a risk it faces of falling into a “trapped transition,” in which key segments are left unreformed or only partially reformed because of strong opposition from powerful interest groups. The negative consequences of this selective reform process have so far been masked by the abundance of resources flowing through the defense industry and RDA system since the late 1990s. But any tightening in budgets because of slowing economic growth could expose the fragilities of this deeply fragmented and flawed system.

Conclusion: People's Liberation Army Weaknesses and Their Implications

This concluding chapter of the report recaps our key findings and then offers some final thoughts on their implications that underscore the importance of conducting further research on the PLA's weaknesses and its strengths. The PLA has made impressive progress in a relatively short time. It is clearly becoming a more professional and more capable military. Its capabilities aimed at deterring or, if necessary, countering U.S. military intervention in the Asia-Pacific region, including systems designed to hold U.S. military bases, aircraft carriers, space systems, and computer networks at risk, are becoming an increasingly serious cause for concern among defense analysts in the United States. At the same time, however, an assessment of the PLA's missions and a comparison of them with its capabilities indicate that the PLA's transformation remains incomplete. Chapter Five explored these potential vulnerabilities and their effects on the PLA's combat capabilities in numerous domains through 2025. On the whole, we found substantial overlap between the findings of outside analysts and the PLA's own assessments in many areas.

Overall, the PLA has made impressive strides in its ability to perform its assigned missions, including advances in capabilities designed to counter U.S. military intervention in a crisis or conflict in the region, but it still faces a number of serious challenges. Chinese military publications reflect a keen awareness of these shortcomings. Indeed, Chinese military media reports and PLA books and journal articles contain voluminous discussions of the PLA's problems, which some Chinese writers refer to as the "two incompatibles/two gaps," a phrase that

highlights perceived incongruencies between current PLA capabilities and the demands of winning a local war under informatized conditions and successfully executing the PLA's other missions.

Some of the key weaknesses of the Chinese armed forces result from problems with the PLA's organizational structure, which appears to be an obstacle to the achievement of the level of joint operations capability to which the PLA aspires, and the shortcomings of its human capital, which include such problems as insufficient education and technical proficiency and rampant corruption. The PLA also suffers from shortfalls in terms of its combat capabilities. PLA publications highlight shortfalls in joint operations capabilities; training; and combat support and combat service support functions, such as logistics and maintenance capabilities.

In the maritime domain, China has made important strides but still faces such challenges as the integration of increasingly complex weapons and equipment, training, and the mastery of such potentially critical capabilities as ASW. China's air power achievements have been very impressive, but it still faces such challenges as insufficient numbers of special-mission aircraft and inadequate strategic transportation. The PLA also faces potential weaknesses in its ability to protect China's growing interests in space and the electromagnetic spectrum. This problem may become more acute as the PLA's reliance on systems that are potentially vulnerable to disruption continues to grow along with advances in its space and C4ISR capabilities. In addition, China's defense industry suffers from a number of problems that have yet to be resolved, despite major advances in its capabilities since the 1998 defense industrial reforms. These reportedly include such problems as widespread corruption, lack of competition, delays and cost overruns, and quality control issues.

The underlying premise of this report is that studying the PLA's weaknesses is crucial for several reasons. First, assuming we can gain greater knowledge of what the PLA sees as its own shortcomings, this is likely to offer a useful guide to assessing the future direction of PLA modernization and reform. The PLA's perceptions are subjective, of course, and may not fully align with outside assessments in all cases. Even if some of them may be inaccurate, as long as they are believed

within the PLA, they are likely to inform the PLA's priorities. Once the PLA diagnoses what it perceives as shortfalls to mission accomplishment, it can be expected to devote substantial resources to developing and implementing solutions.

Second, studying PLA weaknesses may inform the U.S. approach to forging a military-to-military relationship with China that advances U.S. interests and contributes to regional security and stability. Of course, China has a number of objectives in terms of its military exchanges with the United States. To the degree that the PLA views one of these as helping it gain knowledge that could allow it to close gaps in its capabilities, deepening our understanding of its weaknesses, and of its own views of these gaps, could provide some insight into how China is likely to approach this important military-to-military relationship.

Third, understanding the PLA's weaknesses, and its own assessment of them, can help to improve the ability of the United States and its allies and partners to deter China from using force or the threat of force to resolve disputes with its neighbors. For example, the United States and other countries could take such actions as revealing the development and testing of new capabilities designed to exploit specific PLA weaknesses, releasing details about new operational concepts that enable these countries to capitalize on PLA vulnerabilities, or highlighting training and exercises that demonstrate the ability to take advantage of gaps in the PLA's capabilities. There are, of course, circumstances under which it is unlikely the United States would be able to deter China from using force to defend what it perceives as its most important security interests, despite the PLA's awareness of its own shortcomings. When leaders in Beijing would see the cost of inaction as unacceptable because it would result in damage to China's core interests or undermine the CCP's hold on power, they might choose to use force, and the PLA would do the best it could with what it has. The perceived costs of inaction, at least in some possible scenarios, could grow if Beijing becomes increasingly concerned that China's populace expects its leaders to exercise power in accordance with China's rising international status.

Fourth, if deterrence fails, knowing the PLA's weaknesses could help devise strategies for countering Chinese use of force. Indeed, under such circumstances, exploiting these weaknesses could help to prevent the PLA from successfully using force or other forms of coercion to achieve China's objectives. For example, an opponent could conceivably strive to present the PLA with challenges that are fast paced, unexpected, and intended to overload or outmaneuver a slow-moving decision system that could have difficulty keeping up with a rapidly developing situation. All these factors underscore the importance of carefully studying the PLA's weaknesses and potential vulnerabilities and its strengths.

In closing, this report attempted to outline a framework to assess how capability level and capability shortfalls affect the PLA's ability to accomplish its assigned missions. The most important consequence of weaknesses in PLA capabilities, of course, is that they create some level of risk that the PLA will not be able to successfully accomplish one or more of its missions if China's leaders call on the PLA to do so. We acknowledge that a detailed application of the framework outlined in this report sets demanding standards for analysis. In this context, our report should be seen not as the definitive study of this topic but as a preliminary step in this direction, one that we hope will inspire future research along these lines. Indeed, we hope this work will serve as a starting point for further, more rigorous analysis. Using the framework as a starting point, a logical next step would be to conduct a detailed assessment of the potential implications of the PLA's weaknesses in light of one or more specific operational scenarios.

Critical Assumptions

This section presents an overview of some of the general assumptions on which our assessments are based and an overview of the possible implications if some of those assumptions are incorrect.

Assumption 1. Preservation of Chinese Communist Party as Top Priority

Preservation of the CCP will remain the top priority of the Party, state, and military leadership, and the CCP will remain firmly in control of the PLA. The implications of this are as follows:

- The political commissar system will continue within the Chinese armed forces, and the Party will continue to directly influence the pace and content of the military's development of combat power.
- The Party's investment in the promotion of nationalism as one of its key pillars of legitimacy will continue to affect China's interaction within the Asia-Pacific region and globally in unpredictable and sometimes erratic and counterproductive ways.
- Despite its verbal and sometimes physical aggressiveness, the CCP tends to avoid conflict and wants to sustain a peacetime environment to ensure the strength of another pillar of legitimacy—economic development.

Assumption 2. Centrality of Joint Operations

China's ability to project combat power depends on coordination across all domains—air, land, sea, space, cyber, and electromagnetic—of military power, and the PLA recognizes that it must enact organizational and training reforms to achieve the level of joint operational capability to which it aspires. The implications of this are as follows:

- The objective of improving the PLA's ability to conduct integrated joint operations must dominate plans for organizational restructuring and training reforms, and a joint operations capability must be realized sooner rather than later, to ensure that the PLA will be able to deter or, if necessary, win future informatized local wars.
- The PLA's ability to realize the objective of being able to conduct truly integrated joint operations depends on a higher level of technically and operationally capable personnel and leadership.

Assumption 3. Continued Dominance of the People's Liberation Army

Even though the Army's traditional dominance may stand in the way of plans to restructure the military and improve its ability to perform its assigned missions, ground forces will continue to attempt to maintain their traditional position and dominate the PLA. They will be at least partially successful because of the role the army plays as a coercive force to ensure the centrality of the CCP and also to absorb undereducated manpower. The implications of this are as follows:

- The PLA's transition to integrated joint operations will be incremental over the medium to long term. Tough decisions will be deferred or watered down if they affect the entrenched power of the CCP.
- Because of the influence of the ground forces, continental thinking will continue to dominate in operational art and leadership thinking.

- Younger officers with talent and ability to help transition to a modern force will likely be discouraged by obstacles to their desires for reform.

Assumption 4. Personnel Turnover

China's recruitment and relatively short rotation of personnel will not change significantly in the short to medium term. The implications of this are as follows:

- China's military personnel system will continue to be plagued by undertrained and inexperienced officers and men in the areas of modern combat, which will impede the force's ability to apply modern equipment and concepts effectively in line with China's concepts for force employment in future joint operations.
- The cycle of retraining will continue following the training and recruitment rotation, which will inhibit the establishment of combat capability.
- For the short to medium term, the cadre of officers and NCOs will remain too small, ill-trained, and inexperienced to transform combat power as rapidly and decisively as senior leaders wish.

Assumption 5. Role of Nuclear Weapons (1)

We assume that Chinese leaders will continue to believe that nuclear weapons underpin China's great power status and serve as a central component of China's broader suite of strategic deterrence capabilities. *If we are incorrect and Chinese leaders do see the strategic utility of nuclear weapons as declining, the leaders may choose to emphasize other aspects of strategic deterrence—such as long-range conventional strike, counterspace or cyberwarfare capabilities—more heavily than nuclear forces.*

Assumption 6. Role of Nuclear Weapons (2)

We assume that Chinese strategists will continue to view nuclear weapons as useful primarily to deter nuclear coercion; nuclear attack; major power war; and, potentially, certain types of conventional strategic attacks against China, rather than in tactical roles. *If we are incorrect and China begins to see nuclear weapons as more useful in tactical roles, it could result in the development of tactical nuclear capabilities that most Chinese strategists thus far have seen as unnecessary and potentially destabilizing.*

Assumption 7. Nuclear Force Modernization

We assume that China will continue to see deterring the United States as the primary focus of its nuclear force modernization. If China begins to see other countries closer to its borders, such as India, as representing a growing nuclear threat, it could increase China's focus on theater-range nuclear deterrence and strike capabilities.

Assumption 8. Defense Budget

We assume that China will continue to have a large enough defense budget to devote the necessary resources to recruiting, training, and retaining highly qualified personnel; conducting necessary operations and maintenance; and investing in a wide range of force modernization programs, some of which may be very expensive, such as China's pursuit of an indigenous aircraft carrier program. For example, we assume China will be able to continue qualitatively and quantitatively strengthening its nuclear deterrent force without facing sharp trade-offs between nuclear force modernization and conventional force modernization priorities. Similarly, we assume that, within the portion of the budget devoted to conventional force modernization programs, China will be able to afford to develop and deploy a number of big-ticket items simultaneously, such as stealth fighters, aircraft carriers,

national security space capabilities, and other types of potentially very costly modern platforms. *If we are incorrect and an economic downturn or shift in government spending priorities significantly curtails defense spending, it is conceivable that China could be forced to face trade-offs it has thus far managed to avoid. In a tighter budget environment, one possibility is that China might have to prioritize some of its major conventional force modernization programs at the expense of others, perhaps leading to slower progress or the purchase of fewer platforms in certain areas. Another is that Beijing might have to consider slowing its nuclear force modernization to accommodate expensive conventional weapon programs or that China could have to shortchange some of its big-ticket conventional programs to continue to support its nuclear modernization adequately if it saw the latter as a higher priority.*

Assumption 9. Civil-Military Relations

If the assessment that the role of the PLA as a Party army constitutes a weakness is wrong, this would imply a stronger degree of acceptance by the PLA of the CCP's leading role in Chinese polity and national security decisionmaking. It would also make efforts to defeat the PLA by playing on the political weaknesses of the CCP more difficult because the PLA would be expected to fight harder to preserve the Party's ruling status. In previous U.S. military operations, most notably the conflict with Iraq under Saddam Hussein, a central component of the U.S. war effort at the outset was in trying to encourage the opposing force to abandon the regime and lay down its arms. If the PLA firmly accepts the CCP's leading role, it will be far less amenable to such calls.

Assumption 10. Civilian Oversight

If the assessment that the absence of civilian oversight is a weakness is inaccurate, the United States might mistakenly conclude that the PLA is less efficient or effective at generating combat power because of the absence of oversight and coordination. If China can effectively

coordinate without substantial civilian input, a warfighting strategy that seeks to complicate Chinese military operations by striking at the seams of civilian and military coordination may be misplaced. However, if the assessment is correct, the United States might complicate China's ability to generate combat power if it could induce doubt into the minds of the Party about the honesty and fidelity of the PLA to the broader leadership of the CCP. From a separate angle, the United States might seek to cause the PLA to doubt the wisdom of the broader policies of the Chinese state and to question whether the line agencies of the government are actually supporting their mission or are leaving the PLA to fight on its own without sufficient economic, diplomatic, policing, or other forms of institutional support for its security mission.

Assumption 11. Operational Initiative

If the assessment that lower levels are not given operational decision-making authority is wrong, the PLA may prove capable of greater tactical flexibility and operational-level innovation than might otherwise be expected. PLA responses to this issue have not yet come to light, and the efforts to improve the NCO corps are not believed to be driven by an effort to create a more competent and trustworthy set of leaders at lower levels who could step into this role.

Assumption 12. Realistic Training

If the assessment that the PLA's training and exercise practices constitute a weakness is wrong and if the PLA is in fact mastering the art of operating under a more complicated, challenging, and realistic set of conditions than has been described above, the implication would be that the Chinese armed forces are more capable of undertaking complicated combined or even joint force operations than most outside observers have assessed to date. It would also imply that the broad community of PLA watchers has grossly overestimated its ability to evaluate the relationship of observed exercises to effective combat capabili-

ties. This would require a major reassessment of our knowledge of the PLA but would fall in line with recent statements from senior United States officials, including former Secretary of Defense Robert Gates and former U.S. Pacific Command Commander Admiral Robert Willard, that the United States has consistently underestimated China's capacity to innovate and catch up in the military domain (Holmes and Yoshihara, 2011).

Assumption 13. Professional Worldview

If the assessment that there is a large gap between academic and foreign-area officers in the PLA and those who have operational control over the force is wrong, engagement may provide more opportunities to shape the PLA's worldviews than had previously been considered possible. Messages could be communicated much more easily to top levels of leadership. On the other hand, it may suggest that the operational officers, who are generally regarded as the most hawkish, are immune to outside influences because the gaps that had been postulated would apparently not exist.

Assumption 14. Professionalism

Knowledge gaps in this area include the effectiveness of PLA efforts to improve morale and discipline and insufficient systematic information about how widespread such problems are and how they affect the PLA's ability to generate and sustain combat power. If assessments that this issue is important are incorrect, we would expect to see the PLA perform well in training and combat now and into the future, even as successive "one-child" generations continue to staff the force. Apart from targeting morale or benefitting from the sloppiness of soldiers who do not follow orders or maintain operational discipline, it is not clear how foreign militaries could seek to exploit such vulnerabilities.

Assumption 15. China-Russia Relationship and Russia's Strategic Orientation

We assume there will be no major change in the China-Russia relationship or Russia's broader strategic orientation. This is important because, if this assumption is incorrect, it could change China's external security environment in ways that could have major implications for the PLA. For example, a sharp downturn in Beijing's relationship with Moscow would require the PLA to devote more attention to deterring or preparing for a crisis or conflict involving Russia. On the other hand, if China's relationship with Russia remains on course but if Russia's relationship with the United States and its NATO allies deteriorates to the point that Washington must strengthen its military posture in Europe, this could result in important changes in China's assessment of the international situation and potentially alter its view of the regional security environment in Asia.

Assumption 16. Major Technological Surprises

We assume that there will be no technological surprises so drastic that they dramatically change Chinese views on future warfare. However, it is possible that the emergence of a dramatic technological surprise, such as in the areas of directed-energy weapons or hypersonic technology, could create new challenges or opportunities for China, potentially changing Beijing's thinking about its force modernization requirements and the demands of future military campaigns.

Abbreviations

AEW&C	airborne early warning and command
ASBM	antiship ballistic missile
ASW	antisubmarine warfare
C2	command and control
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CCP	Chinese Communist Party
CMC	Central Military Commission
CSC	Central Special Committee
DDG	guided missile destroyer
DoD	U.S. Department of Defense
EW	electronic warfare
FFG	guided missile frigate
GAD	General Armament Department
GLD	General Logistics Department
GSD	General Staff Department
HADR	humanitarian assistance and disaster relief

ICBM	intercontinental ballistic missile
IISS	International Institute for Strategic Studies
IRBM	intermediate-range ballistic missile
ISR	intelligence, surveillance, and reconnaissance
IT	information technology
MIRV	multiple independently targetable reentry vehicle
MOOTW	military operations other than war
MRBM	medium-range ballistic missile
N/A	not applicable
NASIC	National Air and Space Intelligence Center
NATO	North Atlantic Treaty Organization
NCO	noncommissioned officer
NEO	noncombatant evacuation operation
NSRD	RAND National Security Research Division
ONI	Office of Naval Intelligence
OSD	Office of the Secretary of Defense
PKO	peacekeeping operation
PLA	People's Liberation Army
PLAA	People's Liberation Army Army
PLAAF	People's Liberation Army Air Force
PLAN	People's Liberation Army Navy
PLANAF	People's Liberation Army Navy Air Force
PLASAF	People's Liberation Army Second Artillery Force

PRC	People's Republic of China
RDA	research, development, and acquisition
SAM	surface-to-air missile
SLBM	submarine-launched ballistic missile
SLOC	sea line of communication
SPD	Strategic Planning Department
SSBN	nuclear-powered ballistic missile submarine
UAV	unmanned aerial vehicle
UN	United Nations
USG	U.S. government

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Index

A

ability to achieve missions
 and air domain weaknesses, 107–110
 and human capital weaknesses, 61
 and land domain weaknesses, 83–85
 and organizational weaknesses, 60
 and PLAA capabilities, 83–84
 and PLAAF capabilities, 107–110
 and PLANAF capabilities, 107–110
 and PLASAF capabilities, 83–84
 and sea domain weaknesses, 94–96
 See also inability to perform missions (Type I weakness)
active defense, 26, 30
Advance News, 6
airborne campaigns, 31–32
airborne surveillance, long-distance, 40
air capabilities, 15, 19–20. *See also* air domain weaknesses
aircraft, 16
aircraft carrier capabilities, 19–20
air defense campaigns, 29, 30
air domain weaknesses, 101–114
 addressing, 110–112
 assessments of, 112–114
 PLAAF and PLANAF force structures, 101–105
 PLAAF and PLANAF training, 105–107

 and PLA's ability to achieve missions, 107–110
Air Force News, 6
airlift capability, 105, 111–113
air offensive campaigns, 32
anti-air raid campaigns, 34
 maritime claim missions, 35
 periphery missions, 32
 Taiwan missions, 33
antisubmarine warfare (ASW), 93, 98–100
army-centric force, 65
assumptions of study, 139–146
ASW (antisubmarine warfare), 93, 98–100
Ayuso, Wanda, 87

B

Battle Flag News, 6
Bhutan, 31
Bi Xinglin, 4
blockade campaigns, 33, 35
bombers, 16
border missions
 capabilities to conduct (through 2025), 39–40
 and PLAAF/PLANAF weaknesses, 107, 109
 and PLAA/PLASAF weaknesses, 84

relevant campaigns and intended
campaign effects, 28–30
Brunei, 34
budget of PLA, 47
Burma, 31

C

campaign essentials, 5
campaign outlines, 5
Campaign Theory Study Guide (Bi Xinglin), 4
CCP. *See* Chinese Communist Party
Central Military Commission (CMC),
56–57, 67
PLAA, PLAAF, PLAN, and
PLASAF representation on, 51
possible addition of civilians to, 62
recent transformation of, 65
and Sichuan earthquake response,
45, 46
Central Special Committee (CSC),
128–129
C4ISR (command, control,
communications, computers,
intelligence, surveillance, and
reconnaissance) capabilities, 15,
116–117
China-Russia relationship, 146
China-U.S. relationship, 22–23
Chinese Communist Party (CCP)
authoritative articles of, 5
civilian oversight, 144
civil-military relations, 143
party-military relations, 44, 61–62
and PLA's support of peaceful
development, 27
political commissars, 55, 56
preservation as top priority of, 139
preserving political supremacy of,
25
civilian oversight, 46–47, 62–63,
143–144
civil-military relations, 45–46, 62, 143

Clausewitz, Carl von, 2
close air combat training, 106, 112, 113
CMC. *See* Central Military
Commission
Coast Guard (China), 28
combat capabilities, likely future
improvement of, 21
combat capabilities weaknesses, 69–124
air domain, 101–114
inability to carry out new historic
missions, 72
lack of modernization, 70–71
land domain, 74–87
nuclear deterrence, 119–124
sea domain, 87–101
space, cyber, and electromagnetic
domains, 114–119
and two gaps, 69–70, 72–74
and two incompatibles, 69–74
See also individual domains
command, control, communications,
computers, intelligence, surveillance,
and reconnaissance (C4ISR)
capabilities, 15, 116–117
command structure, 18–19, 56–58, 67
addressing weaknesses, 67
Central Military Commission,
56–57, 67
General Staff Department, 57, 58
likely future modernization of,
20–21
military regions, 57, 58, 67
compensation, 49–50, 64
Comrade-in-Arms News, 6
conventional missile attack campaigns,
33, 34
coral reef offensive campaigns, 35
core missions, 26
corruption, 18, 48–49, 63–64
and compensation, 50
in defense industry, 132
and professionalism, 60
counterlanding campaigns, 29, 30
counterspace capabilities, 20, 114–115,
118

CSC (Central Special Committee),
128–129
cyber capabilities, 115, 117–119
cyberspace, national security interests
in, 26
cyber warfare capabilities, 17–18

D

Dai Xu, 92
defense budget(s), 47, 142–143
defense industry, 125–133
 bureaucratic fragmentation in,
 127–129
 corruption in, 132
 improving capabilities of, 125–126
 lack of transparent pricing in,
 131–132
 monopoly structure of, 127
 outdated administrative tools of,
 130–131
 potential impact of weaknesses, 133
 weaknesses of, 126–132
defense spending, 21, 143
detering China's use/threat of force,
137
disaster response, 45–46. *See also*
 humanitarian assistance and disaster
 relief (HADR) missions
doctrine of PLA, updating of, 18
domestic problems, future PLA
 modernization and, 21–22
dominance of PLA, 140–141

E

East China Sea, 34, 40–41
economic growth rate, future PLA
 modernization and, 21–22
electromagnetic domain, 118
 cyber and EW capabilities in, 17,
 115, 118–119

 weaknesses in, 115, 118–119
electronic warfare (EW) capabilities,
16, 17, 115, 118–119
equipment
 inexperience in use of, 76
 PLAA, 78–80, 86
 PLASAF, 82
ethnic minority regions, violence/unrest
in, 22
EW capabilities. *See* electronic warfare
capabilities

F

fighters, 16, 20
Finkelstein, David, 18
fleet air defense weaknesses, 88–91,
96–100
force composition, 55
force development problems, 71
force structure
 force composition, 55
 noncommissioned officer corps, 55,
 66
 and personnel enablement policies
 weaknesses, 53–56, 65–66
 PLAAF and PLANAF, 101–105
 political commissars' role, 55–56
 recruitment, retention, and veteran's
 benefits, 53–55, 66
 size of PLA, 53, 65–66
future modernization (through 2025)
 factors that will influence, 21–24
 likely trajectory of, 19–21

G

Gabon, 36
GAD (General Armament
 Department), 129–131
Gao Rui, 4
Gates, Robert, 18, 145

General Armament Department (GAD), 129–131
 General Logistics Department (GLD), 129–130
 General Staff Department (GSD), 57, 58, 129
 generational equipment issues
 improvements in, 126
 for PLAAF and PLANAF, 78–80, 103–104
 generation gap, 76–77
 GLD (General Logistics Department), 129–130
 ground force domination, legacy of, 51–52
 GSD. *See* General Staff Department
 Gu Junshan, 48, 49, 132
 Gulf of Aden, 37, 41, 91
 Guo Boxiong, 45, 46, 48, 129

H

HADR missions. *See* humanitarian assistance and disaster relief missions
 Henley, Lonnie, 87
 Hua Xiaoping, 57
 Hu Jintao, 26, 46, 69, 130
 human capital weaknesses, 43, 58–60
 addressing, 67–68
 mental and physical health, 59, 68
 and PLA ability to achieve missions, 61
 professionalism, 60, 68
 quality of recruits, 58–59, 67–68
 humanitarian assistance and disaster relief (HADR) missions
 capabilities to conduct (through 2025), 41
 PLAAF/PLANAF weaknesses, 109
 PLAA/PLASAF weaknesses, 85
 PLAN weaknesses, 95
 relevant campaigns and intended campaign effects, 36

I

ideological thinking, 75
 inability to perform missions (Type I weakness)
 addressing problem of, 73–74
 air domain, 107–110
 land domain, 84–85
 as most severe form of weakness, 2–3
 problems identified with, 72, 73
 sea domain, 94–96
 See also ability to achieve missions;
 combat capabilities weaknesses
 India
 battle tanks of, 79
 and periphery mission capabilities, 40
 strategic rivalry with, 23
 unresolved disputes with, 31
 Indian Army, 30
 Industry for National Defense, 126
 inefficiencies in military capabilities (Type 3 weakness), 3
 air domain, 107–110
 human capital weaknesses, 61
 land domain, 84–85
 organizational weaknesses, 60
 sea domain, 94–96
 information dominance, 17
 informatization level, PLAA and, 77–78, 86
 informatized wars, 70–72
 internal auditing of PLA, 63
 international military exchanges, 18
 international perceptions of China, 27
Intimidation Warfare (Zhao Xijun), 5
 Iran-Iraq Tanker War (1984–1988), 38
 Iraq war, 143

J

Japan, 34, 40–41
 Ji Shengde, 48

Johnson South Reef, 34
 joint blockade campaigns, 33
 joint border counter attack campaigns, 29–30
 joint island landing campaigns, 33
 joint operations
 capability for, 140
 centrality of, 140
 as challenge for PLASAF, 81, 86–87

K

knowledge gaps, 11, 49
 Korean War, 23
 Kristensen, Hans, 121

L

land domain weaknesses, 74–87
 addressing, 85–86
 assessments of and PLA-wide issues, 86–87
 People's Liberation Army Army, 74–80, 85
 People's Liberation Army Second Artillery Force, 80–83, 85–86
 and PLA's ability to achieve missions, 83–85
 leadership, for strategic weapons programs, 128–129
 leadership abilities, 75–76
Liberation Army Daily, 6
 Libya, 36, 37
 “little emperor” phenomenon, 60. *See also* one-child policy
 Liu Mingfu, 60
 Liu Weidong, 92
 logistics, 71, 72
 PLAA, 80, 87
 PLAN, 91–93, 98, 100
 PLASAF, 82–83

M

Malaysia, 34
 Mali, 36
 maneuver warfare campaigns, 31
 maritime claim missions
 capabilities to conduct (through 2025), 40–41
 PLAAF/PLANAF weaknesses, 109
 PLAN weaknesses, 95
 relevant campaigns and intended campaign effects, 34–36
 Ma Xiaotian, 51, 104, 107, 110, 112
 mental health of PLA forces, 59, 68
 methodology of study, 3–7
 military budget (2013), 15
 military capabilities
 addressing problem of, 73–74
 problems identified with, 72, 73
 See also inability to perform missions (Type I weakness)
 military diplomacy, 18
 military education, 18, 20. *See also* training
 military operations other than war (MOOTW), 21, 25, 27, 70. *See also* missions of PLA
 military regions, 57, 58, 67
 military spending, 15
 military strategic guidelines, 20
 military weakness, forms of, 2–3.
 See also specific forms, e.g.: combat capabilities weaknesses
 militia, 13n1
 Ministry of Defense, 46–47
 missile attack campaigns
 conventional, 33
 strategic missile force, 20
 missile capabilities, 15, 16, 20
 missions of PLA, 25–42
 ability to achieve (*see* ability to achieve missions)
 border missions, 28–30, 39–40
 capabilities to conduct (through 2025), 39–42

humanitarian assistance and disaster relief missions, 36, 41
 inability to perform (*see* inability to perform missions)
 maritime claim missions, 34–36, 40–41
 mission sets, relevant campaigns, and intended campaign effects, 27–39
 new historic missions and combat capabilities weaknesses, 72
 noncombatant evacuation operations, 36–37, 41
 periphery missions, 30–32, 40
 sea line of communication missions, 37–38, 41
 strategic deterrence, 38–39, 41–42
 strategic objectives, 25–27
 Taiwan missions, 32–34, 40
 mobilization capabilities (PLAA), 80, 87
 modernization levels
 addressing problem of, 72–74
 problems identified with, 70–72
 See also combat capabilities weaknesses
 modernization of PLA, 13–24
 factors that could change direction of, 21–24
 lack of, as combat capability weakness, 70–71
 likely trajectory through 2025, 19–21
 nuclear forces, 142
 since 1990s, 13–19
 MOOTW. *See* military operations other than war
 mountain offensive campaigns, 31

N

nationalization, 44, 61
 National People's Congress, 62–63

NATO (North Atlantic Treaty Organization), 24, 146
 naval base defense campaigns, 29, 30
 naval capabilities, 15, 19–20. *See also* sea domain weaknesses
 naval coastal raid campaigns
 maritime claim missions, 35
 sea line of communication missions, 38
 NCOs. *See* noncommissioned officer corps
 NEOs. *See* noncombatant evacuation operations
 new missions
 combat capabilities and inability to carry out, 72
 core, 26–27
 Ni Wenxin, 105
 noncombatant evacuation operations (NEOs)
 and airlift capability, 105
 capabilities to conduct (through 2025), 41
 and PLAAF/PLANAF weaknesses, 109–110
 and PLAN weaknesses, 96
 relevant campaigns and intended campaign effects, 36–37
 noncommissioned officer (NCO) corps, 55, 66, 76
 Norris, Robert, 121
 North Atlantic Treaty Organization (NATO), 24, 146
 North Korea, 23–24, 31
 North Vietnam, 23
 nuclear counterstrike campaigns, 39
 nuclear deterrence, 119–124
 addressing shortcomings, 123–124
 capabilities and weaknesses, 121–123
 improvement of capabilities for, 16
 PLAN's future role in, 20
 strategic and nuclear deterrence concepts, 119–121
 nuclear force modernization, 142
 nuclear weapons, 121–122

assumptions about role of, 141–142
 no-first-use policy for, 38, 120
See also strategic deterrence

O

one-child policy, 60, 68, 145
 operational initiative, 50
 organizational culture weaknesses,
 47–53, 63–65
 addressing, 63–66
 army-centric force, 65
 compensation, 49–50, 64
 corruption, 48–49, 63–64
 legacy of ground force domination,
 51–52
 operational initiative, 50
 professional worldview
 development, 52–53
 realistic training, 50–51, 64
 organizational structure weaknesses,
 44–47
 addressing, 61–63
 civilian oversight, 46–47, 62–63
 civil-military relations, 45–46, 62
 party-military relations, 44, 61–62
 organizational weaknesses, 43–58,
 60–67
 command structure, 56–58, 67
 force structure and personnel
 enablement policies, 53–56, 65–66
 and military capabilities, 72
 and modernization, 71
 organizational culture, 47–53,
 63–65
 organizational structure, 44–47,
 61–63
 and PLA ability to achieve missions,
 60

P

Paracel Islands, 34
 party-military relations, 44, 61–62
Peace Ark, 36, 41
 “peace disease,” 105, 106
 Peace Mission exercises, 31
 peacetime mentality, 76
 Peng Guangqian, 4
People’s Armed Forces, 6
 People’s Armed Police, 13n1, 28
People’s Front, 6
 People’s Liberation Army (PLA), 13n1,
 140–141. *See also individual topics*,
e.g.: missions of PLA
 People’s Liberation Army Air Force
 (PLAAF), 101
 and 2011 NEO in Libya, 36, 37
 airlift capability, 105, 111–113
 capabilities for border missions, 39
 close air combat training, 106, 112,
 113
 on CMC, 51
 combat capabilities weaknesses,
 83–85
 conventional missile attack
 campaigns, 33
 dominance of, 51
 force structure, 101–105
 GSD management of, 58
 likely future modernization, 20
 modernization of, 15–16
 multiple-generation aircraft, 103–
 104, 110, 113
 pilot instruction, 107, 112, 114
 and PLA ability to achieve missions,
 107–110
 PLAA domination of, 65
 “principle contradiction” for, 70
 safety training, 106–107, 112, 114
 special-mission aircraft, 104–105,
 110–111, 113
 sustained operations training, 106,
 113
 training, 105–107

People's Liberation Army Army
(PLAA)

combat capabilities weaknesses, 74–80, 85
as dominant PLA force, 65
ideological thinking, 75
and informatization, 77–78, 86
logistics support, 80, 87
mobilization capabilities, 80, 87
personnel problems, 75–77
and PLA's ability to achieve missions, 83–84
training, 77
weapons and equipment shortfalls, 78–80, 86

People's Liberation Army Navy
(PLAN)

antipiracy patrols, 37
antisubmarine warfare, 93, 98–100
on CMC, 51
conventional missile attack campaigns, 33
fleet air defense, 88–91, 96–98, 100
GSD management of, 58
HADR missions, 41
likely future modernization, 19–20
logistics support, 91–93, 98
maritime claim missions, 40
modernization, 15
overwatch of 2011 NEO in Libya, 36, 37
PLAA domination of, 65
potential weaknesses, 88–94
SLOC missions, 41
training, 93–94, 99–101

People's Liberation Army Navy Air
Force (PLANAF), 101

close air combat training, 106, 112, 113
force structure, 101–105
multiple-generation aircraft, 103–104, 110, 113
pilot instruction, 107, 112, 114
and PLA ability to achieve missions, 107–110
safety training, 106–107, 112, 114

special-mission aircraft, 104–105, 110–111, 113
sustained operations training, 106, 113
training, 105–107

People's Liberation Army Second
Artillery Force (PLASAF), 51

combat capabilities weaknesses, 80–83, 85–86
in conventional missile attack campaigns, 33
GSD management of, 58
joint operations challenges, 81, 86–87
likely future modernization, 20
logistics, 82–83
modernization, 16
and PLA's ability to achieve missions, 83–84
training, 52, 81–82
weapons and equipment, 82

People's Navy, 6

People's Republic of China (PRC), 1
periphery missions

capabilities to conduct (through 2025), 40
and PLAAF/PLANAF weaknesses, 109
and PLAA/PLASAF weaknesses, 84
relevant campaigns and intended campaign effects, 30–32
use of force against, 23

personnel enablement policies, 53–56, 65–66

personnel problems, 141

PLAA, 75–77

PLASAF, 80–81

personnel turnover, 141

Peru, 36

Philippines, 34, 35

physical health of PLA forces, 59, 68

pilot instruction, 107, 112, 114

piracy

antipiracy patrols, 37

counterpiracy missions, 93

PLA (People's Liberation Army), 13n1, 140–141. *See also individual topics, e.g.*: missions of PLA
 PLAA. *See* People's Liberation Army Army
 PLAAF. *See* People's Liberation Army Air Force
 PLAN. *See* People's Liberation Army Navy
 PLANAF. *See* People's Liberation Army Navy Air Force
 PLASAF. *See* People's Liberation Army Second Artillery Force
 political commissars, 55–56
 Pollpeter, Kevin, 117
 positional defense campaigns, 28–30
 positional offensive campaigns, 31
 PRC (People's Republic of China), 1
 professionalism of PLA forces, 60, 68, 145
 professional worldview, 52–53, 145

Q

quality of PLA recruits, 58–59, 67–68

R

RDA (research, development, and acquisition) of weapons, 127, 130
 realistic training, 18, 50–51, 64, 144–145
 recruitment, 53–55, 66, 141
 recruits, quality of, 58–59, 67–68
 Republic of Vietnam, 34
 research, development, and acquisition (RDA) of weapons, 127, 130
 retention of personnel, 53–55
 risk of failure (Type 2 weakness), 3
 air domain, 107–110
 land domain, 84–85
 organizational structure, 60

 sea domain, 94–96
Rocket Force News, 6
 Russia
 assumed strategic orientation of, 146
 battle tanks of, 79, 80
 change in strategic orientation of, 24
 China-Russia relationship, 146
 fighters of, 110
 and periphery mission capabilities, 40
 Sino-Soviet border conflict (1969), 31

S

safety training, 106–107, 112, 114
 SAM (surface-to-air missile)
 capabilities, 16
 satellites. *See* space capabilities
Science of Campaigns, The (Wang Houqing and Zhang Xingye), 4
Science of Campaigns, The (Zhang Yuliang), 4
Science of Military Strategy, The, 4, 120
Science of Second Artillery Campaigns, The (Yu Jixun), 5
 sea-based air defense, 40
 sea-based nuclear deterrence, 122
 sea blockade campaigns, 35
 sea domain weaknesses, 87–101
 addressing, 96–100
 antisubmarine warfare, 93, 98–100
 assessments of, 100–101
 fleet air defense, 88–91, 96–98, 100
 logistics support, 91–93, 98, 100
 and PLA's ability to achieve mission, 94–96
 potential PLAN weaknesses, 88–94
 training, 93–94, 99–101
 sea force group campaigns, 35
 sea-line guarding campaigns, 38
 sea line of communication (SLOC)
 missions

capabilities to conduct (through 2025), 41
 and PLAAF/PLANAF weaknesses, 110
 and PLAN weaknesses, 91–92, 96
 relevant campaigns and intended campaign effects, 37–38
 Second Thomas Shoal, 34, 35
 Senkaku/Daiyou Islands, 34–35
 Shanghai Cooperation Organization, 31
 Shou Xiaosong, 118–119, 121, 123
 Sichuan earthquake (2008), 45–46
 Sino-Indian Border War (1962), 30
 Sino-Soviet border conflict (1969), 31
 Sino-Vietnamese War (1979), 31
 size of PLA, 53, 65–66
 SLOC missions. *See* sea line of communication missions
 social instability, future PLA modernization and, 22
Soldiers News, 6
 sources
 limitations of, 7–11
 for studying PLA weaknesses, 3–7
 South China Sea, 34, 40, 109
 space, national security interests in, 26
 space capabilities, 15, 114–115
 improvement in, 17
 likely future modernization of, 20
 weaknesses in, 114–119
 SPD (Strategic Planning Department), 129–130
 special-mission aircraft, 104–105, 110–111, 113
 Spratly Islands, 34
 State Administration for Science, Technology, and Industry for National Defense, 126
 State Oceanic Administration, 28
 strategic deterrence, 141
 capabilities to conduct (through 2025), 41–42
 China's concept of, 38, 119–120
 relevant campaigns and intended campaign effects, 38–39

strategic missile force, 20
 strategic objectives of PLA, 25–27
 Strategic Planning department (SPD), 129–130
 submarine fleet, 15, 19
 surface ships, 15
 surface-to-air missile (SAM)
 capabilities, 16
 sustained flight operations, 106, 113

T

Taiwan
 detering moves toward independence by, 26
 and joint-island landing campaign, 34
 and One-China Principle, 32
 potential peaceful unification with, 24
 and South China Sea claims, 34
 Taiwan missions, 24
 capabilities to conduct (through 2025), 40
 and PLAAF/PLANAF weaknesses, 109
 and PLAA/PLASAF weaknesses, 84–85
 and PLAN weaknesses, 94–95
 relevant campaigns and intended campaign effects, 32–34
 technological surprises
 assumption about, 146
 and likely future improvement of PLA, 24
 terrorist attacks, future PLA modernization and, 22
 Third Taiwan Strait Crisis (1995–1996), 32
 Tian Xiusi, 107
 Tibet
 containing separatist forces in, 26
 invasion/annexation of (1950–1951), 31

violence in, 22
 traditional core missions, 26
 training
 increasing realism and complexity of, 18
 likely future modernization of, 20
 and military capabilities, 72
 and modernization level, 71
 PLAA, 77, 85
 PLAAF and PLANAF, 105–107
 PLAN, 93–94, 99–101
 PLASAF, 52, 81–82, 85
 realistic, 18, 50–51, 64, 144–145
 two gaps, 69–70, 72–74, 135–136. *See also* Combat capabilities weaknesses
 two incompatibles, 19, 69–74, 135–136
 military capabilities, 72
 modernization levels, 70–71
 problems identified with, 70–72
 See also Combat capabilities weaknesses
 Type 1 weakness. *See* inability to perform missions
 Type 2 weaknesses. *See* risk of failure
 Type 3 weaknesses. *See* inefficiencies in military capabilities

U

United Nations peacekeeping operations (UN PKOs), 36
 United States, 14–15, 18, 22–23
 and China's leverage over Taiwan, 40
 and cyber/EW capabilities, 115
 fighters of, 110
 implications of PLA's capabilities/weaknesses for, 135–138
 and maritime claim missions, 40–41
 strategic weapons programs of, 129
 tension between Russia and, 24, 146

U.S.-China relations and future
 PLA modernization, 22–23
 unmanned aerial vehicles (UAVs), 16
 UN PKOs (United Nations peacekeeping operations), 36
 urban assault campaigns, 31
 urban defense campaigns, 29, 30

V

Vanguard News, 6
 veterans' benefits, 53–55
 Vietnam, 34, 79–80
 Vietnam War, 23

W

Wang Houqing, 4
 weaknesses of PLA, 1–11
 defining, 2–3
 implications of, 135–138
 source limitations and knowledge gaps, 7–11
 sources and methodology for studying, 3–7
 understanding, 1–2
 See also individual weaknesses
 weapons
 PLAA, 78–80, 85–86
 PLASAF, 82, 85–86
 RDA management system, 127, 130
 See also defense industry; nuclear deterrence
 Wen Jaibao, 45, 46
 Willard, Robert, 145
 Wu Hui, 93
 Wu Shengli, 70

X

Xi Jinping, 6, 7, 20, 46, 61, 63, 67, 132
Xinjiang, 22, 26
Xu Caihou, 48, 63
Xu Qiliang, 51, 71, 72, 132

Y

Yao Youzhi, 4
Yin Zhuo, 92
Yu Jixun, 5

Z

Zhang Dan, 93
Zhang Xingye, 4
Zhang Youxia, 127
Zhang Yuliang, 4
Zhao Xijun, 5, 121
Zhou Yunxiang, 92