

China's New Great Leap Forward

High Technology and Military Power
in the Next Half-Century

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Preface

For more than forty years, Hudson Institute has studied trends in science, technology, and economics, and their long-term consequences for the structure of world politics. For three decades, we have been especially interested in Japan but, more recently, we have been impressed, as have others, by the growth of the Chinese economy and what it means, not only for commercial and financial relationships, but for strategic and military trends as well. *China's New Great Leap Forward: High Technology and Military Power in the Next Half-Century* focuses on the growing scientific and technological sophistication of China's economy and society and, accordingly, the country's potential for developing and deploying weapons of greater complexity and power.

Much of our ongoing work is international in outlook and interdisciplinary in character, and this report draws on the diverse backgrounds and substantive expertise of Senior Fellow in Trade and Productivity at Manufacturers Alliance and Adjunct Fellow Ernest H. Preeg; Research Fellow Mary C. FitzGerald; and Senior Fellow Charles Horner. Editorial direction was provided by Research Fellow Maria Farkas. We believe that the issues that this report raises about the future of military conflict will be of increasing importance to the general public and to government policymakers.

Kenneth R. Weinstein
Chief Executive Officer
Hudson Institute
Washington, DC
November 2005

Introduction

The Chinese Economic and Military Challenge

This study seeks to define some challenges to U.S. security interests that 25 years of Chinese economic growth and transformation may create. Its focus is on the growing scientific and technological sophistication of China's economy and society and, accordingly, the country's potential for developing and deploying weapons of greater complexity and power. Our discussion is divided into three main parts.

The first is an overview of the evolution of Chinese thinking about the relationships among technology, strategy, and military power. The examination of such relationships has been a consistent presence in China's thinking about national security since the mid-nineteenth century. The idea that, somehow, the country, by the application of "People's War," could make a military virtue out of the necessity of its technological backwardness was made famous during the ascendancy of Mao Zedong and written into the Chinese Communist Party's official history of how it came to power. That notion, as we shall see, has been discarded during the past 25 years. Whatever relevance to either China or the world that the idea may once have had, the current Chinese leadership believes that a rising power in the modern world must make its way through the exploitation of modern science and technology, that China must develop its own independent capacity for technological innovation even beyond what it can draw on from the rest of the world, and that one important by-product of greater technological capacity ought to be more military power.

The second part of our discussion will address China's progress in building a science and technology-based economy during the past 25 years, what China is now able to do in translating that success into militarily-relevant design and manufacturing, and what China will likely be able to do in this realm over the next 25 years.

Although in recent years the world has taken notice of China's spectacular economic growth, the common perception is that China is a place of low-end manufacturing (because of low wages)—a country that produces a seemingly limitless quantity of inexpensive goods to fill the shelves of Wal-Mart stores. This perception is true so far as it goes, but it misses a proper sense of the transition now underway in China's economy—a transition from lower-order to higher-order production. Close observers of the Chinese economy already know about this, but this realization does not yet inform most discussion in the policy communities. Accordingly, it is important to summarize China's remarkable progress in science, technology, and engineering, and assess, in appropriate detail, what that progress may mean if applied to military pursuits.

The third part of the study examines China's focus on high-technology weaponry, how China understands the implications of such weaponry both for the future of its own military forces and for the global military balance, and how China proposes either to overcome outright or otherwise neutralize the advantages the United States currently has in this arena.

Finally, we will consider some scenarios for a China-Taiwan conflict and the practical implications of China's outlook, given the military challenges we are dealing with today. Such "scenarios" can provide useful insight into the challenges we may have to face. For, in prosecuting the war on terrorism, our attention on a daily basis is directed toward another end of the scale of military conflict, conflict where the terms "transformation" and "modernization" have come to mean improving our skills at special operations, urban warfare, and post-conflict stabilization. Prior to the attacks of September 11, 2001, however, these same terms were routinely applied to other realms of warfare: information warfare, space warfare, deep-sea warfare, and the less exotic but still vital arena of air superiority.

We think it is very important to keep these concerns before the general public and before policymakers. Traditionally, our Defense

Department's formal statements about military challenges have spoken of more than one war—of “two wars” or “two-and-a-half wars”—that the country may have to fight at one and the same time. The reference has always been to two major, or two major and one minor, conflicts in different *geographic areas* of the world. In the twenty-first century, however, the reference can just as easily be applied to two different *types* of war: the intense and vicious man-to-man war we see on television every day, and also the war of complex technologies that others may be planning to fight and that also requires us to engage in ongoing transformation and modernization. In this respect, our situation is in one way reminiscent of a situation forty years ago, when we had to deal with “insurgency” while at the same time dealing with a rival determined to dominate “strategic competition” at the highest level.

The Intelligent Design of Chinese Strategic Thinking: From “Surrounding the City” to “Opening to the World”

On October 1, 2005, the People's Republic of China (PRC) marked the fifty-sixth anniversary of its founding. The elaborate ceremonies held at the time by the Communist Party leadership, which were designed to communicate a sense of calm and continuity against a background of rapid economic growth and ongoing social change, were not very instructive about the tumultuous events of the past several decades. For the country has experienced enormous upheavals and abrupt alterations of course, great instability and destructive internal violence and, most of all, a profound transformation in Chinese thinking about China's place in the world—how to maintain it, and how to advance it. This paper addresses only one set of changes in a very large cluster—how China's power is to be developed at home and projected out to the rest of the world.

The Communists who came to power in 1949, and especially their leader Mao Zedong, had very strong views about how to

construct a new China and how to make New China a force in the world. New China was to be an ally of the Soviet Union, and a member of the Soviet-sponsored international system of communist states. It would therefore not participate in the post-World War II political and economic international order created under the auspices of the United States. It was not interested in world trade or economic development, in our understanding of these terms. Whereas Old China had been trying for decades to integrate itself into the world economy and therefore had focused attention on great coastal port and manufacturing cities like Shanghai, New China would focus on the interior of the country and follow a path of economic development that not only did not rely on national-international connections, but also did not rely very much on rural-urban connections within the country.

This way of looking at things reflected Mao's understanding of how the Communist Party had risen into power in the first place. Mao had argued for abandoning the major cities and building the party's power base in the vastness of rural China. In a phrase that would later become famous in another context, his strategy was to surround the city with the countryside, rather than projecting the power from the city into the countryside. In these important respects, Mao's sense of how China would become a "modern" country was altogether different from the main thrust of Chinese thinking about these questions during the preceding century.

Our task here is to consider but one facet: what it means for China to become "modern"—the connection between technological advancement and military power. For China to posit such a connection, of course, presents it with a two-part problem—how to develop the country's technological capacity, and how to connect that capacity to the creation of military forces in accordance with some prior sense of what China's military forces are for and how they might be used. A simple way to understand this is to remind ourselves of the dramatic shift in Chinese thinking over the past 40 years.

In September 1965, then Chinese minister of defense Lin Biao published a seminal article “Long Live the Victory of People’s War!” marking the twentieth anniversary of Japan’s defeat in World War II. Lin himself had been a commander of one of the PLA’s four field armies, leading Communist forces in the climactic battles of the Chinese civil war in the northern part of the country in the late 1940s. Although routinely described as “Chairman Mao’s closest comrade-in-arms” and, at one time, Mao’s designated successor, Lin fell out with Mao and died in a still-mysterious plane crash in 1971. In 1965, however, the People’s Republic, and certainly Minister Lin, was obviously very optimistic about its prospects.

Could China come to prevail over a technologically and industrially advanced country like Japan? Lin, of course, glossed over the role other countries had played in Japan’s defeat, but for his purposes, historical accuracy was not a requirement. Lin argued that China had prevailed because it had a Chinese Communist Party possessed of powerful insights into the nature of things, especially into the real nature of the war with Japan. Critically important was the Party’s idea that a latent power resided in China’s hundreds of millions of backward peasants that could be tapped and then translated into effective military power by following the teachings of Mao on the proper conduct of war. Mao had written extensively about the so-called “people’s war,” “protracted war,” “revolutionary war,” or “war of national liberation.” Although this kind of war was to be “protracted,” it would provide China a shortcut to power, a way for China to bypass the traditional methods, whether Chinese or Western, of organizing and training armies. It could also leapfrog the decades required to create the traditional scaffolding of military power, particularly a sophisticated armaments industry.

It seemed like a good idea at the time. In the Party’s view of things, the “people’s war” had brought the Communists to power in China, it had fought the United States to a standstill in Korea, it seemed on the verge of further successes on the mainland of Southeast Asia, and it had attracted adherents all over the world.

Perhaps its main contribution was to China's morale; the country, once regarded as pathetic and well-nigh hopeless, now inspired fear instead. Toward the end of his article, in just a few sentences that became renowned, Lin presented New China's prescription not only for a revolutionary transformation of non-Western societies, but a vision of how that transformation could then be applied on a global scale to change fundamentally the world's balance of power. In a tribute to the establishment of rule by the Chinese Communist Party, Lin argued that just as China's peasants had surrounded their country's cities from the countryside, so too could a "world countryside" of Maoist states surround the "world city" of advanced industrial societies, and thereby initiate an entirely new era in world affairs. Among other implications, this particular world view afforded China a unique and central role in an historic transformation of the entire world.

A generation ago, Lin's prescription and prophecy had an electrifying effect. They inspired insurgents in many countries and caused established governments to examine their strategies and tactics in light of this challenge. Indeed, defeating "insurgencies" and "wars of national liberation" became a high priority for the armed forces of the United States, even as competition with the Soviet Union for dominance at the highest level of strategic nuclear weaponry continued apace. Within the more parochial realm of China studies, the need to solve these problems focused attention on traditional Chinese military doctrine, on the study of even more ancient Chinese military classics, on Mao's theories of warfare, and on a popular Chinese vernacular literature of peasant rebellion. International relations theorists pondered how Mao's and Lin's Sino-centric vision of proletarian internationalism would influence opinions about liberal democratic capitalism. Yet for all the extensive reverberations of that era, the PRC's first great sally into world politics is now a historical curiosity.

Our understanding of the "China threat" is far different today, because China's understanding of its past, present, and future is also

different today. Mao died in 1976, and after a short but intense struggle over the succession, Mao's sometime-ally, sometime-political opponent, Deng Xiaoping, won out. Deng's program, which he called "socialism with Chinese characteristics," presented a wholesale repudiation of Maoist economic and social organization. It was, in essence, based on the "export-led growth" model that had worked so well in Taiwan, Hong Kong, South Korea, and, earlier, in Japan. Deng's rendition of New China placed the country in the middle of the world's trading economy, with financing by huge amounts of foreign capital—capital from the overseas Chinese diaspora mostly, but with substantial amounts coming from the United States, Japan, South Korea, Europe, and ironically enough, the equivalent of many billions of dollars more from rival Taiwan itself.

This fundamental reorientation in the country's foreign relations was accompanied by an even more radical shift in the country's domestic arrangements: the movement of about 60 percent of the economy into the private sector; internal migration of tens of millions of workers; a complete reorganization of the rural economy into a market-based system; rapid urbanization and new urban construction; nationwide infrastructure construction involving thousands of miles of modern highway, railways, new ports, and airports; and creation of a telecommunications network with, for one example, hundreds of millions of cell phone users. All this has led to profound problems, challenging the ability of the government to cope: unprecedented personal income inequality and regional imbalances; an unstable financial system; water shortages; environmental deterioration; endemic corruption and tax evasion; and widespread health problems of the modern kind—cardiovascular disease, cancer, and mental illnesses.

Still, the Chinese Communist Party insists that, despite all of this, it remains a Marxist-Leninist party. If we take it at its word, we can infer that the Party believes that the "modernization" of China's economic system—what Marxists call the "substructure"—must inevitably lead to a "modernization" of politics and ideas—what

Marxists call the “superstructure.” Thus, what we outsiders might regard as certain abrupt changes in ways of thinking in the post-Mao age can be explained by a doctrinaire Chinese Marxist as nothing out of the ordinary, but only what one would have expected.

Even so, in the area of interest to us here, contemporary China is thinking about strategic and military problems in a way that Chairman Mao would have found unfathomable. In the first place, the country's presently stated understanding of what makes for a powerful military harks back, fundamentally, to the late nineteenth century and China's then concept of “self-strengthening.” This was in part an effort to overcome technological, and therefore military, backwardness both by the development of indigenous capabilities and by purchases on the world armaments market. The models were to be found in the successes of others, whether that of the British navy or the Prussian army—what we today might call “world-class” military forces. “Openness to the World” was therefore a prerequisite of such a policy; as it has become once again. However, a critical measure of success must be China's own technology-developing capacity.

The Rapid Development of China's Advanced Technology Industry and Its Impact on Military Modernization

by
Ernest H. Preeg

Chinese economic strategy since 1995 has centered on the development of advanced technology industry. The results have been most evident in commercial markets, through investment, industrial output, and exports most of all. There also has been an important defense industry dimension, however, through similar structural reforms within defense industry and a deepening integration between the civilian and defense sectors. The overall process of industrial modernization is moving at such a rapid pace that it is difficult to assess the results with precision, especially for defense industry, but there is little doubt that the Chinese challenge to long-standing U.S. leadership in technological innovation and application has far-reaching implications for U.S. commercial, national security, and foreign policy interests.

This chapter begins with a current assessment of what can be called the emerging Chinese advanced technology superstate, in terms of domestic resource commitments, foreign direct investment, and trade.¹ The second section then elaborates the related advances in Chinese defense industry and military modernization. The third and final section discusses the likely course ahead, principally over the coming five to ten years, with a briefer, more general commentary on the longer-term outlook of 25 years and beyond.

¹The presentation here draws heavily on Ernest H. Preeg, *The Emerging Chinese Advanced Technology Superstate* (Manufacturers Alliance/MAPI and Hudson Institute, July 2005), Chapters 1–6.

The Emerging Chinese Advanced Technology Superstate

China is rapidly developing into an advanced technology superstate, with technological innovation by Chinese scientists, engineers, and companies the ultimate goal. This was stated in starkest terms by Premier Wen Jiabao in April 2005 in Beijing—where “independent innovation” means Chinese innovation independent of foreign companies:

Science and technology are the decisive factors in the competition of comprehensive economic strength. . . . We must introduce and learn from the world's achievements in advanced science and technology, but what is most important is to base ourselves on independent innovation. . . . Independent innovation is the national strategy.

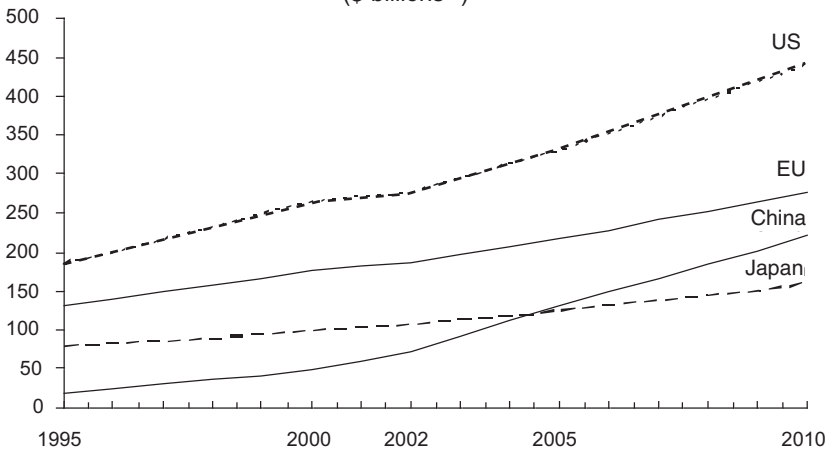
As background, China began its export-led, high-growth industrialization strategy in 1978, but the focus during the first 17 years was on investment in labor-intensive industries, mostly in coastal “Special Economic Zones.” Such industrialization and agriculture were the stated top priorities among the “Four Modernizations,” while science and technology and military modernization were relegated to priorities three and four. It was only in 1995 that a number of key decisions were taken to elevate science and technology to priority number one, as stated by Premier Wen, and the results after only ten years have been impressive, in terms of domestic resource commitments, a central role for foreign investment, and rapid growth in increasingly high-tech exports.

Domestic Resource Commitments

Major financial commitments and incentives have been directed to research and development (R&D) and education. Since 1995, R&D expenditures in China have been growing at more than 20 percent per year, compared with 6 percent in the United States and 5 per-

cent in Europe and Japan. As shown in Chart 1, Chinese R&D expenditures in 1995 were only one-tenth of those in the United States, one-seventh of those in the EU, and one-quarter of those in Japan. By 2005, however, Chinese expenditures had risen to about one-third of the U.S. level, one-half of the EU level, and above the Japanese level. The projection to 2010, with a more modestly anticipated 15 percent annual growth in Chinese R&D, shows a further substantial narrowing of the gap with the United States and the EU.

Chart 1
Chinese R&D Expenditures
(\$ billions *)



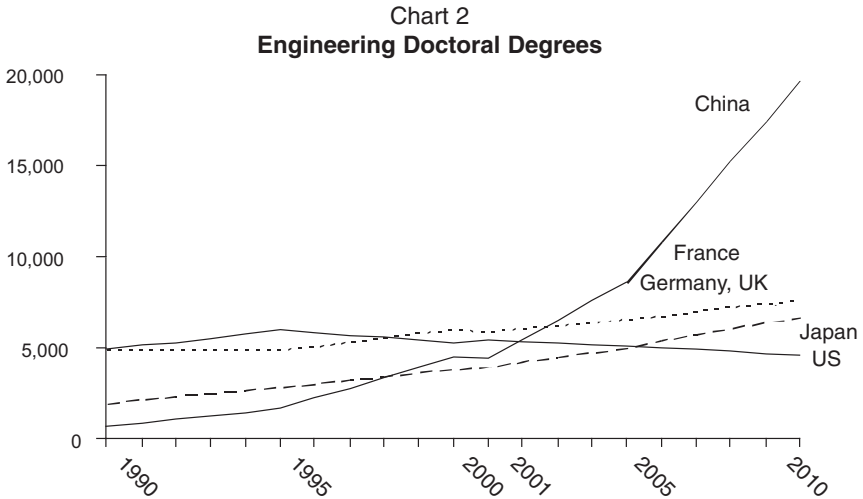
*purchasing power parity

Source: OECD, for 1995 -2002; growth projections for 2005 and 2010 at annual rates of China 15 percent, United States 6 percent, European Union 5 percent, and Japan 5 Percent.

Chinese R&D is concentrated in export-oriented manufacturing, most heavily in the information technology and telecommunications sector, and in defense industries. About 60 percent consists of investments by foreign and Chinese enterprises and 40 percent by the government, similar to the breakdown in the United States.

The results in the education sector are equally dramatic. The number of college graduates in China has tripled since 1995, from one million to three million, putting it on par now with the United

States. Chinese students are far more concentrated in science, math, and engineering, however, and China now graduates six to eight times as many undergraduate engineers as does the United States. Statistics compiled by the National Science Foundation on the number of doctoral degrees awarded per country and year in science and engineering—figures that it considers more directly related to technological innovation—again show a striking expansion in China. As shown in Chart 2, in 1995 three times as many engineering doctorates were awarded in the United States as in China; in 2005, conversely, the number of Chinese doctorates outnumbered those of the United States by a margin of two to one.



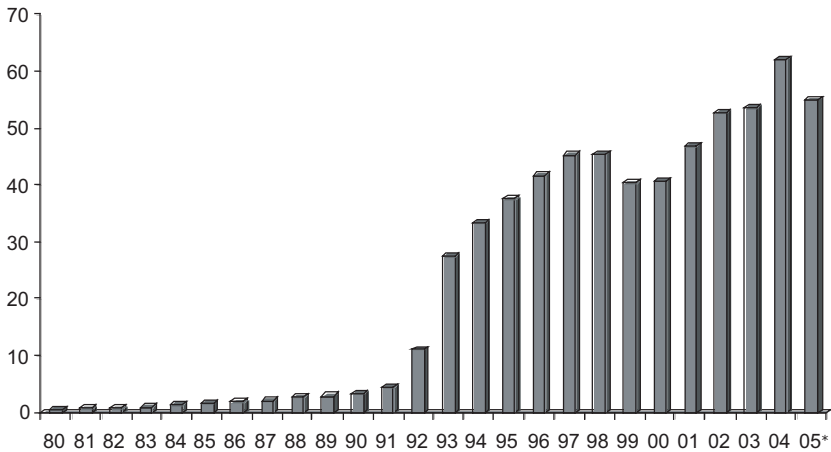
Source: National Science Foundation, 1990 -2001; growth projections for 2005 and 2010 at annual rates of China plus 18 percent, the United States minus 2 percent, France, Germany, and the United Kingdom plus 3 percent, and Japan plus 6 percent.

The National Science Foundation's data, moreover, is limited to those degrees granted in Chinese universities, excluding the tens of thousands of engineering doctorates granted annually to Chinese graduates of U.S., European, and other foreign universities, many of whom return to China.

Foreign Direct Investment

One major component of Chinese advanced technology development that was not a significant factor for earlier undertakings of industrial modernization in Japan, South Korea, and Taiwan is foreign direct investment (FDI), which, up to this point, has been the decisive catalyst for the rapid expansion of China's advanced technology industry. As shown in Chart 3, FDI in China during the 1980s and early 1990s was small, reflecting the dominance of labor-intensive industries, such as apparel and footwear, which require relatively little investment in plant and equipment, and which were developed principally by Chinese rather than foreign companies. Then, in the mid-1990s, much broader access within China as well as large financial incentives spurred FDI to rise sharply to \$40 billion to \$50 billion per year, reaching a record \$61 billion in 2004.

Chart 3
Foreign Direct Investment in China: 1980–2004
(\$ billions)



Source: Chinese Ministry of Commerce
*Projected

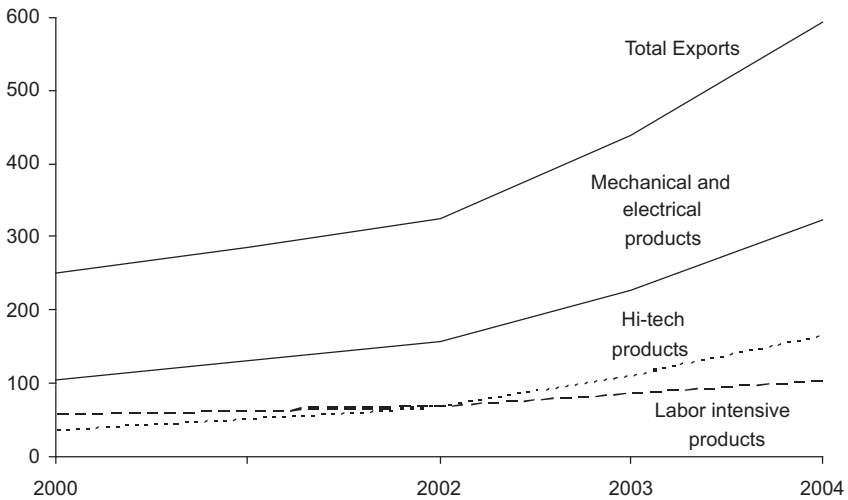
70 percent of this FDI is in the manufacturing sector—again most heavily in the information technology and telecommunications sector, but also prominently in the machinery, automotive, and pharmaceutical sectors, among others. The Chinese government offers generous tax and other financial initiatives to foreign high-tech firms. It also applies pressure on foreign firms—often related to official approval for a new investment—to do R&D and higher technology production in China. As a result, the number of R&D centers by foreign companies, usually in the form of joint ventures with universities or Chinese companies, rose from 100 to 200 in 2001 to more than 700 in 2005.

International Trade

The bottom line for gauging international competitiveness is the trade account, which also provides the most detailed and up-to-date data. Here again, the recent Chinese growth experience is dramatic. Total Chinese merchandise trade doubled from 2001 to 2004, with exports in the first half of 2005 up by 33 percent compared to a 14 percent rise in imports. In 2004 China overtook Japan to become the third-largest trading nation, after the United States and Germany. At the current rate, China will be the number-one trading nation within five years.

The qualitative restructuring of Chinese trade is equally important in terms of the development of advanced technology industry. The apparel and textile share of Chinese exports has declined from 27 percent in 1990 to 21 percent in 2000 and 15 percent during the first half of 2005, despite an increase this year related to the phase-out of quotas on textile imports. In parallel, as shown in Chart 4, the shares of exports for a select category of “high-tech products” and for the more broadly based category of mechanical and electrical products have risen sharply and now constitute the majority of Chinese exports. In other words, the image of China as an exporter principally of low-tech, labor-intensive products is rapidly becoming history.

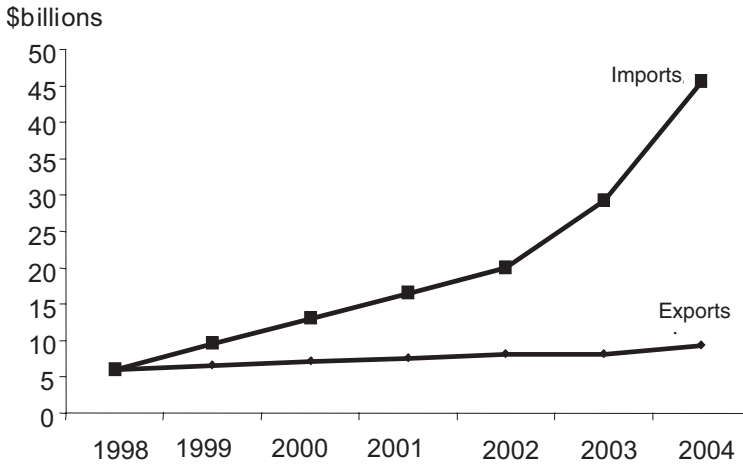
Chart 4
Chinese Exports Go High Tech
(\$ billions)



Source: China's Customs Statistics

The competitiveness of China's exports is most striking in the country's huge bilateral trade surplus with the United States, which will total about \$200 billion in 2005. For our purposes, the bilateral account for advanced technology products, or ATP, provides the most relevant measure. Chart 5 shows statistics on the bilateral account with China of ATP, products that are selected by industry experts of the Census Bureau for having the highest degree of R&D and engineering content, and that comprise about one-quarter of the U.S. trade in manufactures. In 1998, trade in ATP was balanced, with approximately \$6 billion in both exports and imports. By 2004, however, U.S. exports of ATP to China had risen only slightly to \$9 billion, while U.S. imports of ATP from China had surged almost eightfold to \$46 billion; this sharply deteriorating trend in the U.S. bilateral ATP balance has continued in 2005.

Chart 5
U.S. Advanced Technology Product Trade with China



Source: National Science Foundation and the Bureau of Census.

Technological Innovation

As for the ultimate Chinese objective of domestic technological innovation, a time lag of course persists between investments in R&D and the emergence of leading-edge innovation, while measurement of innovation is difficult in any event. Yet evidence of significant results is growing. Recent examples of independent Chinese innovation include: (1) the planned launch of 100 satellites over the next several years, to form a global earth observation system; (2) the Dawning 4000—A Shanghai supercomputer; and (3) the Godson II central processing unit computer chip with 64-bit performance able to support a Linux or Windows operating system.

In February 2005, the Task Force on the Future of American Innovation, comprising 21 academics, private-sector organizations, and companies—including the American Electronics Association, the American Physical Society, the Materials Research Society, Intel, Lucent, and Microsoft—issued a report that concluded, “China has been investing heavily in nanotechnology and already leads the U.S. in some areas...and is making rapid progress in biotechnology.”

Overall Assessment

These are the basic facts about the rapid development of Chinese advanced technology industry. In the short time span of ten years, China has been transformed into an emerging advanced technology superstate, in terms of human and financial resource commitments, R&D, production capability, and exports. The whole process has been within a policy framework of open trade and investment, with fierce competition among and between Chinese and foreign companies. The long-standing U.S. leadership position in advanced technology innovation, production, and international competitiveness, has been reduced significantly. The net result is a fundamentally changed bilateral economic relationship between the United States and China, together with the rise of China within the global trade and financial systems as one of three economic superpowers, together with the United States and the EU, while Japan recedes to a more and more distant fourth position.

The Impact on China's Defense Industry and Military Modernization

The development of advanced technology industries in the civilian sector has proceeded in parallel with a fundamental restructuring of the Chinese defense industry. This has involved a growing integration between the two sectors within a common strategy of competitive performance standards and increased resources for R&D and engineering services. The results for the Chinese defense industry are more recent than for the commercial sector and less clearly understood by foreign observers in view of the secrecy that shrouds Chinese weapon design and production. Only in 2004 did hard assessments of major improvements in the Chinese defense industry begin to emerge, with the first comprehensive U.S. official statement contained in the July 2005 annual Department of Defense (DOD) Report to Congress.

Pre-1997 Reforms

The performance capability of the Chinese People's Liberation Army (PLA) from the 1970s through the 1990s was dismal, a fact that both Chinese and foreign observers in the United States and elsewhere clearly recognized. In 1979, China launched a punitive attack on Vietnam, and suffered enormous casualties against the smaller but more experienced Vietnamese defenders. Chinese command and communications were uncoordinated and many casualties arose from "friendly fire." The U.S. use of "surgical" bombing and electromagnetic warfare in the Gulf War in 1991 dramatically demonstrated the huge gap that China faced vis-à-vis the United States in modern weapons systems, a gap that was further displayed in 1996 when two U.S. aircraft carrier battle groups off the coast of Taiwan upstaged Chinese missile exercises with flight combat maneuvers and the monitoring of PLA activities on the ground. During the 1990s, the U.S. Department of Defense consistently assessed the Chinese military capability as being at least 20 years out of date across the board, a view shared by most independent analysts.²

The reasons for this failure of the PLA to develop combat readiness and modern weapons systems have been analyzed extensively.³ A continuing series of "reforms" within the military establishment were frustrated by vested interests in the status quo, a lack of incentives to improve performance, and the general isolation of highly secret defense facilities, even from one another, including the relocation of defense enterprises to remote interior areas known as the "Third Line." R&D institutes were separated from manufacturing facilities, preventing cost-benefit analysis at the development stage related to production costs and weapons' ultimate performance. Corruption was also massive, stemming mainly from the large-scale

²See David Shambaugh, *Modernizing China's Military: Progress, Problems, and Prospects*, (University of California Press, 2002), p. 328.

³See, for example, *The People's Liberation Army in the Information Age*, James C. Maulvenon and Richard H. Yang, eds. (Rand Corporation, 1998); *The Chinese Armed Forces in the 21st Century*, Larry M. Wortzel, ed., (Strategic Studies Institute, 1999); *China's Growing Military Power: Perspectives on Security, Ballistic Missiles, and Conventional Capabilities* (Strategic Studies Institute, 2002); and Shambaugh, *op. cit.*

production by defense industry enterprises of goods intended for commercial markets with weak accounting procedures.

1997–1999 Reforms

Finally, from 1997 to 1999, a fundamental restructuring of the Chinese defense industry was adopted, closely linked, in concept and application, to the new framework for the development of advanced technology industry launched a couple of years earlier. The National Defense Law of 1997 essentially subordinated the armed forces to state or civilian government control, asserting that “the State Council shall direct and administer the building of national defense” according to nine categories of responsibilities, including, most importantly, fiscal appropriations. The 1998 National Defense White Paper elaborated this shift in control, giving the State Council responsibility for deciding the size, structure, and location of defense assets. With regard to the defense industry in particular, it implemented three basic changes: (1) control of the very large state-owned defense enterprises was shifted from the military to the civilian government; (2) these defense industry enterprises became more integrated with other advanced-technology enterprises for weapons development, including through joint R&D programs at universities and elsewhere; and (3) defense projects were subjected to competitive bidding among defense and other enterprises, based on price and performance. The restructuring of the Chinese defense industry, as related to the development of advanced technology industry, was summed up by Tai Ming Cheung in this way: “The divestiture of the PLA’s commercial operations took place at the same time as far-reaching reforms to curb and separate the state’s involvement in business was being implemented . . . This was a key pillar of Zhu Rongji’s overall efforts to develop a robust market economy.”⁴

⁴See Tai Ming Cheung, *China's Entrepreneurial Army* (Oxford University Press, 2001). The restructuring process is recounted in detail in Chapter 10 “The PLA’s Divestiture from Business, 1998–1999,” with the quote from p. 258.

This fundamental restructuring of the Chinese defense industry constitutes, in effect, a rejection of the failed Soviet model, in which military facilities operated by administrative decree in isolation from the rest of the economy, and movement toward the U.S. model of civilian defense companies competing on the basis of price and performance, with considerable interaction between primary defense contractors and many other advanced technology companies engaged in everything from R&D to dual-use components.

The decisions of 1997 to 1999 initially met with skepticism, if not dismissal, by U.S. and other foreign observers. This was a reaction based largely on the consistent failure of previous PLA reforms, and thus the cautious view that several years of credible implementation would be required before a positive assessment could be made. For example, a commentary from 1999 concluded, "Whereas the PLA's ambitions were clear, the gap between ambitions and capability could well be growing with the continuing advance in military technologies . . . What should be anticipated is a slow and sometimes erratic expansion of CMIC [Chinese military industrial complex] capabilities in technologies applicable to the areas viewed as critical in future warfare."⁵ A study by David Shambaugh in 2002 reached a similar conclusion: "Although the PLA has embarked on a systematic and extensive modernization program . . . a combination of domestic handicaps and foreign constraints severely limits both the pace and the scope of China's military progress."⁶

The Department of Defense's FY04 annual report to Congress on Chinese military power, issued in May 2004, devoted relatively little attention to reforms within the Chinese military industrial complex.⁷ Only 1 page out of 54 was devoted to the "Domestic Defense Industry," with the conclusion that "Chinese defense industries have taken near-term steps to address deficiencies, but Beijing realizes

⁵Bernard D. Cole and Paul H.B. Godwin, "Advanced Military Technology and the PLA: Priorities and Capabilities for the 21st Century," Wortzel, op. cit., pp. 209–210.

⁶Shambaugh, op. cit., p. 10.

⁷*Annual Report on the Military Power of the People's Republic of China*, at www.defenselink.mil/pubs/d20040528prc. The quotes that follow are from pages 28, 19, and 5, respectively.

that long-term modernization will take time and entail a variety of measures.” More specifically, with respect to the development of advanced technology, the report explained that “with few exceptions, such as ballistic missile research, development, and production, most of China’s domestic defense industries are inefficient and remain vulnerable to dependencies on foreign suppliers of technology.” The net assessment of the report is guarded and somewhat vague: “Self sufficiency will continue to be China’s long-term defense industrial goal, with plans to achieve weapon quality levels approaching those of the industrialized world within the next five to ten years. At best, we expect China to meet with uneven success meeting this goal.” This was nevertheless a far cry from the DOD assessment five years earlier of China’s being at least 20 years out-of-date across the board and a harbinger of what was to come in the 2005 report.

Despite this general hesitancy to assess positive results from the 1997–1999 restructuring, reports slowly began to emerge of basic change and significant improvements. A path-breaking paper by Evan Medeiros of the Rand Corporation, presented before the U.S.-China Economic and Security Review Commission in February 2004, lays out the changed circumstances:

In the last five years, China’s defense industry has become far more productive than in past decades. The defense industrial reforms implemented in the late 1990s, unlike the ones adopted in previous years, were substantial and have positively influenced the quality of China’s defense industrial output. . . . Chinese defense firms have improved their R&D techniques, production processes, and, thus, the quality of their output.

With respect to the operations of the largest defense industry enterprises, Medeiros continues:

These firms are not controlled by the Chinese military. . . . They are civilian entities under the authority of the State Council and its subordinate organ, the State Commission on

Science, Technology, and Industry for National Defense. . . . Current estimates of the amount of civilian production in each of the eleven large defense corporations range from 65 percent to 90 percent. . . . Thus, even though these enterprises are officially considered by the government as defense industrial firms, they are also primarily involved in producing civilian goods and services, and thus are intertwined with China's huge civilian economy. In addition, there are a growing number of firms that do not belong to the eleven defense-industrial conglomerates (especially in the information technology sector) which produce goods under contract for the military. The line between defense industrial firms and civilian firms in China is increasingly blurred.

More specifically:

In the last two years alone, Chinese defense factories have produced a variety of new weapons systems based on novel Chinese designs. Many are highly capable weapons platforms. The development of these weapons importantly reflects improvements in R&D techniques, design methods and production processes, especially compared to the 1980s and the 1990s. Not only are the new systems more advanced, but China's production of them is faster and possibly more efficient.

Medeiros goes on to explain how progress has been mixed among defense industry sectors and that systemic weaknesses remain. He speculates that the extent and effectiveness of competitive bidding for defense contracts is probably still limited. Nevertheless he concludes that "A new paradigm is needed to analyze China's defense industrial capabilities."⁸

Out of all of China's military branches, the linkage between accelerated military modernization and the advanced-technology

⁸Evan S. Medeiros, "Analyzing China's Defense Industries and the Implications for Chinese Military Modernization" (paper presented before the U.S.-China Economic and Security Review Commission, February 6, 2004). The quotes are from pp. 1, 3, and 9.

commercial sector is most intense for the navy. China has a 9,000-mile coastline and a long history as a maritime power dating back to the ninth century. Current naval strategy is to achieve short-term national security objectives related to Taiwan and the South China Sea and longer-term regional maritime dominance through both combatant and merchant vessels. By 2010, China plans to build about 70 modern surface ships and 20–30 submarines.⁹ Over the past four years, in a first for China, its shipyards produced four 7,000-ton destroyers, based on state-of-the-art stealth design and improved air defense and antisubmarine capability. China continues to upgrade its submarine fleet, launching the 094-class submarine ahead of schedule in July 2004. The U.S. Department of Defense judges the new submarine, which is capable of launching medium- to long-range nuclear missiles, to be a major improvement over China's older ballistic-missile submarines.¹⁰

The commercial maritime counterpart to China's navy is even more impressive, and is strongly supportive of the navy's modernization programs. China already has one of the largest merchant marines, and its shipbuilding industry will soon surpass that of Japan to become second to South Korea. In 2004, China State Shipbuilding Corporation, the country's largest shipyard, produced 3.6 million tons of ships, a 65 percent increase over 2003. In August 2004, the Huadong Shipyard contracted to build five advanced-design liquefied natural gas carriers, related to a policy requiring Chinese-built ships to participate in liquefied natural gas import contracts. Chinese merchant shipping is, of course, linked to the rapid rise in Chinese trade, with container traffic through Chinese ports growing 29 percent per year from 1998 to 2003. Shanghai is spending \$10 billion to expand its port so as to bypass Hong Kong and become the world's largest container port. The rise of China to become the dominant maritime nation in the Pacific, as the United

⁹See Bernard D. Cole, *Waterways and Strategy: China's Priorities*, (Jamestown Foundation, February 2005).

¹⁰Bill Gertz, "China Tests Ballistic Missile Submarine," *Washington Times*, December 3, 2004.

States was a century ago, has profound geopolitical as well as national security implications.¹¹

China's aerospace industry for short-range ballistic missiles is also improving its output in terms of accuracy and destructiveness, including the development of anti-ship cruise missiles with satellite-aided navigation. The development of eight new road-mobile DF-31 long-range missiles, reported in January 2005, goes beyond the predictions of the DOD FY04 report cited above.¹²

Most deeply integrated with the development of Chinese advanced technology industry are defense electronic systems for command, control, communications, computers, and intelligence, known for short as C⁴I systems. Thousands of kilometers of buried fiber-optic cable, connected by modern switches and routers, now provide secure communications to nearly every unit of the Chinese armed forces, while large computer networks are dedicated to operational command and control.

The Fiscal Year 2005 DOD Report

These various reports and assessments during 2004 and early 2005 went forward in parallel with a basic reassessment within DOD and the intelligence agencies. An early draft of the 2005 annual report to Congress on the "Military Power of the People's Republic of China" brought out differences within the U.S. government over the pace and degree of Chinese military modernization, and the final report was delayed four months until July. Differences were reported between long-standing analysts who tended to downplay China's performance, and outside experts and political-level officials who saw a greater threat. The resulting final text reflects these differences of view, and the conclusions are less clear than in previous reports. Nevertheless, the content includes important new

¹¹ See Tai Ming Cheung, *Chinese Defense Industrial Reform and the Navy* (Jamestown Foundation, February 2005) and *Financial Times*, December 17, 2004.

¹² Bill Gertz and Rowan Scarborough, "Inside the Ring," *Washington Times*, January 21, 2005, with reference to an assessment by the International Institute for Strategic Studies.

developments, compared with the previous 2004 report, and the 2005 report is on an entirely different track from the complacent “20-years-behind” mindset of the 1990s.

The epigraph for the 2005 report’s introductory chapter, “Understanding China’s Strategy,” is the familiar quote from Deng Xiaoping—“hide our capacities and bide our time”—which, incidentally, is characteristic of Chinese statements about its civilian advanced technology as well as its defense industry’s performance. The report clearly states the success of China’s recent defense industry reforms in its executive summary: “PLA modernization has accelerated since the mid-to-late 1990s in response to central leadership demands to develop military options for Taiwan scenarios.” It also admits the weakness of previous reports: “In recent years . . . China rolled out several new weapon systems whose development was not previously known in the West” (page 16). The 2005 assessment, however, remains largely doubtful about Chinese capability: “According to intelligence community estimates, China’s defense industries are inefficient and dependent on foreign suppliers for key technologies,” (page 22) and “China has not yet demonstrated the ability or innovation to go through a research, development, and acquisition process for a sophisticated weapon system without foreign assistance” (page 24). The net assessment is vague, however, compared to the previous reports, with no specific judgment about the narrowing of the gap with the United States. The closest to a precise comparative assessment is: “China will require until the end of this decade or later for its military modernization program to produce a modern force, capable of defeating a moderate-size adversary” (page 26). Aside from avoiding a comparison with U.S. forces, this assessment also raises the question of which potential moderate-size adversaries: Taiwan, South Korea, Japan?

The real value of the 2005 report is in its statements about specific Chinese defense capabilities and weapon systems under development. It is comprehensive, ranging from nuclear deterrence to logistics to command and control to weapon systems, and it places far greater emphasis on the mutually supportive interaction

between weapons developments in the Chinese defense industry and developments in advanced technology industry more broadly than did the 2004 report:

China is changing industrial organizations and business practices to encourage cooperation and collaboration among companies. These changes have implications across the domestic industrial base, but, significantly, indications are that they have enabled it to modernize and expand its defense industry across all sectors since the late 1990s to increase production capacity, develop and produce new or upgraded weapons and modernize production processes. (Page 22)

But how is this newly enabled ability to develop and produce new weapons consistent with the earlier statement that China has not yet demonstrated the ability to develop a sophisticated weapon system? The same question applies to specific weapon systems that the report describes as being developed and produced by Chinese defense and civilian advanced technology industries, with varying degrees of foreign assistance, particularly from Russia. According to the report:

China is qualitatively and quantitatively improving its strategic missile force. . . . The introduction of a new generation of SLBMs on China's new ballistic-missile submarine will provide an additional survivable nuclear option. . . . [Pages 28–29]

Beijing is in serial production of the domestic SONG-class submarine, acquiring more Russian KILO-class submarines, developing a new YUAN-class conventional submarine, and developing the Type-093 nuclear attack submarine for missions requiring greater at-sea endurance. . . . [Page 33]

The purchase of . . . SOVREMENNY Y-class destroyers from Russia helped equip the PLA navy with modern systems while China produces its own . . . LUYANG-class destroyers. . . . [Page 23]

The PLA recently increased amphibious ship production to address its lift capacity . . . and is organizing its civilian merchant fleet . . . which . . . could augment the PLA's organic lift in amphibious operations. . . . [Page 31]

China's air forces continue to acquire advanced fighter aircraft from Russia . . . China is also producing its own version of the Su-27 SK, the F-11, under a licensed co-production agreement with Moscow. Last year, Beijing sought to renegotiate its agreement and produce the multirole Su-27 SMK for the remainder of the production run . . . China is still developing the FB-7, an all-weather, supersonic, medium-range fighter-bomber to have an anti-ship mission. . . . In addition, China . . . has nearly completed development and testing of an upgraded FBC-1 long-range fighter/attack aircraft. . . . [Pages 4 and 32]

The type and number of modern SAMs and Beijing's inventory is increasing with the acquisition of Russian-made strategic SA-10 and SA-systems. China is reverse-engineering its own version of the SA-10, the HQ-9. . . . [Page 32]

China's logistics reform features the integration of the civil sector with the military procurement system. . . . The PLA will acquire common and dual-use items on the market. Increasing numbers of logistics functions will be outsourced, especially when civilian industry can perform similar functions at lower cost. [Page 34]

The final statement is the most pointed about the interaction of defense and civil industries, but the deepening integration appears to be widespread. For example, China's recent second manned space launch will have positive spin-off for various weapons developments. In any event, as recommended by Evan Medeiros, a new paradigm that would integrate fully the parallel development of the Chinese civil advanced technology and defense industries is in order. Since the Defense Department's FY05 report does not address Chinese military capability vis-à-vis the United States, while

new reports of military developments in China continue to surface, no attempt is made here at a net assessment. There is no question, however, that the DOD FY06 report, due in March 2006, and related to the DOD quadrennial review, needs to be read with special interest and care.

The Course Ahead

The rapid pace and highly dynamic content of the advanced technology transformation under way within Chinese civil and defense industries makes quantitative projections over a lengthy time period extremely suspect and difficult to justify on technical grounds. A shorter 5- to 10-year projection can be more precise and, in any event, this medium-term timeframe will have an important if not decisive impact on the future role of China in global affairs and on U.S. national interests in particular. The presentation here thus deals principally with the 5- to 10-year period ahead, with briefer, more general commentary on the longer term outlook of 25 years and beyond.

A critical judgment for any comparative assessment of Chinese civil and defense industry performance, current or future, is the basis of measurement, namely between the "exchange rate" and the "purchasing power parity," or ppp. The exchange rate measure simply takes the amount of goods and services produced at domestic yuan prices and converts the total into dollars at the official exchange rate. The ppp measure, in contrast, adjusts the values to take account of the generally much lower prices of comparable goods and services produced in China compared with prices in the United States. The differential at this stage is huge, in large part a reflection of the greatly undervalued yuan. For example, the World Bank, which is a principal source for ppp measures, calculates Chinese GDP in 2004 at 15 percent of the U.S. level using the exchange rate measure and almost 60 percent using the ppp measure. Likewise, Chinese GDP relative to Japan rises from about half

the Japanese level with the exchange rate measure to almost double the Japanese level with the ppp measure.

The choice of measure depends on what is being examined. For some international financial relationships, the exchange rate measure may be more appropriate. For international comparison of GDP, per capital income, and, of particular relevance to this presentation, R&D and defense expenditures, however, ppp is clearly the appropriate basis for measuring the quantities of comparable goods and services produced in China compared with the United States and other countries. The relative levels of R&D presented in Chart 1, for example, are on a ppp basis, from an Organization for Economic Cooperation and Development source which refers to the exchange rate measure as “hardly a plausible measure.”¹³

A final comment about the ppp measure is that it is an estimated figure, most readily available for GDP, and rarely calculated for industry or functional sectors, such as for R&D and defense expenditures. Ppp estimates are also difficult to project out more than a few years because the ppp differential with the exchange rate measure tends to decline over time for high-growth economies such as China.¹⁴ Nevertheless, in view of the massive current differential for China and the ppp as the appropriate analytic measure for the principal relationships being examined here, it is fitting to heed the sage advice of John Maynard Keynes that it is better to be approximately right than precisely wrong. In other words, ppp is the measure of choice, however approximate the results.

With this lengthy yet critical introduction for the measurement issue, this section deals first with the likely course over the next ten years for Chinese advanced technology civil industry, then provides a similar, although less detailed, outlook for defense industry and military modernization, and concludes with a broader commentary

¹³ *An Emerging Knowledge-Based Economy in China?*, Indicators from OECD Databases (OECD, March 2004), p. 6.

¹⁴ A comparable problem exists for projections using the exchange rate measure to the extent exchange rates change over time. For example, if the yuan should appreciate 50 percent over the next several years, there would be a one-time increment of 50 percent in dollar-denominated GDP, defense expenditures, etc., as calculated with the exchange rate measure.

on China, the United States, and global relationships 25 years into the future.

The Ten-Year Course for China's Advanced Technology Industry

The first 10 years of rapid development of Chinese advanced technology industry, through 2005, were characterized by annual growth of 9 percent for GDP, 15 percent for industrial production, and 20–30 percent for exports, over 90 percent of which were manufactures. In the process, Chinese industry was transformed toward a high-technology industry orientation, with much higher R&D and engineering content, and with foreign companies the principal engine for export-oriented growth. The basic question posed here is whether this same trajectory will continue for the 10 years ahead, and the short answer is “no.” A major restructuring of the Chinese economy will take place, including the role of advanced technology industry within it. Within this changing structural context, however, the development of advanced technology industry, in terms of rapid growth and enhanced technological innovation, will almost certainly continue.

The “almost certainly” caveat refers to the political trajectory of China. A major political crisis in China, including widespread violence and loss of control by the government, could bring the overall economy, including advanced technology industry, to a halt or near collapse. This is judged to be extremely unlikely, however, and although political stress and change will occur over the coming 10 years, with adverse and disruptive impact on segments of the economy, the impact on advanced technology industry should be relatively small. Advanced technology industry is the crown jewel of economic growth for all economic interests in China, and the financial resources for continued growth in education, R&D, and investment, are readily available. Moreover, the directions of economic reform, which are the subject of the remainder of this section, should be generally supportive of continued rapid growth in advanced technology industry, albeit in somewhat different directions.

Major structural adjustment in the Chinese economy is inevitable over the coming 10 years, with major developments highly likely within five years. Three interrelated developments will have the principal impact on the course of economic events, and on advanced technology industry in particular: financial sector reform, exchange rate adjustment, and demand shift from export to domestic markets.

Financial sector reform. Virtually all observers point to reform of the Chinese financial sector as a top priority for ensuring continued high growth in the economy. Large state banks are heavily laden with nonperforming assets, especially in state-owned enterprises, while operations are plagued by weak management, political pressures, and corruption. Banking reform is, in fact, well under way, especially for smaller banks, which will be required to meet global capital adequacy standards by 2007 and which were recently allowed more freedom to price loans to reflect the risk profile of borrowers. Foreign banks also are being permitted to expand operations in China, related to WTO commitments, which will make the banking sector more efficient and competitive. Broader financial reform, including for equity and foreign exchange markets, is also under way.

Financial reform will have a positive impact on investment and job creation throughout the Chinese economy—although advanced technology industry has suffered relatively less than other sectors from existing weaknesses in the financial system. The foreign companies that are the driving force for the sector obtain their financing from international banks abroad, while larger Chinese firms, such as Lenovo and Huawei, have various sources of finance other than high-cost Chinese banks. The largest beneficiaries of banking reform will be smaller private Chinese firms, which until now had been at a major disadvantage due to their dependence on Chinese banks. They will become more successful and competitive as a result. The rapid growth of venture capital firms in China since 2000, directed largely at smaller company startups, is an indication of the positive impact banking reform could have on advanced technology

industry. Better regulated equity markets also should be of benefit to Chinese firms of all sizes.

Exchange rate adjustment. The most important issue facing China today in terms of a direct and pervasive impact on the economy is exchange rate adjustment. The Chinese global trade surplus will quadruple in 2005 to about \$130 billion, with a corresponding current account surplus of \$170 billion. This skyrocketing external surplus is the cumulative result of a decade of rapid development and high-productivity growth in export-oriented advanced technology industry, described in the first part of this paper. It also means that earlier estimates that the yuan was undervalued by 25–50 percent need to be raised even higher. Growing international pressures, as well as Chinese self-interest, dictate a substantial revaluation of the yuan of at least in the 25–50 percent range over the coming five years.

The impact of such revaluation on advanced technology industry will be mixed, and the outcome will be dependent on structural adjustments elsewhere in the Chinese economy. A higher yuan exchange rate will at least moderate, if not reverse, the growing trade surplus, meaning slower export growth and greater import competition. The sharpest adverse impact, however, will be on Chinese labor-intensive, low technology industries, such as textiles and apparel and footwear. The yuan's revaluation will accelerate the phase-down of these industries, already under way in relative terms, as happened in earlier decades in Japan, South Korea, and Taiwan. For advanced technology industries, relative costs will also rise in most respects, although yuan prices for imported raw materials and petroleum will decline, which will, among other things, restrain inflationary pressures. One important result will be an industry structure, including trade, even more oriented toward advanced technology industries.

A structural shift from exports to domestic demand. This fundamental restructuring of the Chinese economy follows directly from the impact of the yuan appreciation and other reforms, and would be

the Chinese contribution to the necessary global adjustment in current imbalances, centered on the rising Chinese external surplus and the U.S. deficit. For China, in order to maintain a high rate of GDP growth and job creation, the adjustment involves a shift away from export-driven growth to faster growth within the Chinese economy. This should be welcome news for the Chinese people, as financial resources are redirected from central bank purchases of foreign exchange, as a consequence of the growing current account surplus, to domestic needs, including education, health care, infrastructure, energy development, and the environment. This restructuring, in fact, is the basic substance of President Hu Jintao's development strategy for 2006–2010, announced in October 2005, as having "significant historic status as a transition period."¹⁵

The net impact of this transition on advanced technology industry should be balanced, to the extent advanced technology companies shift their strategies more heavily toward the domestic Chinese market, which many are already doing. The potential domestic growth sectors of health care, infrastructure, energy, and the environment, all involve heavy demand for advanced technology products and related services, while higher growth in consumer demand, from a more highly educated and affluent middle class, provides the basis for rapid growth in technology-intensive consumer products.

These will be the basic lines of structural adjustment within the Chinese economy over the coming five to ten years. The adjustment will have its transitory adverse impact on particular sectors and regions, and will require overall astute management by the government. The almost certain prospect for the advanced technology sector, however, is a continued high-growth path in quantitative terms, together with continued movement up the ladder of technological innovation and application.

The net result will be for China to achieve the status of an advanced technology superstate in ten years, by 2015. China will be

¹⁵ *The Wall Street Journal*, October 12, 2005.

the number one trading nation, with the large majority of exports in advanced technology products. The overall quantity of goods and services produced, or GDP, appropriately measured on a ppp basis, is about 60 percent of the U.S. level in 2005. Projecting 7 percent annual growth in China and 3 percent in the United States, Chinese GDP will reach 85 percent of the U.S. level in 2015; projecting a continued 9 percent Chinese growth would result in a slightly larger Chinese GDP by 2015. As for technological innovation and application, the high growth in financial resources committed to R&D and education should continue, while foreign investment and the strongly stated Chinese policy to nurture Chinese companies with their own intellectual property and brand names, should provide substantial results in all advanced technology sectors, including information technology, telecommunications, pharmaceuticals, biotechnology, and nanotechnology.

*The Ten-Year Course for China's Defense Industry
and Military Modernization*

A ten-year projection in this area is more difficult than for civil advanced technology industry because there is less hard information on current performance and greater uncertainty about Chinese decisions that will influence the outcome. The best that can be offered are indicative comments on the two basic parameters that establish the framework for military modernization—the new paradigm for defense industry and the level of defense spending—followed by similar observations about the individual services—the navy, air force, and army—and the overarching functional category that can be called “information technology and telecommunications weaponry.”

The new paradigm for defense industry. This was discussed earlier in terms of the integration of defense and advanced technology companies within a more competitive, results-oriented policy framework. This new paradigm—in effect, the American model—has produced significant positive results over the past several years, and will almost

certainly be strengthened and broadened in scope in the decade ahead, with corresponding further improvements in performance.

The level of defense spending. This gets immediately to the issue of measurement: exchange rate versus ppp. The Chinese report only exchange rate–calculated figures. The ppp measure, however, is clearly the appropriate measure conceptually, although there are no available targeted estimates of the ppp differential for defense industry. For overall GDP, the Chinese ppp estimate produces a level of comparable output three times larger than that using the exchange rate measure, and until a defense industry estimate is developed, this is the only available approximation to use to avoid being “precisely wrong.”

The DOD FY05 report cites the Chinese exchange rate–based official level of defense expenditures of \$30 billion in 2005, and then adjusts for other defense-related sources of spending, which results in an estimated total two to three times larger than the official level, or \$60–\$90 billion. If a tripling adjustment is then made to approximate the ppp-based level of spending, the 2005 level rises to \$180–\$270 billion, or about half the level of U.S. defense expenditures. Projecting these 2005 levels ahead ten years, based on a continued 10 percent increase in expenditures by China and 3 percent by the United States, results in a Chinese level of defense spending in 2015 at about 75 percent of the U.S. level.

These current and projected levels of Chinese defense spending, however approximate, clearly indicate relatively large Chinese expenditures, steadily rising toward one-half to three-quarters of the U.S. level. In any event, China will be the number two global military power by 2015, if not sooner. Moreover, since Chinese military deployment will be overwhelmingly in Asia, while U.S. deployment is global in scope, the defense spending relationship within Asia, at least in comparable quantitative terms, will be on a parity with, if not in favor of, China.

Chinese and U.S. force structures are not symmetric, however, and the balance of capabilities within an overall parity for defense

expenditures directed toward Asia needs to be examined service by service, weapon system by weapon system. Relative force structures also need to be related to Chinese objectives for military deployment. Chinese deployment up to this point has focused predominantly on Taiwan, in terms of potential military intervention and confrontation with U.S. forces. To the extent China broadens its military mission, for example to defend Chinese trade—particularly oil tankers transiting the Malacca Strait, a different projected force structure would result. These considerations are highlighted in the following commentary on the ten-year outlook within the respective Chinese military services and weapon systems.

The Chinese navy. The Chinese navy is projected to grow substantially in quantitative and qualitative terms over the coming ten years. The number of ships is expected to rise to at least 300, while the U.S. Navy declines in size from 290 to less than 250 ships. Chinese qualitative modernization is also likely to be substantial, enhanced by the integration of newly constructed naval and commercial shipyards. The relative military capability of specific ship models, however, especially submarines and destroyers, is difficult to predict based on current available information. There is also a big question as to whether China will buy or build aircraft carriers, which it has considered but thus far not undertaken. The carrier decision is related to the question of a broader mission to defend shipping through the Malacca Strait, which would require carrier-based air support. An even broader regional naval mission, likely including blue water port facilities in Myanmar in the Bay of Bengal, also would entail changes in fleet structure toward longer distance vessels and greater air and supply capabilities.

The Chinese air force. The Chinese air force also will grow substantially in quantity and quality over the coming ten years, although the pace of modernization has lagged behind the navy up to this point. The recent beginnings of a commercial aircraft industry in China, first through production of smaller commercial jets to compete with Canadian and Brazilian aircraft companies, and further

through plans for participation in Airbus production of larger aircraft, should have spillover impact on military aircraft design and production. Individual models under development and production, as cited in the DOD FY05 report, would need to be examined in terms of what their capabilities will be in five or ten years compared with the anticipated upgrading of U.S. aircraft. As for broadening the Chinese military mission in Asia, aircraft needs will also change to include carrier-based planes and longer-range aircraft.

The Chinese army. The projected path ahead for the Chinese army is for a reduction in the number of personnel, currently more than one million, together with upgraded command and control systems and weapons. The modernization trajectory will likely be slower for the army than for the navy and air force, but hard analysis is lacking. A priority for upgrading small-sized elite units is likely, based on Chinese observation of highly effective U.S. forces in Afghanistan and Iraq. In any event, by the nature of likely Chinese military objectives in Asia, and vis-à-vis the United States in particular, the navy and air force will be the priority services for upgraded weapon systems and modernization.

Information technology and telecommunications weaponry. The development and application of more and more advanced information and telecommunications technologies are at the center of both the Chinese economic and defense strategies, with pervasive overlap. For the civil sector, Premier Wen Jiabao, during an April 2005 visit to India, predicted: "If India and China cooperate in the information technology industry, we will be able to lead the world . . . and it will signify the coming of the Asian century of the information technology industry." John Chambers, CEO of Cisco, the largest U.S. manufacturer of computer equipment, told a Beijing audience in September 2004: "China will be the information technology center of the world." The application of more advanced information technologies will be part of all Chinese weapon modernization projects, and are at the core of missile launch and satellite observer capabilities, as well as for "cyber warfare" in terms of disabling the

adversaries' communications and control systems. These are all areas where Chinese capability will move forward over the coming ten years, although it is not clear how this will measure up to counterpart advances on the U.S. side. A specific focus in this area will, or at least should be, the Chinese ability to track the location of U.S. aircraft carrier battle groups and to threaten them with missiles and cyber warfare.

This is the broad picture of the likely course of Chinese defense industry and military modernization over the coming ten years. There are some parallels with the U.S.-Soviet relationship in the late 1940s and early 1950s, as the Soviet Union rose to become the second global military power. Two fundamental differences, however, distinguish the current U.S.-Chinese relationship. The first is the integration of Chinese civil and defense industries, including the major role of foreign companies in the development of Chinese advanced technology industry. The Soviet defense industry, in contrast, was largely isolated from the rest of the Soviet economy and even more so from international trade and investment. The second difference is the U.S.-Soviet concentration of resources on conventional ground forces on both sides, within the European context. For the U.S.-China military relationship, again in sharp contrast, the navies and air forces are the dominant services in play, plus a whole new world of satellite- and cyber-related warfare.

Twenty-Five Year Outlook

Far-reaching changes in the U.S.-China relationship with respect to advanced technology industries and defense modernization have been sketched out for the coming ten years, but where will this all go over a longer timeframe of 25 years and beyond? This is a far more difficult question to answer, even in approximate form. The pace of change in the world, driven by the amazing scope and intensity of technological innovation under way, is without historical precedent. One result is that the practical time span for "futurology" studies has contracted. An earlier 25-year transformation with

respect to technology development is now condensed, perhaps to ten years, while a 25-year look ahead involves what earlier was the very long-term 50-year time horizon and beyond. In this context, a few general comments about the 25-year prospect, including contingencies likely to alter the current course, are offered in conclusion.

The 10-year outlook is for China to emerge as an advanced technology superstate and counterpart to the United States and the EU, to form a tripolar grouping of advanced technology regional hegemonomies driving the global economy.¹⁶ In parallel, China will rise to become the number two global military power, approaching a balanced relationship with the United States across the Pacific. The null hypothesis projected out 25 years would be for this relative rise in Chinese economic and military capability to continue, with the likelihood that China will become the number one global economic power and dominant economic hegemon within East Asia, while steadily rising toward global military parity with the United States. This trajectory of current trends, however, can be influenced substantially if not critically by a number of contingencies that simply cannot be predicted. The four most important such contingencies are:

(1) *Further technological innovation and application.* The continued or accelerated pace of technological innovation that has occurred over the past 20 years can and probably will change the course of international relations during the coming 25 years in fundamental ways. For example, a hydrogen-driven automobile and large-scale, commercially viable energy production from tar sands and renewable energy sources would strengthen the relative economic positions of the United States and China, while diminishing greatly the economic role of the Middle East. Potentially most threatening, more readily adaptable technologies to develop weapons of mass destruction by rogue states and terrorist groupings would cast a dark cloud over the entire world order, and greatly

¹⁶ See Preeg, *op.cit.*, Chapter 11, for a full presentation of the projected tripolar advanced technology regional hegemony relationship.

deepen U.S.-Chinese mutual interests, as the two principal military powers, to contain and destroy such threats.

(2) *The rise of India as the fourth advanced technology superstate.* This would expand the emerging tripolar advanced technology superstate relationship to a four-way structure, with the likely rise of India as a prominent military power as well. India has undertaken a number of reforms in recent years to move in this direction, but major barriers remain, and the 25-year timeframe will likely be more definitive for the outcome than the current 10-year outlook. If India should rise to such advanced technology and military superstate status, there will be a fundamental impact on U.S.-Chinese relations, as the growing Indian engagement is integrated into international economic and broader foreign policy relationships, especially within Asia.

(3) *Political change within China.* This will probably be the most important contingency for any 25-year projection of global relationships and the role of China within them. There will almost certainly be major political change within China, as the population becomes more and more educated and affluent, the economic power structure moves more and more toward the private sector and becomes internationally oriented, and communications capabilities expand. A good case can be made that the direction of change will consequently be toward democratization and the rule of law, and thus a deeper mutuality of interests between China and the United States will arise. Other scenarios, ranging from a more nationalist dictatorship, supported by a strengthened military, to political crisis and civil war, however, also are discussed.

(4) *The U.S. response to all of the above.* U.S. foreign policy and domestic economic strategies since the end of the Cold War have been ill-defined. Foreign policy over the past several years has focused overwhelmingly on the war against terror and democratization of the Middle East. Domestic policies have been directed toward various fiscal and regulatory objectives, but, of relevance here, the Chinese challenge to long-standing U.S. technology leadership has had a generally low priority. For example, during con-

gressional hearings to make absolute cuts in the FY04 budget for the National Science Foundation, China was never mentioned. One startling result of the recent trend in business-related policies is that U.S. industry now spends more on tort litigation than on R&D.¹⁷ This could change, with a new sense of national purpose and accompanying programs to maintain the international lead in advanced technologies, as happened in the 1950s in reaction to the initial Soviet nuclear tests and the Sputnik space launch. Such a change in U.S. policy priorities could have a substantial impact on the projected U.S.-China relationship over the coming 10 to 25 years, although thus far the issue is only beginning to be addressed.¹⁸

There is certainly a clarion call from China challenging U.S. advanced technology leadership, with important commercial, foreign policy, and national security implications. The U.S. response, at some point, will have to be addressed more seriously. One major dimension of such a reassessment, however, that comes closest to a 1.0 probability, is that over the coming 25 years—if not already—China will be the number one, most important U.S. bilateral relationship. By far.

¹⁷ *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, October 2005), p. 18.

¹⁸ A first cut at such a comprehensive strategy and program of implementation for maintaining U.S. technology leadership in the world is contained in Preeg, *op.cit.*, Chapters 7–10.

China's Evolving Military Juggernaut

by
Mary C. FitzGerald

The Revolution in Military Affairs (RMA)

In the aftermath of the stunning victory over Iraq in Desert Storm in 1991, a senior Russian military official declared: “We have seen the future—and it works.” A senior Chinese official dubbed it “World War 2.5.” For both Russia and China—at times uneasy allies—Desert Storm generated their current codified “strategic partnership,” whose nucleus consists of a multibillion dollar arms deal.

The Chinese, caught like a deer in the RMA headlights, quickly echoed Russian lessons from Desert Storm. The Chinese air force switched its philosophy from defense of national territory to both offense and defense. The navy's emphasis shifted from coastal defense to defense in offshore waters. The army's structure changed from no group armies to integrated group armies. The missile forces reorganized from nuclear to nuclear plus conventional units. And manpower was reduced by 1 million men in order to invest in high-tech weapons and systems that would bring the Chinese modern information warfare capabilities. Major General Wang Baocun has declared:

The current revolution in military affairs is the greatest, deepest, and broadest global military transformation that has ever occurred in mankind's history. Its core idea is to convert mechanized troops that were suitable for conducting mecha-

nized warfare in the Industrial Age into information-based troops that are suited to conducting information-based warfare in the Information Age.¹⁹

Chinese military scientists assert that when Marshal Ogarkov proposed the brand-new concept of the “revolution in military affairs,” his thinking was clearly ahead of his time.²⁰ This time, technology is again running ahead of military thinking. The thinking that tries to rely on one or two new and advanced technology weapons as “killer weapons” that can vanquish the enemy—read “absolute”—is now obsolete. Whenever something reaches an ultimate point, it will turn in the opposite direction. According to Chinese experts, the new RMA is bound to generate a new revolution in military theory, and this revolution in turn is bound to generate a new RMA.

The Chinese are endeavoring to transform their armed forces from a numerically superior to a qualitatively superior type: from a manpower-intensive to a technology-intensive type.²¹ Regarding the modernization of armaments, China has adopted the practice of conducting less production and more R&D, “pursuing small numbers and high standards,” and “storing fewer armaments and more technology,” discarding the attrition war strategy for weapons procurement. Accordingly, the PLA will focus on the acquisition of “new-concept” arms and military equipment for the Second Artillery, the air force, and the navy.²²

According to General Xiong Guangkai, deputy chief of the PLA General Staff, the “revolution in military affairs” was first translated into Chinese as the “military revolution.” With a deepening under-

¹⁹ Wang Baocun, “The Future Warfare for Which the U.S. Military Is Making Preparations: Network-Centric Warfare,” *Zhongguo Junshi Kexue* (hereafter cited as *ZJK*), October 20, 2002, pp. 133–143.

²⁰ Senior Colonel Qiao Liang and Senior Colonel Wang Xiangsui, *Unrestricted Warfare: Assumptions on War and Tactics in the Age of Globalization* (Beijing: PLA Literature Publishing House, 1999), pp. 10–33 [hereafter cited as *UW*].

²¹ “China’s National Defense in 2000,” *Xinhua*, October 16, 2000.

²² “Assessment of the 1998 Situation of China: Military Affairs,” *Ch’uan-Ch’iu Fang-Wei Tsa-Chi*, May 1, 1999, pp. 34–43.

standing of the matter and specifically considering China's realities, however, "We thought that it would be more precise to translate this term into Chinese as "military changes."²³ These "military changes" include the following:

- The percentage of "intellectualized" weapons and equipment went from 8 percent in Desert Storm to 35 percent in Allied Force to 90 to 98 percent in Iraqi Freedom.
- Armed forces are now small in quantity but highly trained.
- Command and control are automated.
- Battlespace is multidimensional. With the widespread application of science and technology in the military field, the battlespace is expanding from the traditional three dimensions of land, sea, and sky to the five dimensions of land, sea, sky, space, and electromagnetism.
- Several recent local wars demonstrate that war is now "systematized." The waging of war under high-tech conditions represents a confrontation between systems, while coordinated fighting by various service arms has matured into a combined operation by various service arms.

China's 2004 white paper on National Defense includes the first official references to the RMA ever published in any Chinese political document.²⁴ Senior Chinese military officials have described the key characteristics of the current RMA as the following: (1) advanced technology and weapons systems constitute the material base (the "hardware") of the RMA; (2) innovative military doctrine serves as its soul (the "software"); and (3) scientific adaptation of the organizational structure should evolve as the "specific embodiment" of the first two. While each of these factors is essential, the RMA can occur only if all three of them are integrated.²⁵

²³ General Xiong Guangkai, "On New Military Changes," *Jiefang Ribao* (hereafter cited as *JR*), May 30, 2003.

²⁴ "Full Text: China's National Defense in 2004," *Xinhua*, December 27, 2004.

²⁵ Zhu Guangya, "Current Engineering Technology Development and the New Revolution in Military Affairs," *ZJK*, February 20, 1996.

Integration is manifest in the organization of the armed forces, first of all in the blurring of distinctions among the various branches. In future warfare, traditional command systems will be incapable of responding to exigent requirements and must “smash through” the inherent divisions between branches—thereby organizing an integrated force. Second, integration is occurring through the blurring of divisions within the various service branches. The armed forces of developed nations are hurriedly trying to organize mixed detachments composed of different branches. Some Chinese scholars label this a “revolution in relationships” or a “revolution in structures.”

The evolving mandates of the RMA also have generated a “revolution in combat systems” based on the transformation from mechanized to informationized armed forces. Society is confronting “the third sea-change in its history”—the Information Revolution. The militaries of developed nations are uniting C⁴ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) systems, smart weapons, and digitized equipment to form “one grand military system.”

According to Chinese military scientists, preparations for twenty-first century warfare can be divided into the “tangible” and the “intangible.” Tangible preparations primarily include weapons procurement, organizational reform, and infrastructure development. Intangible preparations refer mainly to theoretical and tactical innovation. The two are complementary. Under conditions of the current RMA, however, “intangible” preparations clearly drive and determine the “tangible” preparations. If theoretical and tactical innovations proceed from muddled or self-contradictory premises, then the funds spent on tangible preparations may be wasted. All countries thus make “intangible” preparations their priority.²⁶

While war is a contest in material forces, say the Chinese, it is also a contest in theory and intelligence. With an advanced military

²⁶ Fang Fenghui, “Preparations for Military Struggle Assume New Importance in the Age of High-Tech Local Warfare, May Avoid War,” *Jiefangjun Bao* (hereafter cited as *JB*), August 27, 2002, p. 6.

theory, a country can achieve “the commanding heights of the future battlefield.” But actual combat provides the only standard for effectively testing the applicability, advanced nature, and operability of any military theory. Theoretical innovation must therefore master both the modern and future battlefields; the required weapons procurement, organizational reform, and infrastructure development will then emerge automatically. Most importantly, military-theoretical innovation directly drives the process of preparing for future war, so that the process perpetuates itself forever with positive results.²⁷

Chinese military scientists note that the marriage of theoretical innovation and technological breakthrough has made innovation revolutionary. Theoretical innovation is no longer partial, particular, or based on low-quality repetition. Instead, innovation unleashes powerful forces at breakneck speed and triggers “destructive reconstruction” of obsolete theoretical systems. The new military revolution “has propelled the PLA, which has been slow to develop, to the crest of change.” But those who are slow to develop are not necessarily the ultimate losers.

Jiang Zemin, then chairman of the Central Military Commission, emphasized that China must adhere to the long-term principle of driving PLA modernization through military-theoretical innovation. Technology is an activity of invention, but theory alone is an activity of innovation: only theory can determine the choice and application of military technology. The more complex the technological system, the greater the need for scientific, future-oriented theoretical guidance. In designing a military for the twenty-first century, China must ask not “What can be done?” but “What must be done?”

As a new RMA evolves, it is invariably linked to a criss-cross set of military reforms. Laterally, an RMA requires military transformations in various aspects, such as the foundation for a systemic

²⁷ Fan Zhenjiang, Zhao Tianliang, and Zhang Guoyu, “Military-Theoretical Innovation Is Needed for Preparing for Information War, High-Tech War,” *JB*, January 21, 2003, p. 6.

transformation. Longitudinally, it requires military reforms to occur in various phases, as the ladder for the military's evolution as a whole. Many developed nations, including China, are accelerating the tempo of their military reforms—all of which are essentially concrete measures for implementing the informationized military revolution.²⁸

Because military revolution itself contains a series of uncertainties, its initial manifestation and ultimate outcome may be inconsistent. There is no guarantee that a superior country will always sustain its position in a military revolution. If an inferior country adopts effective measures for “leaping over” intermediate phases, then it can “catch up from behind,” narrowing the gap between forerunners and itself and even obtaining certain advantages in some critical areas. The value of military revolution is therefore both absolute and relative.

To date, the military revolution in the PLA has included four dimensions. First, the PLA has “worked hard to develop military theories.” It has concentrated on studying the trends in the global military revolution, especially by probing the characteristics and patterns of high-tech wars. It has studied the strategies and tactics that would enable the PLA to defeat an enemy given the Chinese military's existing weaponry. Second, it has “done its best” to improve the military's weaponry. Third, it has “actively but cautiously” proceeded with military organizational reforms. Fourth, it has elevated military education and training to a “strategic position,” training troops in science and technology in order to enhance their overall combat capabilities. The key to meeting the challenge of the global military revolution is in qualified personnel: “We would rather have the qualified personnel wait for the weapons than the other way around.”²⁹

Zhang Zhaozhong, head of the Chinese National Defense University's Military Science, Technology, and Armaments

²⁸ Liang Biqin, “Rethink on the Issue of New Military Revolution,” *JB*, January 1, 2002, p. 6.

²⁹ Wen Tao, “China to Speed up Military Transformation with Chinese Characteristics, Push for Informationization of Armed Forces,” *Ching Pao* (hereafter cited as *CP*), no. 311, June 1, 2003, pp. 40–42.

Department, has bluntly described the current PLA dilemma as follows: “We still have one foot in the agricultural age and one foot in the industrial age—with our eyes on the information age.” Given this situation, the PLA could choose from among the following three options for implementing military reform:³⁰

- Option 1: The PLA could concentrate all resources on mechanization and then “make a push” for informationization after mechanization has been completed.
- Option 2: The PLA could postpone mechanization for now and rush to informationization.
- Option 3: The PLA could accelerate informationization of the military even as it intensifies mechanization.

In considering the pros and cons of these options, Chinese military experts have concluded that the next 10 to 15 years present a critical strategic window of opportunity for the PLA. During this window an unprecedented digital divide will appear between the developed and developing countries, and the gap between informationization and mechanization will become even wider. The PLA cannot wait until mechanization is completed and thereby miss this window, for the price of a future catch-up in informationization will be too high. However, if China plunges all of its resources into informationization while still lacking mechanized power, traditional firepower, and such combat platforms as tanks, airplanes, and ships, the PLA will still lack combat capability.

Therefore, say the Chinese, the best choice is clearly for the PLA to implement mechanization and informationization simultaneously, with a special emphasis on the latter. By using informationization to drive mechanization, China could skip some stages of mechanization and directly enter the stage where mechanization merges with informationization—thereby achieving a “leaps-and-

³⁰ *Ibid.*

bounds” brand of development. Chinese military experts argue, “As we produce one generation, research and develop one generation, and pre-search one generation, we must move on to explore one generation.”

This “leaps-and-bounds” theory, which has become the linchpin of Chinese military development for twenty-first century warfare, is currently reflected in a “Three-Step Strategy” for the PLA.³¹ Step one of this strategy calls for China to have developed a host of advanced weapons and a system for not only deterring but also waging a war in high-tech conditions by around 2010. Step two calls for China to accelerate the qualitative improvement of weapons systems and further optimize the organizational structure of the troops by around 2020. Indeed the “heart” of the current RMA is said to consist in transforming the PLA’s force structure. Precision-guided munitions revolutionize above all a military’s organizational structure (size, unit tables of organization and equipment, etc.). For example, functions that were previously performed by several troops or troop-arms can now be accomplished by one soldier using high-tech equipment, significantly reducing the size of the armed forces. Considering trends in the global RMA, the PLA’s “ponderous” size and “lopsided” organizational system stand out as major problems. Finally, step three calls for China to achieve the informationization of national defense and the armed forces by around 2050.

In other words, the initial period will focus on “contingencies”—ensuring that the PLA can win those limited wars that occur in high-tech conditions. The next period will consist of “skipping and passing”—skipping some of the more traditional stages in weaponry development and swiftly raising the level of weapon informationization by vigorously developing electronic information devices. The final period will find China “making a dash for the information age.”

The PLA’s “three-step-sprint” conforms greatly with the pace of Chinese economic development overall. China’s GDP is expected to

³¹ *Ibid.*

double between 2000 and 2010. The defense budget continues to increase annually by double-digit margins. Against this backdrop, the prospects for the PLA's swift emergence as a peer competitor in the RMA are said to be "bright."

In March 2003, then Chairman Jiang formally called for "an RMA with Chinese characteristics." According to some Chinese military leaders, his address to the PLA delegation of the 10th National People's Congress demonstrated that China's resolve to implement the RMA "has entered a new stage," and that Chinese military development "is facing a major strategic transformation." General Xiong Guangkai, deputy chief of the PLA General Staff, has explained that Jiang's concept of a Chinese RMA calls for China to analyze and incorporate the experiences of various countries that have implemented RMA-generated reforms and actually waged local wars in high-tech conditions—but without mechanically copying their patterns of military reform or lessons from high-tech wars.³²

General Xiong Guangkai also has summarized the primary components of "an RMA with Chinese characteristics." Since information technology must drive the PLA's mechanization, China must use computerization to drive mechanization and vice versa. The military information technology effort primarily includes the vigorous development and enhancement of computerized weapons and equipment, digitized forces, and the digitized battlefield. A critical Chinese characteristic lies in the military-civilian production nexus—and above all the traditional superiority of a people's war in high-tech conditions.³³

According to Major General Ku Guisheng, deputy dean of China's NDU, the new global RMA epitomizes a trend of accelerated development, which is manifested in four main dimensions.³⁴ The first is innovations in military theory. For example, Russian military expert General-Major Vladimir Slipchenko has proposed the theory

³² Ibid.

³³ Xiong Guangkai, "On New Military Changes," *op. cit.*

³⁴ Yang Fan, "People's Liberation Army Rousing Itself to Overtake Others," *Wen Wei Po* (hereafter cited as *WWP*), 23 August 2003.

of “non-contact warfare.” Other experts have proposed the theories of “network-centered warfare,” “informationized warfare,” “space warfare,” etc. The second is an evolution in the shape of warfare. The mechanized warfare of the industrial age is metamorphosing into the informationized warfare of the information age. Information technology is generating qualitative leaps in the performance of weapons and equipment, changing traditional units into digital units, integrating combat power into a system, and engendering automated/real-time command and control. The third is the development of military technology and equipment. “New-concept” weapons with different mechanisms for killing and injuring will emerge continually. These include infrasonic wave weapons, electromagnetic pulse weapons, laser weapons, climatic weapons, etc.—which often trigger a destructive effect second only to that of nuclear weapons. The fourth is revisions in organization and structure. The pagoda-shaped structure of layers of command for corps, divisions, brigades, regiments, and battalions has changed in favor of highly effective, flexibly mobile, network-type mechanisms and structures.

Spurred by the new RMA, the organization and structure of armed forces are continually undergoing changes—whether great or small, fast or slow. Such changes are visible first of all in the downsizing and structural optimization of the overall scale of armed forces. Second is the modularization and integration of the composition of units. Commanders can select different modular components and create integrated combat units based on different combat missions. Third is a command-and-control mechanism that is networked and real-time, establishing digital communications links among different organizational units and achieving networked, real-time command. And fourth is ensuring that the mechanism is integrated and informationized.

All of these developmental trends in the new global RMA provide the PLA with “five points of enlightenment:”³⁵ (1) the precursor

³⁵ Ibid.

is updating “our” point of view; (2) the core is systems integration; (3) the support is transformation of organization; (4) the key is development of talented people; and (5) the foundation is embodiment of special Chinese characteristics.

According to Chinese military scientists, various countries are currently developing all kinds of intelligent robotics, nanotechnologies, and space technologies. When these technologies reach maturity and are widely applied to the military sphere, then other RMAs may occur in the later stage of the current informationized RMA. These new RMAs could include robotized, ultramicrotechnological, “extraterrestrialized,” or even a newer type that combines all of these types.³⁶

As cerebrology, biology, physics, chemistry, mathematics, electromagnetism, and related integrated applied technologies develop, the confrontation between two enemies may develop into a direct confrontation that deeply penetrates the mental activities of both sides. The human brain and the “electronic brain” (the Chinese equivalent of “computer”)—including laser, quantum, and neural network computers—also become gradually integrated. When that happens, a “neural RMA” may emerge that will directly influence and control human mental activities. By then, the armed forces and modes of warfare that we see today will be thoroughly changed. And “defeating the enemy without battle” will cease to be only a metaphor.

The Nature of Future War

After his timely military-theoretical writings in response to Desert Storm, then Chairman Jiang essentially defined PLA mainstream views on both the RMA and the nature of future war. For example, he argues that China should work hard to implement the “two fundamental changes” regarding military preparations for waging twenty-first century warfare as mandated by the global RMA. First, China must change from coping with wars in “general” conditions to

³⁶ Liang Biqin, “Rethink,” *op. cit.*

winning a limited war in high-tech conditions. Second, in terms of force development, China must change from the quantity-and-scale model to the quality-and-efficiency model, and from the manpower-intensive model to the technology-intensive model. According to Chinese military experts, he articulated this long-term view so that PLA modernization “can progress with the times and cleave through the [RMA] waves.”³⁷

Since the 1970s, these turbulent waves have profoundly changed the economic face of human society as well as the face of future war. Weaponry has become increasingly informationized, knowledge-based, and integrated. Non-contact, non-linear, and asymmetrical wars have become the basic method of warfare in high-tech conditions. And knowledge and information have become new growth points for combat capability. China has thus switched from emphasizing mainly “manpower mobilization” to “scientific-and-technological” and “knowledge-based” mobilization.

“High-tech war” is a dynamic concept that means different things in different stages and different historical periods. If war in the industrial age is “iron-and-steel” confrontation complete with imposing arrays of troops, then war in the information age is the asymmetrical confrontation of information that is silent and invisible. This trend is generating a brand-new form of war—“non-contact war”—which had its debut in Desert Storm and distinguished itself in the Kosovo war. To deal with non-contact war, say the Chinese, the most important requirement is to develop innovative military theories, disengage from the traditional contact war model, and break new ground joint operations, integrated air-and-space warfare, and information network warfare.

Comrade Jiang has stressed that the PLA must focus on the unique features of high-tech regional wars, the laws governing high-tech people’s war, and the tactics of defeating superior weaponry with inferior

³⁷ Li Bingyan and Chai Yongzhong, “Strategic Changes and Development by Leaps—People’s Army Advances with Giant Strides Toward Modernization,” *JB*, November 4, 2002, p. 1.

weaponry in order to develop and enrich operational theories with Chinese characteristics. While the PLA currently faces problems in waging high-tech regional wars, the real Chinese strengths still rest with people's war. To safeguard national security, China must always uphold people's war—the “magic weapon for subduing the enemy.”³⁸

One feature of high-tech warfare is confrontation between systems. China must therefore strengthen its concept of system buildup; make overall planning with layouts of key areas; fully exploit the achievements made in mechanization and information technology; and strive to create a structurally rational, functionally versatile, and responsive modern operational system that will provide full scope to the combined operational efficiency of all military branches and national war potentials. Combined operations have already become the main form of operations in modern high-tech war.

In early 2005, Defense Minister Cao Gangchuan instructed the PLA's General Armament Department to target cutting-edge military technologies. He stressed that “2004 saw remarkable progress in the development of arms, equipment, and national defense technology.” Cao called on the PLA to enhance strategic and basic research and to make breakthroughs in key technologies in a bid to “leap forward in the armaments development drive.”³⁹

Countering High-Technology Weapons

Precision-Guided Munitions (PGMs). Chinese military scientists continue to dissect recent U.S. operations in order to catalogue effective counters to PGMs. The Chinese focus on the obligatory commandment to use the “inferior” to defeat the “superior”: “swordsmanship over the sword.”⁴⁰ In Allied Force, say Chinese military experts, the

³⁸ Qiu Shi, Yao Youzhi, Wang Xinsheng, Lu Jining, and Zhang Quanjia, “A Study of Military-Strategic Issues from the Perspective of Managing the Country—A Study of Jiang Zemin's Military-Strategic Thinking,” *Qishi* (hereafter cited as *Q*), no. 11, June 1, 2003.

³⁹ “Chinese Defense Minister Urges Armed Forces to Target Int'l Cutting-Edge Tech,” Beijing *Xinhua* in English, February 7, 2005.

⁴⁰ See Mary C. FitzGerald, “A Non-Contact, Contact War,” *Armed Forces Journal* (August 2003): 26–29.

Serbs not only resisted attacks but also achieved “splendid” battle results in both artillery and electronic confrontations. In fact, due to the sustained resistance of the military and the people, NATO was forced to reinforce its troops. Despite strikes more intense than those in Desert Storm, command and control (C²) systems continued to function, and the Serbs downed numerous NATO planes and cruise missiles. Indeed they created a combat method of relay radar surveillance that even downed an F-117. And despite inadequate air defense systems, the military persisted in overcoming “hard” means with “soft” means. The Chinese also note that owing to NATO superiority in air and space reconnaissance, the Serbs used the strategy of concealing the genuine, displaying the false, and breaking the whole into parts. While PGMs hit 69 percent of targets in Desert Storm and 85 percent in Desert Fox, they hit only 20 percent in Kosovo. The failure to hit targets was due not to inaccuracy, but to an ingenious CCD (Cover, Concealment, Deception) campaign.

In Iraqi Freedom, say the Chinese, the Iraqis executed effective low-tech counters and asymmetrical tactics to thwart coalition airpower. They broke up ground units, used decoys, melded the military with civilians as one, and integrated fire systems with defense works. A stable initial defense and counter-attacks in Basra and Umm Qasr generated rising expenditures in coalition PGMs. Iraqi troops had learned to avoid U.S.-imposed large-scale war, and deftly forced the coalition to switch to storming fortified cities. Urban areas, they knew, are highly resistant to PGMs.

Even before the official Sino-Russian drive to overcome their respective lags vis-à-vis U.S. superiority in RMA technologies, the Chinese hungrily studied Russian military theory regarding twenty-first century operational art—including counters to cruise missiles and stealth developments. Assessments by Chinese military scientists range from unquestioning acceptance to a tailoring process based on the self-proclaimed “Chinese characteristics” that must define *their* current RMA.⁴¹

⁴¹ Xu Minjie, “How to Defeat the Enemy in Future Wars,” *Zhongguo Kongjun*, February 7, 2003, pp. 14–16.

According to the Russians, offensive and defensive air combat is a basic form of high-tech local warfare. One must be able to conduct “defense within offense” and “offense within defense” in order to attain “an invincible position.” According to Chinese military officers, the “point of enlightenment” here is that offensive action must be accompanied by a tight organization of air defenses, thereby achieving an organic integration of offense and defense, defeating the enemy’s attempts at “preemptive control” or “counter-control,” and guaranteeing that “the defense will hold and the offense will succeed” (“fang de zhu, gong de cheng”).

According to the Russians, the maximum increase in combat capabilities can be achieved only through establishing comprehensive standards for combat power in each and every aspect of the military build-up. For example, the standard for each task of the Russian Air Force is combat readiness. The PLA proposed “combat operations in the lead” (“zuozhan qianyin”) some years ago, and this has played an important role in improving combat power. But, “If we could learn from the experience of the Russian Armed Forces, and improve this specific leading mechanism, then it would help to raise the combat power of our units to a new level.”

According to the Russians, joint area air defense is the basic form of air defense operations and requires joint training. To this end, the Russian air defense groups all organize an annual air defense sector joint campaign exercise (with tasks assigned by the Air Force). The exercise sets up opposing conditions according to the principle of “assume the enemy’s reasoning to be the same as your own.” It proceeds step by step through “formulate plans, simulate and evaluate, oppose with actual forces, and conduct live-fire exercise under electronic jamming.”

The Chinese note that borrowing this method from the Russian military would help strengthen the concept of joint combat operations in the air defense units of the PLA. It would help to establish the centralized, unified command of the Military Region Air Force over the air defense forces in that air defense

sector, thereby enhancing the joint air defense capabilities of PLA units.

The history of Chinese combat operations consists in “using the inferior to defeat the superior.” But Chinese experts have nonetheless studied Russian theory and practice regarding how to use inferior equipment to defeat superior equipment under high-tech conditions. The Russian solution, they say, is to research and develop advanced weapons—virtually to the exclusion of any other method.

Since their keynote is to “rely on equipment,” say the Chinese—like the S-300 for air defense—the Russian military has developed almost no theory or practice for “using the inferior to defeat the superior.” On the contrary—Russian military theory holds that the course and outcome of a war depends on the correlation of forces between belligerents, the performance of their weapons, and the respective levels of their combat training and readiness. The superior military force will likely win. Russian military doctrine therefore “clearly proposes” the first use of nuclear weapons if conventional forces cannot defeat the high-tech conventional enemy.

Yet Chinese military scientists also contend that the Russian military’s viewpoint deserves their serious consideration. First, “using the inferior to defeat the superior” is conditional—not a sweeping generalization. The key to whether or not the dictum can be fulfilled consists in whether or not the inferior side can use other conditions and methods to compensate for inferior weaponry. Second, in air combat operations under high-tech conditions, the capacity of command and the complexities of coordination inevitably constrain the size of the force employed. Numerical superiority can therefore compensate only partially for qualitative inferiority.

In addition, say the Chinese, the standard by which to judge whether or not the dictum is fulfilled is whether or not combat objectives are achieved. A more comprehensive evaluation of overall combat effectiveness is required. Individual incidents—such as the 1999 Yugoslav successes against about 40 NATO cruise missiles and one Stealth aircraft—are not a basis for asserting the validity of the

dictum. This centerpiece of Chinese military theory amounts to a last resort. When combat objectives cannot be achieved with inferior equipment, then advanced weapons must somehow be acquired.

“Technology determines tactics,” and even a people’s war cannot transcend the potential of advanced weapons. If a problem cannot be resolved by technology, then it will not be resolved by tactics. For example, the Russian family of S-300s is capable of hitting cruise missiles, whereas the Hong-2 missile [as published] cannot—no matter what tactics are employed.

Chinese military scientists agree with their Russian counterparts that the operational employment of high-tech weapons relies entirely on their technical performance. Developing effective countermeasures requires a technical theory that assesses these performance characteristics. While the Chinese Air Force has made progress in this regard, military experts assert that borrowing from the Russian experience vis-à-vis the “technical analysis” method will yield even more countermeasures to Stealth aircraft and cruise missiles.

Chinese military scientists note that modern anti-aircraft systems have attained the “best of both worlds” by combining missiles and antiaircraft guns into integrated weapon systems. They praise the Russian Tunguska and its successors as “the most outstanding” modern air defense systems.⁴² Owing to advanced radar and photoelectric systems with excellent interfaces connecting them to command systems, the problem of detection is immediately solved. Cruise missiles cannot escape their dense barrage—“no matter how low they fly.” In fact, the destruction probability on cruise missiles can reach above 90 percent due to the aforementioned synthesis of missile and gun. Multi-level positioning further increases the probability of interception and destruction.

Asymmetrical Anti-Air Operations. Chinese military scientists have noted that while Iraq and the Federal Republic of Yugoslavia succeeded in shooting down some missiles and aircraft during recent

⁴² Zhang Wenzhu, “Modern Anti-Aircraft Guns Can Block the Cruise Missile,” *Xiandai Bingqi*, June 2, 2000, pp. 11–13.

wars, their actions exerted little impact on the course and outcome of the wars. To avoid such passive states in counter-air strike operations, China must execute “asymmetrical” measures, such as employing cruise missiles to destroy the enemy’s airports, aircraft carriers, and naval bases and vulnerable large area, and fixed targets.⁴³

In addition to using the PLA Air Force, experts have proposed employing both conventional ballistic and cruise missiles together in the struggle for air dominance in order to “control the air from the ground.” First, conventional ballistic missiles can be used to penetrate the enemy’s command and communications hubs, airports, seaports, and early-warning air defense radars—thereby “paving the way” for subsequent strikes by cruise missiles. This method is particularly effective in areas such as islands and peninsulas since the strategic depth of any island region is very shallow, thus yielding little space for maneuver. The densely structured airports are even easier to attack and destroy by surprise missile strikes.

According to the Chinese, the strategic concept of asymmetrical anti-air operations consists in seizing the initiative and gaining superiority through strategic interactions. By no means is it a strategy as direct as “firing at the warplanes of the enemy.” Its essence stems from both Mao’s “You fight your way and I fight my way” and the ancient Chinese art of war: “As a commander: no sky above, no earth below, and no enemy in front.”

While Chinese experts admit that their countermeasures against PGMs are still inferior, they contend that the PLA can compensate by concentrating the best weapons and launching airborne assaults in the enemy’s rear and raids against the command, intelligence, communications, and electronic systems of the enemy’s naval and air bases. Such operations may also deliver a lethal blow to the enemy. This type of guerrilla warfare epitomizes operations wherein the small defeats the large, the short defeats the tall, and the covert defeat the overt.

⁴³ Liu Dingping, “Thinking About Anti-Air Raid Operations in the Future,” *Junshi Wenzhai*, May 1, 2004, pp. 12–16.

As a result, say the Chinese, the PLA can rely only on superiority in the new asymmetrical anti-air operations to compensate for inferiority in both weapons and equipment. They must learn about wars within wars, make changes when the enemy changes, and continually develop innovative concepts such as “guerrilla warfare,” “unrestricted warfare,” and “information warfare” that respond to the mandates of modern operations. This process is said to be generated and fueled by the people’s war mindset.

Anti-Carrier Campaign. In recent years, PLA experts have focused sharp attention on “anti-carrier methods during a war in the Strait.” First, they extol the advantages of combating carriers with a combined tri-service force. Second, they stress the need to establish a “unified C⁴I command system.” Third, they argue the need for concentrating both crack troops and powerful anti-carrier weapons in such a war.⁴⁴

The future tri-service anti-carrier operation would be “a combined defense-offense blitzkrieg stretching far and deep over hundreds of nautical miles and consisting of multi-directional stereoscopic weapons wafting indeterminately in the air, on the surface, and under water in a complex electromagnetic environment on expanded sea areas remote from coastal bases.” When the three services join forces to battle carriers, the linchpin is “joint,” and if the formation is hierarchically “joined” from top to bottom, then the force will multiply its combat power.

Chinese military experts have noted that *all* military forces engaged in anti-carrier combat must solve at least three problems. First, the air force must solve the problem of hitting early-warning aircraft and interdicting the communications between a carrier group and satellites. Second, intelligence and communications departments must solve the target positioning problem against a carrier group in a state of advance. Third, all militaries face complex training programs in information and electronic warfare. This kind of “gun powder-less”

⁴⁴Liu Dingping, [Untitled], *Junshi Wenzhai*, July 1, 2004, pp. 19–22.

combat will always constitute the prelude to future conflicts—no country can totally prevent an enemy information warfare attack.

According to the Chinese, the features of an anti-carrier campaign include: (1) a synthesized operational multi-discipline theory applied as the strategy; (2) men, weapons, and equipment as the base; (3) first-strike information and electronic warfare as the prerequisites; (4) accurate target detection and accurate assessment as the measures; (5) sneak attack, potent attack, jamming, deception, concealment, long-range raids, stealth, and disinformation as the tactics; and (6) the tri-service, “crack troop composition,” joint operations concept as the model. But above all, the anti-carrier campaign requires a high-tech military strategy and future-oriented military-theoretical research.

Anti-Carrier Sea-Launched Cruise Missiles (SLCMs). In early 2005, Chinese military experts noted that SLCMs designed to attack carrier groups now face an even more complex electromagnetic environment since ship-borne integrated defense systems are more capable of detecting, jamming, and intercepting the missiles. A missile's ability to penetrate defenses depends on both the missile's own performance and the enemy ship's defensive capabilities. The Chinese delineate several requirements to ensure penetration.⁴⁵

First, implement effective measures to improve survivability. In the powered phase, it is essential to minimize the infrared signature of the engine's exhaust gas flow, and release decoy targets or use varied flight trajectories to confuse the enemy's early-warning satellites and reduce his early-warning time. In the middle phase of the trajectory, release decoys to cover the warhead and use warhead camouflage to reduce radar scatter and infrared signature. Equip the missile with jammers, heavy lures, and several light lures. Cover the warhead with plasma material, which can greatly attenuate incoming electromagnetic waves. After warhead and body separate, make the missile body disintegrate.

⁴⁵ Yang Zukuai and Wang Zaigang, “How to Develop China's Precision-Guided Missiles,” *Jianchuan Zhishi*, no. 2, January 5, 2005, pp. 28–30.

In the reentry phase, say the Chinese, use five techniques. First, reduce radar cross-section in all directions with an effective external warhead shape and a coating of suitable wave-absorbing material. Second, use heavy lures (active or passive jamming bombs) flying at the same speed as the real warhead. Third, alter the warhead's trajectory at a high rate of flight speed and execute erratic maneuver. Fourth, increase the altitude at which the submunitions are released, and employ explosive submunitions and electromagnetic jamming submunitions together. Also, launch in salvos. Finally, fifth, in terms of tactics, first launch stealthy jamming missiles, and when the warheads are overhead at a suitable altitude in the target area, release electronic jamming bombs, anti-radiation bombs, or powerful electromagnetic pulse bombs.

Another technique is to employ maneuverable, flexible, multiple warheads. These include cluster warheads, separately guided multiple warheads, and maneuverable multiple warheads. However, improving terminal guidance is the most critical element in improving strike accuracy.

According to Chinese military scientists, a new generation of low-cost, precision-guided SLCMs could be researched and developed quickly using existing missile technology. Attacking aircraft carriers requires long-, medium-, and short-range versions to ensure strikes on a carrier group at all ranges. This would constitute not only an "assassin's mace" ("shashoujian") against enemy carriers, but also somewhat of a deterrent. The Chinese stress the following technical and tactical specifications of SLCMs: (1) vertical launch technology; (2) advanced propulsion systems, high-performance fuel, and enhanced survivability/capabilities in mobile warfare; (3) the ability to change course in mid-trajectory; i.e., add course change engines to be activated in mid-trajectory while the missile is in outer space to ensure maneuverability for reentry; (4) improved inertial guidance systems and advanced composite guidance, etc.; (5) priority development of both submunitions technology and multi-functional warheads with increased lethality; and (6) priority development of electromagnetic pulse warheads.

Some Chinese experts assert that the twenty-first century is the “maritime century,” when the seas and oceans will constitute an entirely new battlefield. On this battlefield, information systems will rely primarily on complex systems in outer space. So China must accelerate the development of advanced SLCMs to prevent a high-tech enemy from winning the initiative.

The Seven-Day War

In late 2004, the PLA’s Chief of the General Staff Liang Guanglie met with then Secretary of State Colin Powell, Defense Secretary Donald H. Rumsfeld, and then National Security Advisor Condoleezza Rice. He also held a working meeting with Chairman of the Joint Chiefs of Staff General Richard B. Myers. According to the Chinese press, General Guanglie emphasized the following:

The Taiwan issue is the most important and sensitive one in Sino-U.S. relations. It has a direct bearing on China’s core interests. The key to the success of maintaining the stable development of relations between China and the United States as well as between the Chinese and U.S. Armed Forces lies in properly handling the Taiwan issue. The separatist activities of the “Taiwan independence” forces represent the root cause of tension between the two sides of the Taiwan Strait as well as the largest threat to peace and stability in the Taiwan Strait area. It is our hope that the U. S. side will conscientiously carry out its promises and refrain from doing anything that violates the one-China policy and the three Sino-U.S. joint communiqués. This is crucial to curbing “Taiwan independence” as well as to maintaining peace and stability in the Taiwan Strait area. This is also crucial to the development of Sino-U.S. relations.⁴⁶

In December 2004, the Chinese regime published an official white paper on national defense policy. It clearly warns:

⁴⁶ “U.S. Government and Military Leaders Meet Liang Guanglie,” *Xinhua Domestic Service*, October 29, 2004.

The Chinese people are resolutely opposed to all separatist activities in whatever manifestation aimed at Taiwan independence, to foreign interference of any form, and to arms sales to Taiwan or entry into any form of military alliance with Taiwan by any country in the world. . . . Should the Taiwan authorities go so far as to make a reckless attempt that constitutes a major incident of “Taiwan independence,” the Chinese people and armed forces will resolutely and thoroughly crush it at any cost.⁴⁷ [Emphasis added.]

The 2004 elevation of several key PLA officials further supports this warning. General Liang Guanglie—former commander of the Nanjing Military Region, where he was “specifically responsible” for the attack plan against Taiwan—has ascended to the post of chief of the General Staff. For the first time, the commanders of the navy, air force, and Second Artillery were elevated to the Central Military Commission—which also reflects the growing importance of a Taiwan scenario as well as the PLA’s “tri-service anti-carrier campaign.” (Although they rarely refer to the 700 missiles aimed at Taiwan.)

According to “authoritative sources in Beijing,” the PLA has not only secretly formed the most elite special amphibious forces, but also developed two sets of offensive plans in which Taiwan’s “Office of the President” and military bases are all priority targets. The two plans are the “blitzkrieg operations plan” and the “landing operations plan,” respectively⁴⁸

In the first, China will blockade its territorial waters and then the PLA will launch cruise missiles against the aforementioned targets, including the underground Hengshan and Chingsan command centers. Thousands of guided missiles will be launched—some with electromagnetic pulse warheads. Then the special forces, which have already infiltrated Taiwan’s offshore islands prior to the war,

⁴⁷ “China’s National Defense in 2004,” *op cit.*, p. 8.

⁴⁸ Cheng Hsin-hua, “Capturing Taiwan Within Seven Days—An Exposure of the PLA’s Top-Secret Strategies,” Hong Kong *Tung Chou Kan*, no. 71, January 5, 2005, pp. 28–32.

will invade cities to force the current leaders to step down. The Second Artillery will be the main force orchestrating the missile strikes. Missiles of the Dongfeng series are said to inspire even U.S. respect. The M15 missile, which can be launched under the sea, boasts a circular error probable of less than 100 meters using either fixed or mobile launchers.

As for the landing operations, they will include the tactics of landing at specific beachheads and landing on all fronts. The PLA will deploy between 200,000 and 400,000 troops to land on Taiwan's coastal areas, which are more than 300 kilometers long. Taiwan's 200,000 troops and limited air defense will be unable to defend all the areas. In order to ensure air dominance, the PLA will use "mammoth forces" to overwhelm Taiwan's small forces. If necessary, the PLA will mobilize 3,000 aircraft in a three-to-one ratio to annihilate Taiwan's 1,000 aircraft. According to an unidentified PLA general, "We must capture Taiwan, even if that means we have to sacrifice the lives of tens of thousands of soldiers!"

To deal with Taiwan's "independence elements," Beijing has earmarked an annual military budget of 500 billion yuan to accelerate production of the required armaments. One of the "trump cards" consists in the "dagger" contingent formed four years ago—the amphibious frogman unit. (General Liang Guanglie is an expert in amphibious operations.) Beijing is also prepared to fight the United States if such a confrontation proves unavoidable. The PLA will mobilize its destroyers equipped with SSN-22 anti-ship cruise missiles, Kilo-class submarines, and Chinese Aegis warships to clash with the Seventh Fleet, and will use information warfare to destroy U.S. satellites and command-and-control systems. But the prevailing opinion of the Chinese Communist leadership is that the United States poses no real threat since a weakened China means that Japan will then dominate the region. PLA authorities have pledged that they can capture Taiwan within seven days. According to General Secretary Hu Jintao, "We believe that the war will not obstruct the holding of the 2008 Olympic Games."

“Peace Mission—2005”

From August 18 to 25, 2005, Russia and China conducted their first joint strategic military exercise. The exercise involved approximately 7,000 Chinese and 1,800 Russian troops, as well as 140 naval ships and submarines, Russian Tu-22M long-range bombers, and Tu-95 strategic bombers. The operations simulated an amphibious assault, a sea battle, and paratrooper landings. Despite all smartly crafted statements to the contrary, these specific and precision operations primarily reflect current PLA war plans for invading Taiwan if the Chinese Communist leadership deems necessary. Here it should be recalled that in early 2005, Russia compelled China to alter the original PLA geographic locations for the exercise—perhaps reluctant to be complicit in any overt anti-Taiwan scenario.

When Russian Defense Minister Sergei Ivanov declared that the historic exercise further illustrates the Sino-Russian “strategic partnership,” he failed to finish the (sound-bite) speech. He failed to note that throughout 2005, he has condoned publications by his own senior military officials and military scientists that depict another China—the one that envisions global politico-military dominance by 2050. A far more honest assessment of the “strategic partnership” was uttered in 2000 by General-Major Slipchenko—arguably the most prescient Russian military scientist since the renowned Marshal Ogarkov. “Desert Storm,” he said, “has forced Russia and China into an arranged marriage—to be followed as soon as possible by a quickie divorce.”

Information Warfare

A senior official on the PLA General Staff has declared, “The twenty-first century will be an information era, and wars in the twenty-first century will be information wars. We can say that whoever has the advantage of information and the control of

information will have the initiative and will win future wars.”⁴⁹ “Which are more powerful?” ask Chinese experts—nuclear or information weapons? They answer that this is a difficult question since it resembles “a contest between a lion and a tiger.”⁵⁰

According to Major General Wang Pufeng, former head of China's Academy of Military Science, an information war refers to a kind of war and a kind of war pattern, while information warfare refers to a kind of operation and a kind of operational pattern. Along with changes in the war pattern in the current information era, information warfare has already become a major pattern for high-tech operations. The PLA must shift its concept from waging electronic warfare—which is but a prelude to information warfare—to fighting information warfare, and from seizing the electromagnetic initiative to seizing the information initiative.⁵¹

Major General Xu Xiaoyan, director of the General Staff's Communications Department, has outlined seven strategies to implement “leaps” in technical development based on information technologies:⁵²

- (1) ***Embed transformation.*** Implant or merge advanced information technologies into equipment already in service, thereby achieving the lead in combat effectiveness.
- (2) ***Integrate systems.*** Take existing, separate, loosely connected, or unconnected subsystems and merge them to form a new integrated and tightly connected system.
- (3) ***Direct upward leaps.*** Conduct research, development, testing, and evaluation directly in accordance with informationization standards, in order to leap over the mechanization phase and proceed directly to informationization.

⁴⁹ Major General Yuan Banggen, *ZJK*, February 20, 1999, pp. 46–51.

⁵⁰ Wu Jianguo and Li Hongbin, “Can Information Weapons Replace Nuclear Weapons?” *JB*, 17 November 1999, p. 5.

⁵¹ Interview with Major General Wang Pufeng, by Ma Yaxi, Hong Kong Hsien-Tai Chun-Shih (Conmilit), April 11, 2000, pp. 19–21.

⁵² Major General Xu Xiaoyan, “A Concept for a Strategy of Development in which Informationization Drives Mechanization,” *ZJK*, February 1, 2002, pp. 107–111.

- (4) ***Borrow/import.*** Absorb advanced technologies and products used in foreign militaries in accordance with the overall requirements of the PLA's informationization effort, thereby increasing the speed and effectiveness of military development.
- (5) ***Rely on compatibility.*** Exploit the dual-use nature of information technology, using the combination of military and civilian technologies as the main measuring rod.
- (6) ***Upgrade structure.*** Exploit the characteristic of information technology as a multiplier, thereby reforming, adjusting, optimizing, and upgrading military structure through the enhancement of information capabilities.
- (7) ***Innovate measures.*** Increase the speed of military development by incorporating innovative scientific research methods.

According to Chinese military scientists, information weapons may be roughly divided into three types:⁵³ weapons that destroy the enemy's national defense, state, and economic infrastructures; psychological weapons; and weapons that use wireless suppression procedures. Targets of the first type include the enemy's national defense information systems, telecommunications systems, electric power distribution systems, petroleum and natural gas storage and transportation systems, banking and finance systems, transportation systems, water supply systems, emergency services systems, etc. The target is not merely the information system itself; an even greater emphasis is placed on using new technologies to alter informational content without otherwise affecting the information carrier. Targets of psychological weapons include both operating personnel and civilians. Finally, weapons that use wireless suppression procedures emit or reflect electromagnetic waves, sound waves, or infrared signals, etc., that can knock out the enemy's electrical equipment, sonar, or infrared equipment.

Chinese military scientists assert that future wars may become so "civilized" that a smokeless computer war is likely to achieve combat

⁵³ "Article," op. cit., p. 8.

objectives through “soft casualties.”⁵⁴ Tactics in this kind of warfare might include electromagnetic field probing and advance, timely, and indirect planting of computer viruses.

Information Weapons/Operations

“New-concept” weapons, say the Chinese, are completely new information weapons that use advanced technologies (especially information technology) and new casualty-and-damage-producing mechanisms. Major weapons of this type include: (1) super-kinetic energy weapons (electromagnetic guns), (2) directed-energy weapons, (3) artificial intelligence weapons, (4) thought control weapons, and (5) micro-electromechanical weapons (miniature robotic electronic incapacitating weapons).⁵⁵

Information warfare—said to be the dialectical counter to PGMs—is conducted in six-dimensional strategic space: ground, sea, air, space, information, and cognition. Major General Dai Qingmin—Director of the General Staff’s Fourth Department and the PLA’s “senior electronic warfare official”—has provided a series of guidelines that serve as a theoretical foundation for conducting information operations.⁵⁶ The guidelines include suggestions for integrating operations, adopting multiple means, and focusing on strategies. In integrating operations, he stresses: (1) the integrated use of information warfare forces, both military/civilian and professional/non-professional; (2) the integrated application of information warfare assets—both network space and electromagnetic space as well as “soft” and “hard” weapons; and (3) the integration of offensive and defensive operations as well as all-dimensional operations. Adopting multiple means by launching an attack on the enemy’s C⁴ISR system in all-dimensional space simultaneously or one after another, he says, is

⁵⁴ Chen Zhaohai, “Computer Warfare Tactics,” *Jiefangjun Bao*, July 7, 1998, p. 6.

⁵⁵ Lt. Col. Liu Aimin, “The Characteristics of Informationized War,” *ZJK*, August 1, 2001, pp. 69–72.

⁵⁶ Major General Dai Qingmin, “Innovating and Developing Views on Information Operations,” *ZJK*, 20 August 2000, pp. 72–77.

the only way for the inferior side to be able to conduct effective information operations and seize local information control. The guidelines focus on strategies, meanwhile, as a critical factor in defeating superior forces with inferior ones in future information operations. While an army with high-tech superiority may overwhelm an enemy with accurate or highly mobile assault arms, it will have to rely on advanced—but exceedingly vulnerable—C⁴ISR systems.

Dai has also provided the theory behind “integrated network–electronic warfare.” The “ideology” of integrated network–electronic warfare represents “a total innovation in information operations theory.” It embodies information operations theory with Chinese characteristics—a synthesis of foreign and uniquely Chinese military-theoretical achievements.⁵⁷ Integrated network–electronic warfare has the following four main characteristics:

- (1) ***Comprehensive Combat Objectives.*** In future high-tech warfare, the destruction and control of the enemy’s information infrastructure and strategic lifeblood—by selecting key targets and launching effective network–electronic attacks—can directly constrain the enemy’s strategic planning. It can weaken and even paralyze his overall combat potential—including political, economic, and military aspects. Integrated network–electronic attacks thus have a comprehensive effect on the enemy.
- (2) ***Integrated Methods of Combat Operations.*** Weakening and destroying the overall effectiveness of the enemy’s information systems while protecting one’s own is a joint objective in both network and electronic warfare. Therefore, when executing an information attack, the PLA must have a unified plan and organization for both, so that they will be coordinated closely, become a single entity, and constitute an integrated attack against a single target. When executing

⁵⁷ Major General Dai Qingmin, “On Integrating Network Warfare and Electronic Warfare,” *ZJK*, February 1, 2002, pp. 112–117.

information defense, network and electronic defense must similarly be incorporated into a unified system with an integrated plan and coordinated execution.

- (3) ***An Expansive Battlespace.*** The integrated employment of network and electronic warfare transcends the traditional boundaries of network space and the domain of the electromagnetic spectrum. Full-depth integrated attacks, non-contact combat operations, non-linear combat operations, etc., will permeate the entire course of combat on the informationized battlefield. Integrated network–electronic warfare will be conducted in a battlespace larger than that of any current form of warfare.
- (4) ***Integrated Operational Effectiveness.*** Integrated network–electronic warfare selects as its main targets of attack the normal operation of information systems in the enemy's military, political, economic, and social systems. It seeks "to cut these nerves and paralyze the entire body." Therefore, the combat effect resulting from such warfare exceeds that of any traditional or single form of combat operations.

Since Iraqi Freedom, Major General Dai Qingmin has asserted that conducting information-based warfare requires the following "four basic ability elements:"⁵⁸

- (1) ***Integrated Information Support Ability.*** The high-level combination of all-dimensional information perception, real-time information transmission, and intellectual information disposal forms integrated information support ability, and becomes "the base and the backbone" of China's information-based warfare system.
- (2) ***Information-Based Fire Strike Ability.*** Information technology has propelled the Chinese transformation from mechanized firepower to information-based firepower. Information-based weaponry and equipment tend to be developed in the direction of being accurate, miniature, stealthy, and unmanned.

⁵⁸ Major General Dai Qingmin, "On Four Abilities for Information-Based Warfare," *JB*, July 1, 2003.

- (3) ***Multi-Level Information Warfare Ability.*** China's ability to totally destroy the enemy's information-based warfare system—the essence of information warfare—depends on whether China's information warfare system can develop multi-level and all-directional information warfare capabilities.
- (4) ***All-Directional Comprehensive Protective Ability.*** China's integrated protective system requires efforts to improve the “Three-Counterattack and One Resistance” abilities of the information system.

According to Chinese military scientists, the “networked” battlefield is the next stage in an evolution primarily driven by the emergence of new technologies. Gunpowder shattered the array battlefield, tanks altered the linear battlefield, nuclear weapons led to the “spacious” battlefield, and the integration of science and technology has generated the “networked” battlefield.

The Chinese theoretical innovation of integrated network–electronic warfare has inevitably triggered a PLA requirement for new, real-time, integrated C² structures. Experts note that traditional combat C² architectures are pagoda-shaped structures. The shortcomings of this kind of structure include: (1) numerous layers, (2) lack of coordination among units, and (3) lack of mechanization and resistance to destruction on the part of lower-level units. One of the profound changes in C² systems compelled by the development of information technology is the networking and lateral integration of combat C² architectures.⁵⁹

The networking and lateral integration of C² architectures means that pagoda-style C² structures will gradually belong to history, and that layers of C² will gradually decrease in number. Not only will there be vertical contact from unit to unit and from weapons system to weapons system, but also lateral contact among them. Not only will there be contact between nearly adjacent echelons, it will also be

⁵⁹ Lt. Col. Liu Amin, “Characteristics,” op. cit., pp. 69–72.

possible to make contact by skipping a number of echelons: information-sharing will truly be achieved. The new networked structure is “criss-crossed like a spider’s web,” an “interactive” organic whole comprising a reconnaissance system, a firepower system, a C² system, a support system, and other combat systems integral to the networked battlefield.

With a pagoda-shaped C² architecture, a force is only a conventional “machine,” with great power but little intelligence. When its vital components are damaged, the entire machine becomes paralyzed. But with a networked C² system, the force becomes a system that can think, with very strong internal feedback, redundancy, and self-regulation capabilities. Each component of the system is in a highly dynamic state, and the system’s comprehensive functioning and overall effectiveness is vastly increased.

Chinese military scientists assert that the nucleus of twenty-first-century warfare will consist in an intense struggle for network superiority. The network becomes “the commanding height” that must be seized by belligerents in order to secure information dominance. Network offensives and network defenses will constitute new operational modes for future troops.⁶⁰

Among others, Major General Wang Pufeng has clarified the relationship between a people’s war and an information war. A people’s war is defined by both its political nature and the extent of mass participation, while an information war is defined by the impact of a dominating technology on the war pattern. Since they each proceed from different categories, there is no issue of mutual contradiction here; nor are the two antagonistic to each other. In fact the only issue that exists is the synergistic one of mutual adaptation between the two. An information war can be waged on the pattern of a people’s war—and vice versa.⁶¹

As noted earlier, the Chinese are to some degree still playing theoretical catch-up with the Russians vis-à-vis the requirements of

⁶⁰ Li Yinnian and Li Zongjian, “Network: Dominator of Future Battlefield,” *JB*, July 21, 1998, p. 6.

⁶¹ Interview with Major General Wang Pufeng by Ma Yaxi, *op. cit.*, pp. 19–21.

the RMA. But Chinese military scientists have recently articulated an aspect of information operations that this author has not yet encountered in Russian information warfare theory. One characteristic of information operations, say the Chinese, is that the impact of such operations will become limited during future “unconventional” operations. The purpose of tactical information operations is to support conventional offensive and defensive operations. But in future “unconventional” war, if the enemy does not rely too much on the electromagnetic frequency spectrum, then the spectrum available for battlefield sensor detection becomes limited. In that case, they say, “information superiority will be rendered useless.”⁶² Here we should recall that the Chinese have heretofore defined “unconventional wars” as asymmetrical, non-contact, non-linear, and non-deterministic.

According to Zhang Zhaozhong, the greatest lesson learned from Iraqi Freedom was the importance of information warfare. He noted that information warfare should not be conducted solely in the sphere of computer networks, but should also proceed in coordination with traditional mechanized modes of warfare.⁶³ Other experts have referred to the war as the “first information war in the true sense of the term since the beginning of human history.” An information-based defense and military are the hallmarks of the new global military revolution. The armed forces of the world “have no choice but to go the information route.”⁶⁴

Chinese experts also have described Iraqi Freedom as the “first truly digitized war in the history of mankind.” This feature of the war has clearly accelerated global military reforms. The PLA today is only semi-mechanized and has just begun to digitize. The army’s command-and-control automation, reconnaissance, early-warning systems, communications, and internetworking are all at much lower technical levels than those of developed countries. The three

⁶² Xu Gonghua and Zhang Dongzhi, “Characteristics of Tactical Information Operations,” *Xiandai Junshi* (hereafter cited as *XJ*), *Conmilit*, February 2003.

⁶³ “Military Specialists Review Outcome of Iraq War,” *Renmin Wang*, April 15, 2003.

⁶⁴ Wen Tao, “China to Speed Up Military Transformation with Chinese Characteristics, Push for Informationization of Armed Forces,” *Ching Pao* (hereafter cited as *CP*), no. 311, June 1, 2003, pp. 40–42.

critical facets of PLA reforms must consist in accelerating the digitization of weaponry, army units, and battlefield infrastructure. While information technology is said to be “the heart of an army,” however, Chinese military scientists strongly warn against absolutizing high-tech weaponry at the expense of the human role in combat.

Experts also stress that U.S. troops exploited their absolutely superior information technology in launching a large-scale psychological warfare campaign, which played an “irreplaceable role” in the war. Iraqi Freedom has “opened the door” to using information technology for psychological warfare in the twenty-first century. Military experts had predicted that psychological warfare launched by information technology would be more important than land, sea, air, space, or electronic warfare, and that it was closely linked with China’s national strategy to generate “the fourth category of war.” Iraqi Freedom has vindicated these predictions with facts. The PLA must raise psychological warfare from the tactical and campaign levels to the strategic level in military planning, so that Chinese troops will really be able to “conquer without a battle.”⁶⁵

While most Chinese experts agree that U.S. forces took full advantage of the mass media, firmly held the initiative in psychological warfare, and promptly readjusted operational methods as dictated by developments, others charge that these operations were handicapped because the war was unjust and lacked popular moral support. In addition, an over-reliance on intelligence resulted in the U.S. misjudging the strategic environment of psychological warfare, and especially the Iraqi national culture. The United States is said to have mechanically duplicated the psychological tactics of Desert Storm with few innovations in techniques and methods. While Iraqi Freedom was fought in the same location against the same enemy, the two wars were fundamentally different.⁶⁶

⁶⁵ Li Xuanliang, “The Iraq War Opens the Door to the Use of Information Technology for Psychological Warfare,” *X*, May 13, 2003.

⁶⁶ Wang Xinsheng, Wu Zhizhong, and Luo Xinqin, “Inspirations from Psychological Operations in the Iraq War,” *Guofang* (hereafter cited as *G*), June 15, 2003, pp. 25–27.

The United States is said to have overly stressed the offensive, neglected the defensive, and proved unprepared for Iraq's psychological counterattack. Before the war began, the U.S. shock-and-awe psychological warfare campaign against Iraq was equivalent to "lifting a huge rock to drop on its own feet." The propaganda regarding a swift and decisive victory with zero casualties failed to scare Iraq; on the contrary, it considerably raised the expectations of U.S. troops, which left them inadequately prepared for complex combat scenarios. During the war's early stage, the international community, troops, and civilians were "immensely shocked" by the progress of the war and U.S. casualties, and the United States seemed powerless to manage foreign and domestic public opinion. According to the Chinese, Iraq repeatedly exposed the lies fabricated by the U.S. mass media and the cover-up of coalition casualties, putting the United States on the defensive and sharply reducing the credibility of its military news reports.

Implementing Informationization

Judging from the experience of developed Western countries, say the Chinese, building an informationized military takes a minimum of 30–40 years. Chinese military scientists have candidly delineated the obstacles to PLA informationization. Major constraining factors include: (1) the degree of civilian informationization, (2) the level of development of national defense industries, and (3) the status of space support infrastructure facilities.⁶⁷ Again judging from the experience of other countries, China should build a dual-purpose (military and civilian) space support system. The core of military informationization—C⁴ISR systems—as well as the ever-emerging global positioning systems both rely on space support.

The military confrontation in informationized warfare is not a confrontation between weapons or between troop-arms and service branches. Instead it is a confrontation between weapon *systems*, and

⁶⁷ Yang Minqing, "How Far from Informationization Are China's Armed Forces?" *Junshi Wenzhai*, October 1, 2004.

a contest in the integration of systems. Completely informationized combat operations require the complete merging of weapons and the systems of troop-arms and services into a single, all-encompassing system. And the support of space systems is mandatory for achieving this objective.

In the wake of the March 2005 session of the National People's Congress, Chinese military scientists noted that the PLA will implement modernization "in two stages and by three major steps." In the first stage (2005–2020), the PLA will basically complete mechanization and intensify informationization. In the second stage (2020–2050), the PLA will basically complete informationization and national defense modernization. The central principle driving the modernization of national defense is reliance on science and technology to make the three armed forces strong.⁶⁸

Chinese experts assert that since Hu Jintao assumed the chairmanship of the Central Military Commission, the PLA has noticeably enhanced its command of the sea, of the air, and of information. In addition, the PLA has streamlined the ground forces and intensified the construction of the naval and air forces and the Second Artillery, with a view to seeking a coordinated development of combat forces and to making the navy capable of conducting offshore naval battles, the air force capable of attacking and defending air territories, and the Second Artillery capable of launching nuclear counterattacks and conventional assaults.

The PLA will continue to be guided by the core strategic idea of positively pushing the implementation of the RMA with Chinese characteristics, and will strive to elevate the level of national defense modernization to "a historically new height in a shorter period of time." The ultimate objective of the RMA is to build informationized troops and win information wars.

In March 2005, a Chinese military expert published an article entitled "Never Ignore the Symmetrical Operation." In view of recent

⁶⁸ "PLA to Materialize Mechanization by 2020, to Basically Realize Informationization by 2050," *Wen Wei Po*, March 14, 2005.

local wars, he writes, “asymmetrical operations” are mandated since the two sides differ so dramatically vis-à-vis combat strength—especially in some decisive spheres. But he argues that the pattern of warfare is never fixed, so the concept of symmetrical operations should never be slighted. During the current transition period wherein the PLA is focused on the ponderous process of informationization, studying asymmetrical operations is indeed critical—but it remains impossible to predict the precise pattern of future warfare.⁶⁹

In future information warfare, the PLA must basically keep a “balance” with the enemy and gain or partially gain the relevant superiority in order to acquire the “prerequisite conditions” for victory. Symmetry and asymmetry constitute the means and processes of warfare while victory remains the goal. The PLA must strive to execute asymmetrical operations against enemy advantages, but also prepare for symmetrical operations against an enemy “who keeps balance with our side.”

In April 2005, the Chinese Communist Party's Central Party School Press published a book entitled *Psychological Superiority: Reflections on Seizing the Psychological Advantage in Warfare*. According to one reviewer, “The book marks the birth of a new superiority theory: the theory of ‘psychological superiority’.” Its most significant characteristic is said to be the assertion that psychological superiority constitutes the highest sphere of superiority, and that all other superiorities—including air and naval—become subordinate.⁷⁰

The second part of the book examines the seizure of psychological superiority through “military, economic, political, diplomatic, psychological, and interests methods.” The reviewer concludes that this is “the latest achievement in Chinese research of military theory in recent years, another great effort following on the contribution to military theory made by the book *Unrestricted War*.”

⁶⁹ He Bing, “Never Ignore Symmetrical Operation,” *Jiefangjun Bao*, March 1, 2005.

⁷⁰ Huang Yuqiao, *Psychological Superiority: Reflections on Seizing the Psychological Advantage in Warfare* (CPC Central Party School Press, April 2005).

Space Warfare

According to Chinese experts, the PLA revamped the research, development, testing, and evaluation program in the late 1990s. The Chinese decided to cancel weapons projects that had been active for 10 years or longer and to direct these funds to developing so-called “new-concept weapons”: laser, beam, electromagnetic, microwave, infrasonic, climatic, genetic, biotechnological, and nanotechnological. The results demonstrate that—besides solving the problem of modernizing its conventional forces—China now has three military priorities: space, nuclear weapons, and “new-concept” weapons.⁷¹

Chinese military strategists stress that “informationized warfare” has three main characteristics: (1) the boundaries of traditional warfare are being crossed and even shattered; (2) combat effectiveness is second only to nuclear warfare in terms of firepower; and (3) space warfare will be the new and critical mode for waging future wars.⁷²

Like their Russian counterparts, Chinese military scientists assert that information warfare missions are accomplished most effectively by using space-based assets. The Chinese delineate at least three reasons for the critical importance of space warfare to information warfare missions.

First, space is the “commanding height” for future information warfare. The advantages of controlling the “commanding height” in space include capabilities for global real-time exploration and advanced warning, long-range high-quality intercontinental communications, and long-range precision combat operations.

Second, seizure of space control constitutes “the first combat operation in future information warfare.” With the continuing development of space weaponry and equipment, belligerents will conduct such new modes of space warfare as the following:

⁷¹ See Mary C. FitzGerald, *Russia-China Convergence/Divergence on 21st-Century Warfare: Volumes I and II*, Fall 2003.

⁷² Major General Zhang Ling, “Initial Appearance of the Characteristics of Informationized Warfare,” in Transcript of May 2003 CPC Central Committee Conference, *Liaowang*, no. 28, July 4, 2003, pp. 9–15.

Information Warfare in Space. The “core of space warfare” is the struggle for information dominance, so information warfare in space constitutes its main mode. The principal forms of space information warfare are: (1) conducting space electronic and space network warfare to inflict “soft” strikes on enemy space platforms, thereby disrupting and destroying their electronic equipment and computer systems; and (2) employing all types of anti-satellite weapons to inflict “hard” strikes on enemy platforms, thereby fundamentally destroying his space information system.

Anti-Satellite Warfare in Space. This is the most effective way to achieve space control. The principal forms are: (1) use aircraft, warplanes, and rockets to launch anti-satellite missiles to destroy enemy satellites; (2) install “space landmines” on the orbits of enemy satellites for destruction once they hit the landmines; and (3) use positioning weapons such as lasers, clusters of particles, and microwaves to attack enemy satellites. According to the Chinese, the United States has recently conducted successful experiments using laser weapons to destroy targeted satellites. Russia has also conducted tests using clusters of particles to disrupt and destroy the electronic equipment of satellites.

Anti-Missile Warfare in Space. This refers primarily to the employment of an anti-missile system composed of space-, air-, and ground-based platforms to detect, identify, and track enemy ballistic missiles. Anti-missile space warfare also refers to the employment of positioning, kinetic, and other anti-missile weapons to intercept and destroy enemy missiles. The United States is currently developing a ballistic missile defense (BMD) system, which, say the Chinese, “is actually an anti-missile system anchored primarily in space warfare.”

Strikes against Endoatmospheric Targets. Because the space theater of war is in outer space and more than 120 km above the earth’s surface, there are no restrictions concerning national boundaries and sovereign air space. The side possessing space control can therefore exercise complete freedom of action. The use of space-based weapons systems to strike endoatmospheric air, land, and sea targets demonstrates a unique superiority.

The Chinese charge that the emergence of this new mode of combat operations “will certainly further fuel the race for space dominance.” It also will elevate the role of space control in future information warfare.

Finally, the decisiveness of space control in future information warfare is clearly reflected in the ever-escalating preparations by world military powers to win future space wars. The pace of competition for the militarization of space has increased dramatically since Desert Storm, to include the vigorous development and deployment of offensive and defensive weapons for space operations, accelerated development of the space theater of war, creation and organization of space combat troops, and development of theories on space combat.

According to the Chinese, the United States and Russia are engaged in a race to develop ground-, air-, and space-based weapons—to include ground-based kinetic anti-satellite systems, laser anti-satellite systems, and airborne anti-missile and anti-satellite systems. They also are intensifying efforts to develop space weapon platforms such as “space war” and aerospace aircraft. The United States is said to be developing space warplanes and space bomber planes that boast a velocity of Mach 10 and radius of operations exceeding 10,000 kilometers, enabling them to execute space and ground strikes simultaneously.

The real motive behind U.S. development of a ballistic missile defense system, say the Chinese, is to construct a space theater of war in order to be the first to seize “the commanding height” in space. They charge that, to seize full control of space dominance, the United States will also take steps to prevent other states from launching satellites. The Chinese also assert that the United States is striving to set up ten “long-range aviation and aeronautical troops”—with plans to build a complete “space army” by 2015. Russia has already set up an independent military branch—the “Space Army” (sic)—which will gradually be charged to conduct only space combat missions.

According to the Chinese, a consensus has already formed in the U.S. and Russian militaries regarding the “ideology of integrated air-

and-space warfare.” In the late 1990s, the U.S. military unveiled the concept of a “seamless” integration of air and space in combat operations, with the objective of developing the air force first into a “space-air force” and then into an “air-space force.” Current theories on space warfare reflect a switch away from space support and toward offense and defense—with a growing emphasis on offense. The U.S. military is said to attach enhanced importance to using all kinds of space weapons against *both* endo- and exoatmospheric enemy targets. The Russian concept of “non-contact war,” say the Chinese, is essentially a theory for using all kinds of long-range precision strike forces—with space combat systems as the nucleus—to execute a highly concentrated, precise, and surprise attack on critical enemy targets.

As “informationized war” advances, say the Chinese, space will truly become the new theater of war and thereby establish a new milestone in mankind’s history of warfare.

According to Chinese military experts, the President George W. Bush’s administration dictates that—in order to maintain its world hegemonic position—the United States must maintain control of outer space. The U.S. loss of its current control of outer space would signify the demise of its status as a global superpower. The United States, say the Chinese, will therefore increase the momentum of using outer space for military purposes.⁷³

To accomplish this objective, the United States is avidly developing outer space weapons, investigating space warfare tactics and strategy, and conducting space warfare simulation exercises. The U.S. space-based laser weapon is said to have entered the integrated flight test stage. Feasibility research of both ballistic missile interception and attacking space targets using high-power laser beams from space platforms has been conducted. In 2010 or later, trajectory tests of space-based laser demo devices will be implemented, to be followed by the deployment of practical systems. The space strike

⁷³ Lu Qichang, “The New Military Strategy of the George W. Bush Administration,” *Xiandai Guoji Guanxi* (hereafter cited as *XGG*), May 13, 2001.

weapons being developed and manufactured—as well as prospective systems—primarily include: antisatellite weapons and high-altitude anti-missile weapons, space warfare weapons platforms, aerospace aircraft, space combat aircraft, etc.⁷⁴

The Chinese also charge that the United States is developing “some new-concept weapons” for its twenty-first century space force, including directed-energy, kinetic-energy, and non-antipersonnel weapons. Directed-energy weapons (laser, microwave, particle-beam, etc.) can be used not only to destroy various ground targets and flying targets such as aircraft, ballistic missiles, cruise missiles, satellites, and space stations, but also in both electronic warfare and photoelectronic warfare. Kinetic-energy weapons use ultra-high-speed warheads with extremely high kinetic energy such as electromagnetic cannons and intelligent intercepting bombs to collide with and destroy targets directly. Non-antipersonnel weapons include chemical energy-losing agents, low-energy-laser-blinding weapons, omnidirectional irradiation weapons, etc.

The Chinese also remind us that the Russian Security Council has approved Russia’s ten-year aerospace development plan for 2001–2010. The program aims to: (1) manufacture and enhance existing dual-use satellites; (2) develop and launch new earth atmosphere and maritime observation, military reconnaissance, and navigation satellites; and (3) explore both Mars and the moon. All of these Russian objectives are said to be tailored precisely to break the U.S. outer space monopoly. “The prelude of the race to win twenty-first century space superiority,” say the Chinese, “has begun.”⁷⁵

Chinese military scientists realized long ago that space—the highest rung in the four-tiered combat ladder of land, sea, air, and space—had become the strategic high ground for winning future wars. But “the global media” are currently “sounding an alarm about the arrival of the age of space war—‘the Sixth War’.” This develop-

⁷⁴ Wei Qiyong, Qin Zhijin, and Liu Erxun, “Analysis of Changing Emphasis in U.S. Military Strategy,” *op. cit.*

⁷⁵ *Ibid.*

ment is said to stem from five factors.⁷⁶ First, as the United States begins to deploy its BMD system, the secure and safe operation of its satellites has become an essential lifeline for the system's effective operation. Second, a satellite's inherent vulnerability and susceptibility to offensive actions remains its weak area. Third, as technology advances, satellites themselves have acquired considerable active-attack capabilities. Fourth, the possibility of terrorist use of antisatellite means may render U.S. comprehensive deterrence against other countries ineffective. Finally, the three recent U.S. high-tech conventional wars demonstrated the unprecedented and ever-escalating importance of satellites.

The United States is said to be working desperately hard in the fields of satellite protection and antisatellite measures to ensure its supremacy in both space and electromagnetic spheres—as well as its hegemony in aerospace warfare and the all-dimensional battlefield. The Chinese charge that U.S. plans to construct a “space empire” will nullify the 1967 Outer Space Treaty. They may also stimulate other countries to enter a space arms race. Russia indicates that it will be prepared for space combat before 2008; while France, Japan, Israel, and South Korea are intensively developing their respective space forces.

Countering Space Systems

According to Chinese military scientists, China aims to achieve at least two objectives in its advancement of military space capabilities and military-technological development.⁷⁷ First, it aims to develop strong-propulsion carrier rockets to carry digital reconnaissance satellites in a bid to form an “around-the-clock” spatial imaging reconnaissance system. Second, it aims to develop a new generation of solid-fuel rockets to carry micro-satellites in an endeavor to estab-

⁷⁶ Weng Hansong, “Military Observations: Building of U.S. ‘Space Empire’ Marks the Start of the ‘Sixth War,’” *Renmin Wang*, January 5, 2005.

⁷⁷ “China Military Space Power Advancing,” *Hong Kong Yazhou Zhoukan*, November 14, 2004.

lish a space network for precise positioning, communications, and electromagnetic jamming and reconnaissance. These rockets use 120-ton liquid oxygen engines and 50-ton liquid oxygen/liquid hydrogen engines, and their carrying capacity can reach 15 tons. They are also capable of launching satellites into near-earth orbit.

Based on the capabilities of reconnaissance satellites, Chinese military experts have compiled the following list of four radar countermeasures:⁷⁸

- (1) ***Impair the signal power requirement of reconnaissance equipment for completely capturing radiation sources.*** This countermeasure calls for using low, extremely low, or ultra-low side-lobe antenna to impair the reconnaissance satellite's ability to meet its power requirement. In addition, radars should be allowed to operate beyond the detection zone of the satellite.
- (2) ***Impair the surveillance requirement of reconnaissance equipment for completely capturing radiation signals.*** This countermeasure involves applying schemes similar to the information encryption principle to expand the operational space of radar parameters beyond the surveillance space of the reconnaissance satellite.
- (3) ***Impair the analysis ability of reconnaissance equipment for completely capturing radiation source signals.*** Using electronic deception and camouflage techniques and tactics, this countermeasure impairs analysis of the completely captured radar signal.
- (4) ***Space information countermeasures.*** These include: (a) aiming for the satellite's effective payload by applying suppression interference to cause overload in the satellite's receiving system, data processing system, and memory; (b) targeting the satellite's remote control system by establishing a space target monitoring system to acquire the reconnaissance satellite's technical parameters and character information, and

⁷⁸ Que Wenyan and Yang Bo, in *Xiandai Leida*, February 1, 2004.

effectively detecting and analyzing the satellite's operational system and down-pass remote signal; (c) attacking the satellite's space-to-ground communication and command nodes to weaken the connection, link, mutual operation, and networking flexibility in order to degrade its operational effectiveness; and (d) using high-energy and kinetic weapons to blind or destroy the reconnaissance satellite.

In late 2004, Chinese military experts analyzed the tactics that the United States could employ to attack the Galileo network. These are said to include:⁷⁹ (1) attacks by ground-based laser weapons; (2) attacks by airborne laser weapons; and (3) attacks by orbiting weapons (orbiting weapons capable of attacking enemy targets include laser and beam weapons). These experts also propose three measures that China and other countries could employ to counter the three above-mentioned tactics: (1) passive defense by creating a protective shield in space to disperse laser attacks; (2) active defense by establishing ground-based antisatellite systems and orbital weapons platforms and deploying orbiting weapons to attack and destroy hostile targets; and (3) developing strategic weapons to counter space weapons.

While Chinese military experts applaud the "brilliant" performance of the U.S. Global Positioning System (GPS) in recent high-tech military operations, they continue to clarify its inevitable "Achilles' Heel." They have delineated three major targets of opportunity: defeating GPS at its source, in the middle, and at the end.⁸⁰ At the source, they propose exploiting the weakness of the low orbits of navigation satellites by attacking with antisatellite satellites, high-energy laser weapons, and high-altitude weather-monitoring rockets. In the middle, they propose exploiting scattered and exposed ground stations. Finally, at the end, they propose exploiting the fact that navigation signals are highly attenuated. After attenuation by

⁷⁹ Hong Kong *Wen Wei Po*, October 25, 2004.

⁸⁰ Chen Xuejun and Lang Daqiang, "Methods for Defeating GPS," *Junshi Wenzhai*, November 1, 2004, pp. 52-53.

natural causes, the ground signal is very weak and easy to jam. To prevent the enemy from locating and destroying the GPS jammers and to avoid personnel losses, the GPS jammer can be carried on a variety of platforms—such as numerous aircraft and projectiles—and thrown into a designated region for effective jamming.

Countering a U.S. Ballistic Missile Defense System

In analyzing the capabilities of the air- and space-based laser systems that underpin the ballistic missile boost-phase interception stage of the U.S. BMD system, Chinese military scientists have also analyzed the feasibility of boost-phase evasive measures, to include the following four methods:⁸¹ (1) employ fast-burning rocket motor to shorten the duration of the boost phase and hence the duration for a laser attack; (2) perform active rolling of the missile body during the boost phase so that the energy of the laser spot at a given location remains lower than the damage threshold; (3) apply high-reflectivity, low-conductivity, anti-laser coating on the missile surface to reduce the thermal coupling coefficient of the laser and keep the temperature rise rate in the safe region; and (4) use other countermeasures such as smoke.

Chinese military experts readily admit that the advancement of boost-stage laser interception systems presents major challenges to offensive ballistic missiles. But the aforementioned countermeasures “can improve the missile’s defense during the boost phase to some extent.” Chinese military scientists also stress that the creation of BMD systems and corresponding “penetrating measures” again prove the “shield-spear” dialectic, each of which will always generate the other and advance competitively. For today, the Chinese propose the following “penetrating measures:”⁸² (1) multiple warhead attack; (2) decoy penetration, including true decoys, signals transmitting decoys, and false decoys; (3) interruption and concealed penetra-

⁸¹ Gu Lixiang, in *Daodan yu Hangtian Yunzai Jishu*, April 10, 2003, pp. 25–32.

⁸² Dong Han-quan and Lu Ming-hua, in *Dangdai Fangyu Jishu*, June 1, 2004.

tions; (4) enclosing balls (huge metallic membrane balloons); (5) trajectory change penetrations; (6) mobile launch; and (7) a preemptive strike to “attack and destroy a certain part” of the BMD system.

To conduct the preemptive strike, the Chinese propose first using “suicide satellites” (an on-orbit type of cruise satellite) or laser weapons to destroy the early-warning satellite system and space-based infrared systems of the BMD system to paralyze them. Then, launch preemptive attacks against each component of the BMD system. According to Russian scientists, say the Chinese, it is possible to use a mid-air nuclear explosion to destroy the “command, control, and communication management center” of the BMD system to both paralyze and attack its essential defensive capabilities. These Chinese experts assert that for the long term, *“we must intensify new and high-tech pre-research in this field, focus on aerospace threats and missile-attack and defense confrontations, and establish an all-dimensional and integrated missile defense system as soon as possible.”*

China's “Monroe Doctrine”—And Beyond

The engine of the ongoing (albeit reluctant) Sino-Russian “strategic partnership” remains unchanged: countering U.S. superiority in the development and employment of ever-emerging weaponry—to include the burgeoning BMD system. On the one hand, senior Russian military officials, such as Colonel-General Alexander Belousov, first deputy defense minister, state, “China . . . is our most serious neighbor, and we understand full well the position it will hold in 30 years or less. So cooperation with it is extremely important for our country.”⁸³

On the other hand, a growing number of Russian officials and experts assert that China constitutes “the main (and perhaps sole) threat to Russia.”⁸⁴ It remains the quintessential specter of resource

⁸³ Colonel-General A. Belousov, cited in V. Statskiy, “The Combat Capability of the Army Should Gain Siberia,” *Pravda*, March 3, 2005.

⁸⁴ General-Lieutenant A. F. Klimenko and Colonel V.I. Lutovinov, “We May Endanger Russia's Military Security by Misrepresenting Real Threats,” *VM*, no. 4, 2001, pp. 69–72.

hunger and demographic overflow. China has more numerous ground forces and unlimited manpower reserves. Unlike Russia, it has large reserves of arms and materiel. Indeed Russian military experts now warn that “thanks to Russia, Chinese military might is growing even faster than its economic might.”

In late 2004, two Russian military experts noted a new development in the Sino-Russian arms partnership: “The Chinese—*just like vacuum cleaners*—collect the most promising technologies and purchase the most up-to-date weapon systems. They are no longer interested in our old weapons: they have an excellent grasp of the developmental trends in modern weapons and they expect only the best from us.”⁸⁵

In January 2005, General-Lieutenant V.I. Ostankov, director of the General Staff's Military-Strategic Studies Center, warned that the strengthening of China's economic might and its growing population require tremendous resources. Because the repository of the world's natural resources has already been divided up, it seems logical that the vector of Chinese expansion will be directed toward the abutting regions of Russia (above all, Siberia and the Far East) as well as of Kazakhstan and other countries of Central Asia. Nor should it be forgotten that China's geopolitics as formulated by Mao gave priority to expanding the country's borders, especially by annexing Russian territories.⁸⁶ According to Russian military scientists, the process of settling Chinese people in the Far East is proceeding almost unchecked. Even now it is acquiring a massive character, which creates the preconditions for a conflict situation and the use of force.⁸⁷

In 2003, Yuri M. Galenovich published a book entitled *The Mandates of Jiang Zemin*. Besides bolstering Russian perceptions of impending Chinese threats, he included a most telling appendix.

⁸⁵ Yuriy Sumbatyan and Colonel Sergei Kharlamov, “Only the Best for the Army: This is the Path Taken During the Continuing Reforms in China,” *Armeyskiy Sbornik*, October 31, 2004.

⁸⁶ General-Lieutenant V.I. Ostankov, “Geopolitical Problems and Possible Solutions in the Context of Ensuring RF Security,” *VM*, no. 1, 2005, pp. 2–7.

⁸⁷ Sumbatyan and Kharlamov, “Only the Best,” op. cit.

The appendix consists of excerpts from a history textbook designed for the eighth grade of a nine-grade public school within the mandatory Chinese educational system. The excerpts are basically maps depicting all Chinese territories seized, occupied, or annexed by either Czarist or Russian forces. (See Figure One).⁸⁸

Despite the “general stability” of current Sino-Russian relations, the perennial concerns over a large-scale non-nuclear conflict between the two powers remain serious. Efforts to prevent this scenario only by political methods, by promoting friendly relations, or by relying on conventional weapons could prove ineffectual. The Chinese factor dictates that Russia’s main political thrust be grounded in nuclear weapons and strategic cooperation with the West.

Some Russian analysts have gone so far as to charge that Russian nuclear weapons are in fact a “non-deterrent” against China. The Chinese leadership is said to be willing to sacrifice “hordes” of its citizens in pursuit of its geostrategic objectives. The only alternative to a Russian nuclear threat consists in creating a strong general-purpose task force and maintaining a well-equipped “theater of military operations” in the region.⁸⁹

In April 2005, General-Lieutenant A.F. Klimenko published the lead article in *Military Thought*—the preeminent military-theoretical journal of the Russian Armed Forces. Citing numerous Russian and Chinese sources, he provided a compelling Chinese masterplan for achieving global politico-military dominance by 2050. This so-called “rebirth” of China is said to be largely rooted in the development of its military-industrial complex, whose reform focuses on the creation of an integrated military-civilian production system.⁹⁰

“In the Russian view,” says General Klimenko, China cannot currently compete with the United States, India, Japan, and Russia. So, to quote Jiang Zemin in 2002, China must temporarily “sheathe the

⁸⁸ Yuri M. Galenovich, *The Mandates of Jiang Zemin* (Moscow: Muravey, 2003), pp. 332–333.

⁸⁹ Colonel V.N. Tsygichko and A.A. Piontkovskiy, “Russia’s National Security in the Early 21st Century,” *VM*, no. 2, 2001, pp. 63–70.

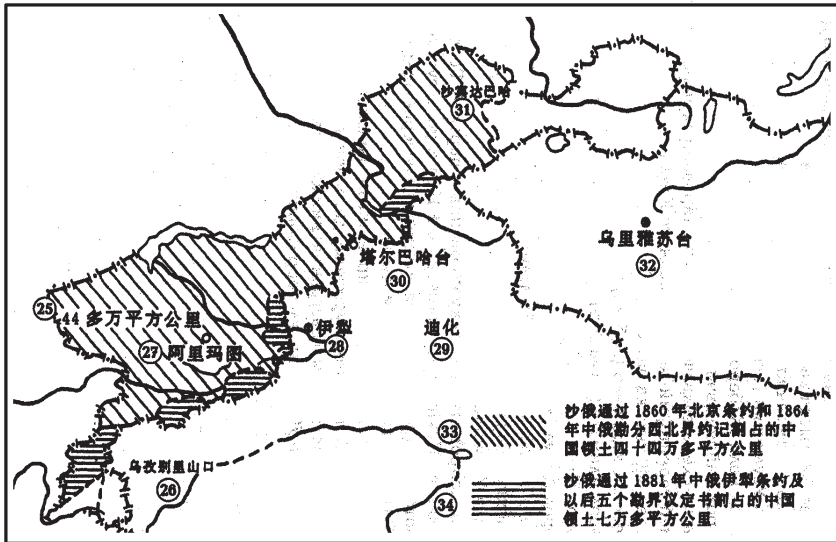
⁹⁰ General-Lieutenant A.F. Klimenko, “The Evolution of China’s Military Policy and Military Doctrine,” *VM*, no. 4, 2005, pp. 2–17.

Figure One

第一章 两次鸦片战争



① 沙俄侵占中国东北示意图



② 沙俄侵占中国西北示意图

sword and learn humiliation” in order to win time to solidify the “masterplan” and then claim the role of world leader. As a result, the essence of China’s current foreign policy consists in cultivating partnerships with the aforementioned powers and other regional players.

China’s geostrategic objectives will therefore be achieved not by open military confrontations, but by “multi-dimensional and multi-year political mergers and ‘special’ military operations.” The PLA’s air and space forces will secure naval dominance in the region during the period of “rebirth.” And, General Klimenko concludes, “Knowing the determination and perseverance of the Chinese, one may believe that they will rush to accomplish their stated goals.”

According to General-Major V. Slipchenko, the ultimate goal of Chinese military reform consists in the creation of a military establishment that guarantees “living space” within “strategic borders.” These “strategic borders” must shift according to the expansion of China’s “Integrated State Power,” the primary components of which are economic and military might. The Russians warn that a Chinese “Monroe Doctrine” is quietly at work: “All of Asia belongs to the Chinese—and not only Asia. . . .”⁹¹

Implications for the United States

Since 2001 we have been challenged by the need to transform our forces to deal with a cunning, soul-less, but essentially low-tech predator—the terrorist. Yet those other realms of warfare that occupied us prior to 9/11—information, naval, and above all aerospace—still constitute the nucleus of the new RMA. If we neglect the timely development of weaponry in these arenas, then China could catch America like a deer in the proverbial headlights—precisely where we caught them after the 1991 victory in Desert Storm.

The Chinese have shown themselves to be capable of quickly translating lessons learned into actions that enhance national power

⁹¹ General-Major V. Slipchenko, cited in “China: Geopolitics and Certain Problems of Military Equipment Acquisition,” *Avia Panorama*, April 15, 2005.

and serve national interests. Consequently, China is likely to evolve into a more formidable adversary at a faster pace—one capable of imposing tangible restraints on the U.S. pursuit of its national objectives. Even in the face of technological superiority, they say, a man can always “kill with a borrowed sword.”

For example, Chinese military strategists argue that China should pursue (and at least partially by “incorporating” critical foreign technologies into domestic developmental programs) the following capabilities to offset the military advantages of U.S. (and Russian) space systems: electromagnetic pulse weapons, antisatellite satellites, suicide satellites, space mines, ground- and air-based high-energy laser weapons, orbiting laser and beam weapons, high-altitude weather-monitoring rockets, novel strategic weapons against space weapons, and preemptive nuclear strikes against BMD system components.

Chinese military strategists argue that the space-information continuum constitutes the nucleus of future wars. The core of ongoing Chinese military reform thus consists in the development of those symmetrical and asymmetrical systems and strategies designed to neutralize *today's* U.S. technological superiority.

History has taught all generations that maintaining technological superiority—not to mention a nation itself—requires a policy, persistence, and (sadly) a price. But at least two recent U.S. technological initiatives—“Air-Land Battle” and “Star Wars”—already have assisted in smashing the bloody cement of the Berlin Wall.

The upcoming Quadrennial Defense Review is due next year. It must address the evolving military, economic, and—lest we all forget—totalitarian Chinese juggernaut.

China-Taiwan Conflict Scenarios

This study has sought to define some challenges to U.S. security interests that 25 years of Chinese economic growth and transformation may create. One way to assess these challenges is to look at scenarios for potential conflict. Seen against the current trends in the development of U.S. and Chinese military power, how U.S., Chinese, Taiwanese, and Japanese strategists, today, imagine the course of a war between China and Taiwan tomorrow—a war that may also involve the United States and Japan—can provide useful insights. Hence, we will briefly discuss perspectives from each of these four actors, derived from open-source material. Though scarcely comprehensive or exhaustive, these writings open a window onto some of the possibilities for a China-Taiwan military confrontation.

The Chinese Perspective

Unsurprisingly, *official* Chinese views on potential conflict scenarios with Taiwan are difficult to come by. There is, nonetheless, a substantial body of writings produced by prominent Chinese thinkers and strategists. A recent RAND Corporation study⁹² analyzed these doctri-

⁹² Roger Cliff, “China’s Military Modernization and the Cross-Strait Balance,” testimony before the U.S.-China Economic and Security Review Commission, September 15, 2005, http://www.rand.org/pubs/testimonies/2005/RAND_CT247.pdf.

nal writings, with their findings falling under five main strategic principles that Chinese military strategists lay out for engaging in any conflict with Taiwan that could potentially involve the United States.

- (1) ***Seize the initiative early.*** The Chinese believe surprise is important not only for the immediate advantage it confers, but also for its continuing ability to maintain the initiative by forcing an adversary to react to China's moves. The chances of achieving surprise are, in turn, greatly increased by preemptive action. Preemptive action, if it can produce a decisive outcome quickly, will also prevent superior U.S. forces from being brought to bear. Because China believes that the United States will inevitably intervene in a conflict on Taiwan's behalf, Chinese planners see an advantage in attacking U.S. forces prior to engaging in such a conflict. Whatever the historical examples to the contrary, some Chinese military strategists believe that a preemptive strike that causes many U.S. casualties and high economic costs will dissuade the United States from further engagement, because the costs of restoring the *status quo ante* will be very high.
- (2) ***Pursue limited strategic aims.*** China believes itself still inferior to the United States militarily, and thus calculates that its best chances for winning and securing Taiwan lie in presenting the United States with a *fait accompli* that avoids harming any of the United States' main interests. The speed required for such an invasion thus involves the use of covert operatives and special forces to attack such critical targets as aircraft; air bases; command and control facilities; communications links; fuel storage, distribution, and dispensing facilities; and repair and maintenance facilities.
- (3) ***Strike "key points."*** The need, therefore, is to focus on striking five "key points": command systems, information systems, weapon systems, logistics systems, and the linkages among these. Massive destruction in these areas might be able to prevent the United States from bringing all of its

fighting strength to bear in a timely fashion, and discourage it from continuing the conflict.

- (4) ***Avoid direct confrontation.*** The Chinese believe they stand to gain more from defeating a handful of critical defenses, such as the “key points” enunciated above, than in directly confronting U.S. and Taiwanese troops. Due to U.S. military superiority, Chinese strategists call for avoiding direct confrontation between sets of forces. This is consistent with the Chinese belief in the principle of limited strategic aims.
- (5) ***Utilize high technology.*** Chi Haotian, a former state councilor and minister of defense reportedly said, “Our strategic principles must be based on the scenario of military intervention by the United States at the deployment level. We should fight a high-technology war and, more importantly, be prepared against the military intervention by a bloc of countries led by the United States and fight a modern, high-technology war of a considerable scale.”⁹⁵

The U.S. Perspective

The Department of Defense’s 2005 report to Congress on China’s military power anticipates five main strategies on the part of the PRC to coerce reunification with Taiwan. These are persuasion and coercion, limited force options, an air and missile campaign, a blockade, and amphibious operations. These strategies are described in detail as follows:

- (1) ***Persuasion and Coercion.*** This strategy involves using psychological, diplomatic, economic, and military pressure to corner Taiwan into choosing reunification over independence. As part of this strategy China encourages economic interdependence between China and Taiwan, and then discourages Taiwanese doing business in China from supporting

⁹⁵ Al Santoli, ed., “Defense Minister: PLA Preparing for War with U.S.; Beijing Details New Ballistic Missile Test,” China Reform Monitor, no. 233, August 17, 1999, <http://www.afpc.org/crm/crm233.shtml>.

Taiwanese pro-independence parties. China also tries to spread propaganda in favor of reunification within Taiwan. It also uses third countries and parties as a way to exert additional pressure on Taiwan by getting them to distance themselves from Taiwan and thereby isolate Taiwan diplomatically. Maintaining military pressure with weapons tests and exercises reinforces Taiwan's isolation through the suggestion of an ever-present military threat.

- (2) **Limited Force Options.** In this scenario, the PRC could use targeted strikes with short-range ballistic missiles, special operations forces, or cyber warfare on key political or military installations to terrorize Taiwan into reunification. One such strike weapon, which might incapacitate Taiwan's electronic war-fighting capabilities, as well as civilian electric and transportation networks, is a high-altitude electromagnetic pulse bomb. Such a strike might not only affect Taiwan's leaders' ability to act, but also likely unnerve the island's population. Other limited force options include using special operations forces to carry out economic, political, and military sabotage within Taiwan.
- (3) **Air and Missile Campaign.** An air and missile campaign could use precision air strikes and short-range ballistic missile attacks to subdue Taiwan before any intervention by the United States or other nations was possible. Key targets of such an attack would include communications facilities, radar and missile sites, and air bases.
- (4) **Blockade.** The PRC could use a naval and/or air blockade as another method of pressuring Taiwan into reunification. A full naval blockade would be difficult for the PLA in its current configuration to execute and maintain. A partial blockade would be more likely and would still have an immediate economic impact on Taiwan. Any form of a blockade would invite international pressure, however, and in the time it took to achieve political concessions from the Taiwanese side

could just as easily lead to a protracted engagement that would not play to the PRC's strengths.

- (5) ***Amphibious Invasion.*** Amphibious invasions, involving complicated logistics and planning, are generally among the most difficult of military undertakings. They also easily can come with a huge loss of life of the invading force, presenting extra political and military risk to China's leadership. The success of any such invasion of Taiwan would depend on the PLA's amphibious and air lift capacity, attrition rates, the interoperability of the PLA's different military branches, the efficiency of the PLA's logistics operations, Taiwan's ability to resist, and the speed and size of a third-party response. On the latter point, delaying, deterring, or defeating foreign intervention would be critical. So far as the United States is concerned, such a Chinese effort would likely employ a PLA sea-denial campaign to hold the U.S. navy, including logistic forces and aircraft carriers, at bay. This clearly represents the riskiest of the five strategies for integrating Taiwan into the PRC.

The Taiwanese Perspective

Taiwan's Ministry of Defense is focused on what it believes would be a blitzkrieg attempt on the PRC's part to retake Taiwan with a goal of "less damage, high effectiveness, rapid strike, and decisive actions."⁹⁴ Taiwan military planners believe that the PLA's efforts in laser, information, aerospace, and automatic technologies, as well as efforts to improve joint operation capabilities between naval and air forces, in conjunction with the deployment of long-range strike weapon systems, are all proceeding with this goal of a rapid and decisive victory.

Taiwan's Ministry of Defense foresees four possible scenarios for PRC military action. These are:

⁹⁴ Ministry of National Defense, R.O.C., "About MND: Introduction," <http://www.mnd.gov.tw/eng/about/Introduction.htm>.

- (1) ***Military coercion.*** In this scenario, the PRC would fire ballistic missiles into the seas surrounding Taiwan, concentrate PLA forces directly across the strait from Taiwan, and possibly execute military expeditions to occupy Taiwan's surrounding islets. PLA warships and fighter jets may initiate actual air and sea attacks, or merely issue warnings, to intimidate Taiwan. The media can become a tool of the PRC, spreading fear and causing social unrest. Taken together with other psychological and economic pressures, this approach could secure Taiwan for the PRC with a minimum of casualties and damage.
- (2) ***Disconnected warfare.*** In this scenario, the PRC would force Taiwan into reunification through three non-military forms of warfare—cyber warfare, electronic warfare, and financial sabotage—as well as three limited forms of warfare—assassination and decapitation, stand-off precision strikes, and raids by special forces to capture high-value military and political targets. One method might be to employ hackers, computer viruses, information bombs, and electronic jamming to destroy or render inoperative Taiwan's command, control, and communications systems. The PRC's goal would be to cause unrest and ultimately a breakdown in economic, societal, and military order.
- (3) ***Blockage warfare.*** In this scenario, the PLA would attempt to seal off Taiwan's seaports and cut off its sea lines of communication. The PLA can use ballistic missile defense tests, mine-laying, and military exercises to conduct a partial blockade and proclaim some portion of Taiwan's offshore islets and sea routes off limits. Alternatively, it could conduct a full-scale blockade of both maritime and air space to sever Taiwan's export and import economic lifelines, depress morale, and essentially force surrender through strangulation.
- (4) ***High-intensity strikes.*** In this scenario, the PLA would utilize high-performance weapons and special forces to conduct

highly destructive strikes that would achieve for it rapid and decisive dominance over Taiwan. Weapons involved here could include ballistic, cruise, and anti-radiation missiles, as well as micromagnetic and electromagnetic pulse bombs. Saturated attacks and joint-precision strikes could destroy Taiwan's centers of economic, political, and military power. Taiwan considers a full-scale invasion by the PLA to be beyond the realm of possibility, but considers that it could in the future develop enough high-performance weapons to subdue Taiwan to the point that full-scale invasion might be possible.

Taiwan views the first three scenarios as the most likely. Some Taiwanese military strategists have put forward the idea of "preemptive defense," that is, maintaining a strong deterrence posture during peacetime and improving long-range precision-strike and information warfare capability. Other defensive measures possible during wartime would include anti-blockade, anti-submarine, and cyber warfare against China's command, control, and communications systems.

The Japanese Perspective

Although the potential for Japan to be involved in a China-Taiwan conflict is obvious because of the dozens of U.S. military facilities the country hosts, the Japanese government—for obvious historical and political reasons—does not address military scenarios openly. But in late September, 2005, *Kyodo News* revealed a confidential security plan drafted by the country's Ground Self-Defense Force (SDF) during 2003 and 2004, part of an effort to revise Japan's Defense Guidelines. The plan, laying out possible Japanese military responses to Chinese attacks on Japan, describes two scenarios involving conflict with China that might occur between 2004 and 2009. The first envisions Chinese troops landing on the Senkaku Islands (a set of oil, gas and fishing rights-rich islands near international shipping routes claimed by Japan, China, and Taiwan) in the East China Sea. The second envisions Taiwan declaring its independence from

China, China attacking Taiwan, the United States intervening, and finally China attacking U.S. military bases or SDF facilities in Japan.

In the second scenario involving a conflict over Taiwan, the Ground Staff Office foresees a possible Chinese invasion of Okinawa's peripheral islands as part of an effort to block any support operations for Taiwan emanating from bases in Japan. They also anticipate attacks by Chinese special forces of certain of the southernmost Japanese islands containing air bases and radar installations by air and amphibious attack.

Both scenarios discuss in great detail the geographical and operational aspects of a variety of Japanese responses, involving redeployments of large portions of Japan's armed forces. Overall, these documents provide an instructive example of how Japan has shifted its military focus from Cold War threats and the Soviet Union to contingencies that consider armed conflict with China.

Toward a New Two-War Paradigm

Certain themes, such as surprise, rapid action, targeted action, and emphasis on high-technology strategies are evident in all four actors' perspectives on a potential China-Taiwan conflict. China's now oft-stated declarations that its future military capabilities will rely on a mastery of the highest of high-tech weapons and China's rapid development as an advanced technology state mean that the United States, whatever other military problems it must solve, must plan seriously for China's development of weapons of greater complexity and power. The United States must be prepared to fight the *twenty-first century version* of "two wars" or "two-and-a-half wars"—not only the low-tech war that terrorists and their organizations are already fighting against us, but also the war of complex technologies—information warfare, space warfare, deep-sea warfare, and the less exotic but still vital arena of air superiority—that China may very well decide to fight against us. We therefore need to ensure that the interpretation of the terms "transformation" and "modernization"

that dominate defense planning right now—enhancing our capabilities for urban warfare, special operations, post-conflict stabilization, and the like—does not come too dangerously at the expense of what these same terms meant just a few years ago—mastery of twenty-first century technologies so as to ensure victory on the twenty-first century, high-technology, battlefield. Expensive and seemingly disturbing as this may be given the other security concerns of today, we have been aware of this problem for the past fifteen years and the United States should no longer forestall an engagement with it. Otherwise, we may face the real prospect that the military operations we can execute with relative ease in Asia today we will not be able to execute with the same confidence fifteen years from now.

