CHAPTER 5

TOWARDS AN INTEGRATIVE C4ISR SYSTEM: INFORMATIONIZATION AND JOINT OPERATIONS IN THE PEOPLE’S LIBERATION ARMY

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INTRODUCTION

The People’s Liberation Army (PLA) views information superiority—the use of information and its denial to adversaries—as the main determiner of success on a high technology battlefield. While much attention has been paid to the PLA’s development of modern weaponry, less attention has been paid to its development of a comprehensive command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system. While the PLA follows Chinese leaders’ guidance, namely Chairman Hu Jintao’s addresses and the recent Defense White Papers, to develop overall information capability, it also sees the development of a networked C4ISR system capable of locating and tracking targets and fusing intelligence into a coherent battlefield picture as essential to carrying out the long-range precision strikes necessary to attack Taiwan and keep the U.S. military at bay.

This chapter conducts an assessment of the PLA’s transformation into an informationized force. In conducting this examination, the chapter will not focus on the development of technologies but will instead primarily focus on the capabilities that such technolo-
gies are intended to provide. To this end, it uses the PLA’s ability to conduct joint operations as the metric for evaluating its level of informationization. As the PLA trains for a potential conflict in the area around and well beyond Taiwan, its navy, air force, and Second Artillery will play larger roles and may even command operations. As a result, information must be brought together through an organizational and technological system that facilitates jointness.

This chapter is organized into four parts and is confined to the 10-year period beginning in 1999, the year the PLA issued a gangyao (纲要)

² that formally instituted joint operations into PLA warfighting. The chapter first looks at the theoretical foundation for informationization and the PLA’s policies to turn itself into a network-centric force capable of winning future wars. It will then examine the PLA’s progress in developing C4ISR technologies with the goal of supporting network-centric operations by offering representative examples of PLA technology development. The third section takes joint operations as the metric for PLA informationization and analyzes PLA progress in organizing and training for joint operations. The chapter concludes that the PLA has made only desultory progress in establishing genuine interservice institutions, technology, and training in the past 10 years. This lack of progress in joint capabilities renders the PLA incapable of carrying out true joint operations. PLA analysts admit this fact and by extension, the PLA’s inability to win informationized wars. The PLA’s modernization goals, however, do not require it to be able to win an informationized war in the near term and China’s 2008 Defense White Paper only commits the PLA to lay a solid foundation by 2010. The year 2009, however, will most likely be seen as a
pivotal year in the PLA’s quest for joint operations. In 2009 the General Staff Department (GSD) provided training objectives that for the first time fully committed the services to joint operations. At the same time, the services have also been admonished for their lack of attention to joint reforms. These regulations and exhortations were followed up by the first war zone-level joint exercise in the PLA in June 2009. Consequently, while the PLA has much work ahead to realize true interoperability, recent efforts have laid a foundation that positions the PLA for reforms in the decades ahead.

INFORMATIONIZATION THEORY AND POLICY: NETWORK-CENTRIC WARFARE

The PLA’s drive to develop into an informationized force began in the early 1990s and was a response to the revolution in military affairs (RMA) and the performance of the U.S. military in Operation DESERT STORM. The superiority of airpower, precision guided munitions, and high technology stirred debate within the PLA on its ability to fight and win modern wars in terms of both technology and operational doctrine. PLA theorists concluded that the source of U.S. military strength was based on the RMA, which PLA authors stressed was mainly a technological revolution in which information technology (IT) would play a central role. In the words of one group of authors, “If information technology is the vanguard of the new technological revolution, then information warfare will be the core of the new military revolution.”

A major component of PLA transformation is the development of a networked C4ISR system. The PLA in this regard has largely been guided by the U.S. con-
cept of network-centric warfare (NCW). The term network-centric warfare was first coined by Chief of Naval Operations Admiral Jay Johnson in 1997 and later popularized by the late Admiral Arthur K. Cebrowski when he headed the Pentagon’s Office of Force Transformation. Network-centric warfare remains ill-defined, but involves translating an information advantage characterized by a shift in focus from platforms to networks, information sharing, and shared situational awareness into a warfighting advantage characterized by knowledge of commander’s intent, self-synchronization, and increased combat power. Network-centric warfare is intended to “enable a shift from attrition-style warfare to a much faster and more effective warfighting style” characterized by speed of command. The resulting increase in the speed of command is intended to foreclose enemy courses of action and disrupt the enemy’s strategy.

The decision to build a network-centric force occurred in the early 1990s when the PLA determined that it required an integrated C4ISR system. This assessment occurred at the same time that the U.S. military was making similar assessments, the difference being that the U.S. military stressed space-based and ground-based system integration whereas China only stressed ground-based systems.

It was not until 2000, however, that the PLA issued a gangyao on the building of “command automation systems.” Command automation systems are defined by the Chinese People’s Liberation Army’s Command Automation Regulations as “military information systems that possess command and control, intelligence and reconnaissance, early warning and surveillance, communications, electronic countermeasures, and other operational
and information support capabilities with computers
as the core.” They have also been described as “an
important yardstick for measuring an armed force’s
operational capabilities.”

While the official definition of command automa-
tion systems does not appear to have changed since
2000, the practical understanding of the term appears
to have changed as the PLA has modernized. In fact,
PLA writings indicate that the practical understand-
ing of command automation was expected to change
as PLA technology levels improved, just as the U.S.
military changed its understanding of command sys-
tems from C2 (command and control) to C3 (com-
mand, control, and communications) to C3I (com-
mand, control, communications, and intelligence) to
C4ISR (command, control, communications, comput-
ers, intelligence, surveillance, and reconnaissance).
As one source states, “The content of military command
automation systems is not unchanging, and it will
continually be developed, enriched, and expanded
along with military technology.”

In a reflection of this, writings around the time of
the issuing of the command automation gangyao often
referred to command automation as equivalent to the
term C3I. An article from 1999, for example, states
that Chinese command automation systems are main-
ly made up of networks, databases, and command
posts and does not mention surveillance or reconnais-
sance technologies. In the years following the issuing
of the command automation gangyao, the PLA began
to develop and field airborne and space-based ISR
technologies, and it was during this time that Chinese
military analysts began to consider the requirements
and applications of C4ISR systems to be used by the
PLA. By at least 2004, articles began referring to “our
military’s C4ISR systems,” with other sources explicitly linking the PLA’s practical understanding of command automation to mean C4ISR systems.

The command automation gangyao “laid down the guidelines for the development of command automation systems, and set objectives and implementation measures.” Xu Xiaoyan, then head of the GSD Communications Department, described the gangyao as a “herculean mission” that would have “an enormous impact on bringing about a fundamental change in the construction of the Chinese armed forces’ command automation systems from being a spontaneous, disorderly endeavor to one that is regulated by law; and on turning separate, independent systems into integrated systems.”

The gangyao proposed “four adherences” to guide the PLA in the development of command automation systems.

1. **Integration** is described as the inevitable trend of the development of command automation systems and the essential measure for improving the overall efficiency of these systems.

2. **Dual Peacetime/Wartime Use** is adherence to the basic principle of combining peacetime and wartime needs and being prepared for offensive and defensive operations. The PLA is urged to develop a system for use in wartime that can also meet peacetime needs. The PLA must also be prepared to defend the command automation network from attacks using information technology and to prepare to attack the enemy’s command automation systems.

3. **Centralization** means that command automation systems must be built according to centralized plans and according to the same regulations and standards.
4. **Innovation** consists of making leap-frog developments and breakthroughs in key areas.\(^{17}\)

**OVERALL STRATEGY**

The *gangyao* also led to the development of a four-part overall strategy to implement informationization in the PLA. The four parts of this strategy include: correct recognition of informationized warfare requirements, technology development, leveraging civilian information technology for military use, and leap-frog development.

**Correct Recognition of Informationized Warfare Requirements.**

One of the primary hindrances to the development of integrative C4ISR technologies in the PLA is the lack of understanding of the exact nature of informationized war. Doubts or misunderstandings remain over the conduct of informationized war and how to fight it. The main reason for this is the PLA’s lack of recent warfighting experience and the inability of PLA officers to accurately conceptualize the demands of modern war.\(^{18}\) In broad terms, the PLA is to expand into three new operational areas that will require it to develop six capabilities: rapid response, precision strike, information offense and defense, situational awareness, command decisionmaking, and precision support.\(^{19}\) The three new operational areas that these capabilities are to support are:

1. **Information:** The PLA is to use information technology to improve operations;
2. **Outer Space:** The PLA is to develop military space technologies and equipment to seize the high ground of space before the enemy; and,
3. Blue water: The PLA is to develop capabilities to defend its maritime interests well-beyond its shores.

Technology Development.

The PLA must develop so-called “assassin’s mace” weapons that are supported by a combination of ISR assets and integrated information transmission and processing technologies. Chinese analysts argue that the sensors and weapons required for over-the-horizon attacks are often possessed by multiple services, and that multiple reconnaissance platforms and services must be used in concert to both maximize strengths and minimize weaknesses. According to PLA analysts, C4ISR systems based on NCW will be completely networked, and will use a variety of communications means to link strategic, campaign, and tactical levels of command with every unit having access to the same information. Operations will be characterized by an expanded operational battle space which encompasses the ground, sea, air, space, and electromagnetic spheres. Information from ISR assets in these spheres will be fused into a large, seamless intelligence system that is designed to provide commanders with all-weather and all-dimensional information.

Leverage Civilian Information Technology for Military Use.

Because economic development is the main concern of the Chinese Communist Party (CCP), national defense construction must be subordinate to economic development. At the same time, national defense construction will continue as long as financial resources
increase. In developing information technology, the PLA will leverage information technology developed in the civil/private/commercial sectors, but will concentrate its own research on developing operational command and weapons systems, and rely on commercially-provided technologies for other systems.  

**Leap-frog Development.**

The PLA will exploit advances by other countries in information technology to assist its own development. The PLA can acquire foreign technology, improve existing foreign technology, learn from the experience of foreign militaries, and use foreign technologies as benchmarks. Leap-frog development is facilitated by the ease with which information technology can be easily purchased (or copied), unlike other types of military technologies, such as missiles. Moreover, the PLA should avoid the U.S. military’s mistake in first building stove-piped systems that then had to be integrated by developing those integrative technologies later.

The PLA’s commitment to leap-frog development is represented in the “twin important historic tasks (双重历史任务) of transforming from a half-mechanized force into a mechanized and informationized force. These taskings explicitly acknowledge that the PLA is not a fully mechanized force, yet is required to work simultaneously to become a mechanized and informationized force. This requirement was based on the realization that if the PLA waited until it became a fully mechanized force to develop into an informationized force, then it would fall too far behind the U.S. military. On the other hand, PLA technology limitations render it unable to transition directly into an informationized force.
TECHNOLOGY ADVANCES

The PLA has made great strides since 1999 in developing the technological basis for a comprehensive C4ISR system. The PLA uses a variety of communication means, including fiber optic lines, wireless communications, and satellite communications. In fact, PLA communication systems are broad-based and extensive. At the strategic level, for example, the PLA has established the All-Army Cultural Propaganda Information System (全军宣传文化信息网), an All-Army Military Training Information Network (全军军事训练信息网), an All-Army Long Distance Telephone Network, an All-Army Command Automation Network (全军指挥自动化网), an All-Army Teleconferencing Network (全军电话会议网络), and an All-Army “310 Office Net” (全军“310办公网”).

At the Military Region (MR) level, the Chengdu MR is said to use a combination of optical fiber networks, satellite networks, program-controlled switched telephone networks, computer networks, and teleconferencing networks. Optical fiber cables now cover 98 percent of the units at the regiment or battalion level and above, as well as key border defense posts and entry ports. Military program-controlled switched telephone network and satellite networks cover all units at the company level and above. Regional computer networks and teleconferencing systems have been established in combat units at the regimental level and above. In addition, a digitized broadband communications network connects all campaign and tactical level units horizontally and vertically.

The Nanjing MR has also extensively developed its C4 system over the past 30 years, which one article breaks down into three stages:
1. In 1978, a phase-one network established a computer network linking the GSD’s Operations Department with the MR Operations Department.

2. In 1985, work began on a phase-two network establishing a computer network linking the GSD with MR combat units at and above the division and brigade level. This network was put into service in 1992.

3. In 1998, the MR began the third phase which raised the MR units’ networking, informatization, and joint operations capabilities. In 2004, the MR built a network that appears to be equivalent to a Non-classified Internet Protocol Router Network (NIPRNet) that extends from the Central Military Commission (CMC) and the GSD to units at and above the regiment level. This network is used for videoconferencing, hosting websites and online forums, sending emails, and broadcasting movies, as well as for hosting specialized networks for political work; materials supply; petroleum, oil, and lubricants management; transportation; and frequency spectrum management. Presently, 100 percent of combat brigades and regiments, 93 percent of organic battalions, and 86 percent of companies are connected to the all-army and MR political networks. This phase also involved establishing a security and encryption system in early 2008.35

ISR systems and procedures have also been improved. For example, China has launched a number of new satellites, including imagery and synthetic aperture radar satellites and is developing the KJ-200 and KJ-2000 airborne early warning and control (AEW&C) aircraft. The PLA is also training to use these new resources. New procedures were developed by a unit of the South Sea Fleet in 2009 entitled, “Stipulated Technical Procedure for Maritime Terrain Digitized Satellite Surveying and Mapping,” that is said to be able
to meet the needs of wartime operations. Another 2009 article states that a Guangzhou MR surveying and mapping unit used satellite imagery to establish the PLA’s first digitized production network for map making. In April 2009, the GSD Surveying and Mapping Bureau held an exercise to support joint operations that used satellite imagery and navigation and precision information to provide targeting information.

The PLA and the commercial sector have also joined hands in maintaining elements of military command systems by having civilian organizations maintain key telecommunication lines and having joint PLA/commercial repair teams fix telecommunications lines. During times of need the PLA has also reportedly taken over or rented civil telecommunication lines from the commercial sector. The Nanjing MR reportedly uses railroad communication lines to send encrypted messages to subordinate logistics units when the military communications network is down.

The PLA has also made progress in developing integrative technologies. Perhaps one of the most important technical advances is the development and possible fielding of a joint operational datalink system called the Triservice Tactical Information Distributed Network (三军战术数据分发系统), abbreviated by Chinese sources in English as TIS. This network is described as being similar to the U.S. Joint Tactical Information Distribution System (JTIDS), a system that provides jam-resistant digital communication of data and voice for command and control, navigation, relative positioning, and identification that allows units using different technologies to communicate with each other. TIS is said to operate over line-of-sight ranges up to 500 nautical miles and operates in the...
960-1,215 MHz frequency band. As with JTIDS, TIS uses frequency hopping and direct sequence spread spectrum to prevent jamming, though sources differ on their effectiveness.

Chinese articles describe TIS as being limited by a lack of over-the-horizon capabilities and requiring a relay mechanism to transmit data over long distances. One article suggests using aircraft to relay communications, but acknowledges that in the case of a conflict over Taiwan, these aircraft will be subject to attack from Taiwanese and U.S. air forces. It notes hopefully, however, that as China’s air defense capabilities improve, the utility of TIS will increase.

Another article describes a system of systems in which multiple TIS nodes are located throughout a theater and linked via satellites, fixed communication networks (e.g., fiber optic lines), service communication networks, and tactical networks to provide theater-wide communications and situational awareness beyond visual range. In using this network, the article concludes it would be possible for the campaign command headquarters, service-level units, and tactical-level units to both provide inputs and access information from TIS in order to obtain a common theater-wide battlefield picture.

The extent to which TIS is integrated into current PLA operations is unknown. A 2000 article states that TIS was under development and that service technologies facilitating intra-service communications may be merged with TIS. An article 7 years later stated that the networking of TIS into a system of systems had already achieved some success. It is unclear, however, how comprehensive this system may be. While a 2008 PLA Navy article boasts that a “tri-service connection via one network” was used during an exercise, the
manner in which the joint communications system was established casts doubt on this claim. The article reports that in order for the services to communicate with each other, ground force communication personnel, with their equipment, were stationed aboard ships to facilitate communication between the services.\textsuperscript{47}

Other reports reveal that individual MRs have established or are working on their own joint C4 systems and it is unclear if these technologies involve TIS. In 2009, it was reported that the Jinan MR held a meeting on the construction of a “new type of theater joint command information system” designed to join the services.\textsuperscript{48} Similarly, a 2009 article stated that the Nanjing MR in the past 2 years had established the PLA’s first theater C4ISR system.\textsuperscript{49} This system is said to have broken the communication barriers between services and solved the MR’s challenges with joint operations command, real-time air intelligence, joint firepower attack, and precision support.\textsuperscript{50} Again, as with other technologies, the development of theater-wide C4ISR systems by individual MRs suggests that a standardized C4ISR system has not been established by the PLA or, at the least, that standardization is not being enforced.

Despite the many successes in developing C4ISR technologies, the PLA admits that its technologies cannot yet fully support joint operations. However, the PLA’s main difficulty in establishing an integrative C4ISR system lies more with the approach the PLA has taken with C4ISR modernization than with the level of technology used. Stovepiping, for example, has been a major impediment. While the services have been good at establishing communications with subordinate units, they have largely ignored connectivity with their sister services.
Communication problems have also arisen due to the incompatibility of technology. Units use different models and generations of weapons and equipment and there are differences in the technology levels of services and combat arms or even between different operational units within a service or combat arm.\textsuperscript{51} One of the main sources of this incompatibility is the decentralized nature of PLA technology development where individual units are provided funding to develop their own technology but pay no attention to connecting with other units. A main communications station of the Navy, for example, was praised in a *PLA Daily* article for building a 600,000 yuan comprehensive training center using indigenously designed software.\textsuperscript{52}

The goal of establishing an automated command system is not just to make systems automated, but also to make them integrated into a synergistic whole in which “1 plus 1 is greater than 2.”\textsuperscript{53} While technology is required, it is also more important to have the mindset, organization, and training to use it correctly.\textsuperscript{54} This requires organizational and training reform to conduct operations that can fuse together separate resources from multiple services to locate and track targets, such as opto-electronic and radar imagery satellites, over-the-horizon radar, early warning aircraft, and more traditional assets such as visual location and tracking by aircraft, ships, or ground personnel that facilitates the technological foundation stressed in NCW. The information collected from network-centric forces needs to be communicated to a central location where it is fused into a common battlefield picture that enables commanders to make informed decisions. This capability is best illustrated by the PLA’s ability to conduct joint operations, which will be evaluated in the following sections.
NCW CAPABILITY: JOINT OPERATIONS

Joint operations are fundamental to carrying out the PLA’s strategy of active defense and winning local wars under informationized conditions. Indeed, China’s 2008 Defense White Paper describes winning local wars in conditions of informationization as inherently relying on jointness. It states:

This guideline aims at winning local wars in conditions of informationization. It takes into overall consideration the evolution of modern warfare and the major security threats facing China, and prepares for defensive operations under the most difficult and complex circumstances. Meeting the requirements of confrontation between war systems in modern warfare and taking integrated joint operations as the basic approach, it is designed to bring the operational strengths of different services and arms into full play, combine offensive operations with defensive operations, give priority to the flexible application of strategies and tactics, seek advantages and avoid disadvantages, and make the best use of our strong points to attack the enemy’s weak points. It endeavors to refine the command system for joint operations, the joint training system and the joint support system, optimize the structure and composition of forces, and speed up the building of a combat force structure suitable for winning local wars in conditions of informationization.\textsuperscript{55}

In 1999, the PLA issued a \textit{gangyao} on joint operations that instituted the concept in PLA warfighting, and since 2000 the GSD has given increased priority to joint operations in its annual military training objectives.\textsuperscript{56} The PLA’s concept and practice of joint operations has evolved since 1999 from emphasizing joint operations to integrated joint operations (一体化
This transition from joint to integrated revealed fundamental flaws in the PLA’s conception of joint operations. The main impediment to achieving interoperability was the 1999 joint operations gangyao itself, which only required the services to form coordinating relationships rather than foster true interoperability. In fact, some PLA sources from this early period stress “joint operation coordination” (联合作战协同). Under this construct, each service remained independent with respect to operational forces, weapons and equipment, communications networks, and logistics, albeit under a unified command.

Ultimately, the codification of coordination over true jointness has come to impede PLA capabilities. Instead of centralizing personnel into one organization, coordination requires each service to exchange personnel between each of the service commands at the campaign, juntuan (军团), and tactical levels. Not only does such a system slow the transition to a wartime command, this process requires different services with their own cultures to mesh their own ways of operating at every level of the campaign. The addition of new personnel also taxes every service command unit to provide computers, communication equipment, and other types of equipment to newly arrived personnel. Indeed, one author asked “if every operational jituan (集团) sends a liaison group and there are 5 to 7 operational groups, then there are 20 to 30 new people who all require command equipment. Where does it come from?”

By 2003, the PLA leadership recognized that coordinated joint operations would not achieve the level of interoperability required by modern war. As a result, PLA analysts began to reconceptualize joint operations into a new framework called “integrated
joint operations.” It appears that the PLA has not officially defined integrated joint operations, but generally they are described as “an advanced stage of joint operations,” in which the command organization is not a coordinating body but, in fact, has the authority to make decisions. Integrated joint operations are thus “not the simple combining of service operations but are the organic merging of the planning and command of separate service operations in order to form a more powerful comprehensive operation.”

ASSESSING PROGRESS IN INTEGRATED JOINT OPERATIONS

This section will evaluate the PLA’s progress in two critical areas: organization and training.

Organization.

The PLA has made some progress in creating a joint organizational structure over the past 10 years, but major hurdles remain. The main reason for the lack of progress is the historical predominance of the ground force and its predilection to control PLA doctrine, organization, and operations. The predominance of the ground force has led to a lack of permanent joint structures, which has stymied a culture of jointness and the technology needed to support it. As one Navy author writing on the dominance of the ground force complained, “military region leadership organizations cannot say that they are a real command organization and this makes it difficult to meet the needs of commanding multi-dimensional operations under high technology conditions.” The lack of a permanent joint organization at the MR level has been the
fundamental impediment to fostering interoperability. Without a joint organization, it has been difficult to develop the technologies to connect the organizations or to train the personnel in joint operations.\textsuperscript{65}

The PLA has made some progress in establishing joint organizations, however. For example, since 2004 each service has been represented at the CMC, but it appears that little effort has been made to go beyond this level of jointness. Only ground force officers have become vice chairmen of the CMC or held the position of Chief of the General Staff. Only one nonground force officer has held the rank head of the General Political Department, General Logistics Department, or the General Armament Department. Li Jinai, current head of the GPD, spent much of his career in the Second Artillery.

Moreover, jointness is limited at the staff officer levels of the four General Departments. For example, at the deputy commander level, the General Staff, Political, and Logistics Departments are each staffed by three ground force officers and one Air Force officer. The staffing of the General Armament Department at the deputy commander level is more nuanced with representation coming from career armament department officers who have served in nonservice specific positions working in the ground, aviation, missile, and space fields. No Navy or Second Artillery officer holds the position of deputy director for any of the four General Departments, and below the deputy director level, jointness appears to be less prevalent.

The PLA also lacks a permanent joint organization at the MR level. Indeed, in a run-up to a war, the MR must transition to a joint warfighting organization called the war zone. The lack of jointness at the MR level is reflected in the fact that only ground force of-
ficers have served as MR commanders. While some deputy commander positions are occupied by the Air Force and Navy, no Second Artillery or PAP officers occupy deputy commander positions.

The PLA has made progress in the area of joint logistics. The PLA officially instituted a joint logistics department (JLD) system in 2000, but a true joint system was not formed until 2004 when the Jinan MR was selected as a test bed for an enhanced JLD. The enhanced JLD provides both common use supplies, defined as supplies used by all services, and service-specific supplies instead of routing supplies through each service. The Jinan MR formally adopted this system in 2007, but Hu Jintao postponed expansion of the JLD system pending additional research and evaluation.

Training.

While training has also had modest successes since 1999, PLA sources indicate that progress has not been sufficient. As one source states, the PLA trains to “fight a battle jointly, yet exercises separately.” Training is said to either lack jointness or is insufficiently joint. An exercise may only be joint for certain segments rather than throughout its entirety. Moreover, no standards or criteria have been established to evaluate jointness. Training also needs to be expanded to include “topic training” on joint offensive and defensive operations, joint command and control, joint logistics, and joint information support.

As with wartime joint operations, the main obstacle to conducting joint training is the lack of a permanent joint training structure at the MR region and below. While the GSD had conducted some joint training,
such training has been done on a temporary and ad hoc basis with limited long-term results. In addition, because there is no permanent joint training structure, the services do not have a mechanism to discuss how joint training should be conducted or evaluated. Consequently, the PLA still lacks clear and sufficient regulations and standards regarding joint training.  

The main attempt to establish an organization for joint training has been the formation of “coordination zones” in 2003. A training coordination zone is described as:

A place where units of various arms and services having similar future combat missions are relatively concentrated, and where a zone of mutually coordinated military training is set up. This is aimed at effective integration and sharing of training resources, so that units of the various arms and services can rely on the coordination zone to accomplish integrated, joint training, and exercises.  

The designation of these training areas as “coordination zones,” however, belies the PLA’s propensity for coordinated operations rather than true interoperability. Indeed, PLA sources lament that training in coordination zones is characterized by “communication” plus “consultation” instead of true jointness.  

Despite structural impediments, the PLA has made some progress in joint training. For example, one article notes that a motorized infantry division now has an Air Force ground controller attached to it. But the joint training praised in PLA publications is often rudimentary or superficial. For example, one report stated that ground force and Navy units in a training coordination zone practiced ship loading and unloading and ground force units practiced loading aircraft onto
railcars for the Air Force. Another report praised the “jointness” of an exercise which merely brought together the top leaders of each service via video teleconferencing. Other efforts described as joint are really combat arms exercises. The Navy appears particularly egregious in this matter and frequently touts training between surface, subsurface, and aviation units as “joint.”

A review of the PLA’s training goals from 2002-09 shows incremental improvements in joint training as training requirements moved from amorphous calls to conduct joint training to the study of the theoretical underpinnings of joint training, to the creation of test points, to the focus on specific joint training subjects, and finally to the first war zone level joint exercise. In detail, the Outline of Military Training and Evaluation (OMTE) for these years is discussed.

The 2002 training goals described joint operations as a key training objective and directed all units to strengthen their understanding of joint operations. However, the training goals directed the PLA to carry out “coordinated training” against the background of joint operations.

The 2003 training goals paid little attention to joint operations and only directed the PLA to carry out training under the guidance of the joint operations concept, but did not specifically mandate what actions should be taken.

Integrated training was formerly introduced into the 2004 training goals. The year 2004 was obviously a “building year” in which emphasis was placed on study as units were urged “to create the substance, methods, and mechanisms of integrated training and to develop a model of integrated training.”
The 2005 training goals stressed “incremental progress” in carrying out integrated training. For the first time, the training goals identified the formation of joint training organizations as a key requirement. Theoretical progress was also stressed, as the Academy of Military Science was directed to conduct theoretical study of integrated training. The integration of specific tasks was also mentioned for the first time. In this case, the strengthening of command and control of intelligence, support, and live fire exercises.  

The 2006 training goals stressed practical application and directed the PLA to continue its theoretical study of integrated operations. Whatever progress was made in 2005 was meant to be refined in 2006, as the 2005 tasks do not appear to have been expanded. Instead, the PLA was asked to study the “pathway” to combined arms and joint training as well as “to give prominence to joint training, and to strive to build and further improve institutions and mechanisms conducive to joint training so as to boost the integrated fighting capability of the army.”

The year 2006 also saw the convening of an all-Army meeting to discuss training under conditions of informationization. This meeting is said to be the first meeting to unify thought, resolve problems, and promote the development of informationized training. The meeting resulted in the CMC issuing a document entitled “Decisions on Strengthening Military Training During the New Period of the New Century,” which issued five instructions to the PLA:

1. Deepen the content of training and promote the establishment of military training systems under informationized conditions. The main efforts were to build a force able to use information, accomplish different tasks, promote joint training, and conduct
realistic training with the goal of accomplishing the New Historic Missions and improving the ability to conduct joint operations under informationized conditions.

2. Take improving joint operations capabilities as the main line. Establish a complete joint training system focused on completing missions and taking strategic and campaign training as the core. Joint training will include support from integrated command platforms and will abide by the principles of the main force taking the lead.

3. Increase the ability of units to work in a complex electromagnetic environment. The PLA was instructed to study the requirements of fighting in a complex electromagnetic environment with a focus on training communication, radar, and electronic countermeasure units.

4. Train joint operations personnel and strengthen the quality of military personnel. Joint training will become part of the educational requirements for personnel and training at military schools will be improved. Education will focus on personnel involved in joint operations, information technology, and new equipment.

5. Take informationized construction as the foundation and develop training methods that are adaptable to the new combat power. The PLA is to focus on training bases and operational laboratories of schools.\textsuperscript{82}

Despite the importance of the year 2006 for setting training goals, press reports on the 2007 training goals merely directed the PLA to “continue to explore integrated training” and to fully use what had been achieved at integrated training test points and
to “promote the healthy and orderly development of integrated training” as well as to explore a path to regional joint training methods.  

The building and exploration that occurred from 2005-07 appears to have been successful as the 2008 training goals became more specific in its requirements for joint training. In fact, 2008 was an important year in which 163 primary level units were involved in developing new training and evaluation standards. In June 2008 the GSD issued 1,522 training publications reflecting achievements in training reform, and in late 2008, the PLA held an all-Army video and teleconference to formally institute these guidelines into PLA training. Interestingly, the training goals did not discuss integrated training, but did identify joint training as a key objective. The training goals specifically mentioned that joint training should be carried out in regards to intelligence, command and control, and communications. The 2008 training goals also encouraged the PLA to organize units and commands by missions and to deepen regional coordinated training. This last requirement suggests progress towards joint training commands organized around particular missions rather than missions carried out by individual services.

The training guidelines developed in 2008 were implemented in 2009. Indeed, the year 2009 appears to be a pivotal one in which the PLA began to address the fundamental barriers to jointness. In fact, the PLA is putting its foot down and ordering all the services to cooperate and institute joint training reforms. In March 2009, the PLA Daily published the minutes of a meeting held by the Jinan MR in which the leadership exhorted the services in no uncertain terms to make joint training work. The organizers of the meeting crit-
icized the services for treating joint training as merely the topic *de jour* rather than as a fundamental reform, stating “the road of joint training must be taken. We have no choice . . .” The leadership also described joint operations as essential to victory, stating “the isolated battle of a single service will never achieve what it wants” and that “every military has acutely recognized that the one who starts joint training first and who does a great job at joint training will have the key to victory.” The services were also urged to continue joint training despite disputes because it is only through continued training that problems can be resolved.86

To carry out the 2009 training goals, the PLA appointed the Jinan MR to be a test bed for joint training and established the first joint training command organization on February 23, 2009.87 This step was described as signifying “that joint training at the theater level started to step into a new development stage.”88 The Jinan MR may be the joint reform test bed for several reasons. The Jinan MR, along with the Nanjing and Guangzhou MRs, is one of three MRs that has representation from all services as well as fleet headquarters, and for this reason joint training can be conducted more easily with higher level service units. The PLA, however, may want to limit the negative effects of experimentation on units in the Nanjing and Guangzhou MRs due to their proximity to Taiwan and probable use in a Taiwan conflict. Finally, the MR has been the site of large-scale military exercises, including the China-Russia “Peace Mission 2005,” which has given the MR more experience with dealing with dissimilar forces.

According to one source, in setting up its joint training command mechanism, the Jinan MR will
make overall plans for joint training, but each year a different service will command the training in which one core issue is highlighted and one subject is practiced. The culmination of these joint reforms to date has been the 8-day exercise “Joint-209” which was held in the Jinan MR and involved all of the services and the People’s Armed Police (PAP), and was the first joint war zone exercise for the PLA. The exercise was said to have focused on four areas:

1. The inclusion of Army, Navy, Air Force, Second Artillery, and PAP forces in the war zone in the exercise for the first time.

2. The inclusion of local governments into training.

3. The inclusion of local national defense mobilization organizations into the war zone joint training system.

4. The use of an integrated command platform to organize joint training for the first time.89

CONCLUSIONS

The 10-year history of PLA informationization reveals a pattern of limited progress stymied by service rivalry, inadequate doctrinal development, and technological shortcomings. In pursuing informationization, the PLA has simultaneously taken a bottom up and a top down approach. Technological improvements have mainly followed a bottom-up process in which even units at very low levels have been given funds to develop their own systems. While individual services have managed to develop robust vertical command and control systems that link superior with subordinate units, they have not taken the initiative to develop integrative technologies that connect them with their sister services. As a result, the CMC and
GSD have had to take a top down approach to force jointness upon the services in the form of doctrine and regulations. These efforts, however, have resulted in limited improvements in establishing an organizational structure capable of supporting joint operations. While the CMC has been made joint and a Joint Logistics Department established, the four General Departments and the military regions continue to lack jointness and it is unclear how joint the JLD system is Army-wide. The PLA has also done little joint training.

Jointness, it seems, is still largely anathema to the PLA, and it appears that the ground force continues to wield extraordinary power at a time when PLA writings on future wars depict a more prominent role for the other services. Without a permanent joint structure, it will continue to be difficult to build suitable technology systems and to change the mindset of single service domination. In fact, the PLA continues to delay making the hard decisions concerning joint reform. There has been no discussion of making the four General Departments truly joint nor do the 2009 training reforms indicate that the MR headquarters itself will be made joint. They only require the formation of a permanent joint training organization. While the PLA focuses on establishing jointness at the CMC and MR levels, the U.S. experience in forming a joint military suggests that joint organizations must be formed from the strategic to the tactical levels. In this regard, the lack of jointness at the General Department level appears to be a critical shortcoming of joint reform as these organizations are the working bodies of the CMC. The prominence of ground force officers in the four General Departments suggests that, at worst, service rivalry continues to retard joint reforms and, at
best, suggests that a lack of a basic understanding of the requirements and capabilities of their sister services by ground force officers limits reforms. Either way, jointness at the General Department level appears to be an essential measure in altering institutional interest and the mindset of the top PLA leadership, and, without that change in mindset, it seems difficult to enforce joint reforms at lower levels.

But how should we judge PLA progress to date? We could judge progress by whether the PLA can conduct joint operations. By this measure, the PLA has failed. Even PLA authors are clear that the PLA is incapable of carrying out true joint operations. But this standard is probably too high. Jointness is difficult. The U.S. military in World War II was joint in many respects, especially in the Pacific Theater, but it lost that interoperability and fought the Korean and Vietnam Wars with minimal jointness. It was not until the passage of the Goldwater-Nichols Act in 1986 that the U.S. military began the path that has led to its current level of jointness and that jointness has been forged by fighting two wars for the past 8 years. By this measure, the PLA has a long and difficult road ahead to become an effective joint force. These efforts will be made more difficult without warfighting experience.

PLA authors have also attempted to establish benchmarks by which to measure PLA progress in joint reform. Noted information warfare expert Dai Qingmin describes three stages of informationization.

The first stage is the standalone construction stage in which individual services build their own information systems and move from a stage of mechanization to informationization as traditional weapons are integrated with information systems.
The second stage is the comprehensive development stage in which information systems are horizontally integrated and changes are made in a military’s organizational structure, training, and education. The U.S. military is described as being in the middle to later part of this stage.

The third stage is the overall transformation stage. This stage reflects a maturation of the informationization process in which a military carries out system-to-system attacks around the information flows on the ground, the sea, the air, the space, the electromagnetic domain, the network, and the sensory dimensions.

Dai concludes that the PLA is in the beginning stages of comprehensive development or in the transition between the first stage and the second stage. Dai also concludes that the PLA is in the preliminary stages of constructing an informationized organization management system that has focused on top-level design, improved regulations and standards, infrastructure, and making breakthroughs in key points.\textsuperscript{91}

The PLA’s own timetable offers a final metric by which to judge progress in jointness. According to the 2008 Defense White Paper, the PLA has the goal of laying a foundation for informationization by 2010, to make major progress by 2020, and to mostly reach the goal of informationization by 2050. The establishment of a joint CMC, a Joint Logistics Department, a joint training structure test bed, and the conducting of the first war zone-level joint exercise has been conducted. Moreover, individual services and MRs have made impressive gains in technology, including the first joint war-zone C4ISR system established by the Guangzhou MR. By this measure, it appears that the PLA is meeting its own standards for joint reform.
Despite the emphasis on informationized operations, informationization does pose dangers for the PLA. By developing into a networked force just like the U.S. military, the PLA opens itself up to the same sorts of vulnerabilities that it hopes to exploit in the U.S. C4ISR system. This reduction of asymmetry could be advantageous to the U.S. military and remains a contradiction largely unaddressed in PLA writings. Dai Qingmin admits that informationization is a double-edged sword that will cause it “danger and hidden troubles,” but he also recommends that at its current stage of development the PLA should pay more attention to its beneficial effects and ignore its disadvantages. This is most likely because the PLA, and China, have no other alternative. China desires to become a major power and can only do this by becoming modern, and modernity depends on a reliance on information technology. To remain as a largely mechanized force forever dooms the PLA to being a second-rate military and China a second-rate power. Consequently, the PLA must transform into an informationized force even if this creates vulnerabilities in the short to medium term.

PLA writings also do not discuss another paradox of a network-centric force: the tendency of commanders to centralize control. Ostensibly, the benefit of NCW is its ability to increase the ability of lower-level officers to make decisions. Technology, however, could further centralize command by enabling senior commanders to monitor and direct small units. Considering the PLA’s predilection for heavily centralized command, command automation systems may strengthen the role of the campaign commander at the expense of limiting subordinates’ freedom of action. These problems will eventually need to be addressed,
but for now what emerges from PLA writings is that they are trying to harness new technology to abide by the tenets of NCW.

The PLA commitment to jointness is undiminished, and it appears will only increase. Could informationization, however, be derailed by the global economic crisis? The PLA’s modernization drive depends upon advancements in civilian information technology, and with China’s export-oriented economy it is possible that a downturn in global demand could negatively affect China’s IT sector, which could then negatively affect military modernization. Here the answer is less certain, but it appears that the drive for informationization will continue unabated. The Chinese government has an immense and expanding amount of money on which to draw from to aid economic recovery. China’s foreign currency reserves reached U.S. $2.13 trillion at the end of the second quarter of 2009. In December 2008, China devoted U.S. $586 billion to a stimulus plan. Of this, 4 percent, or U.S. $23.44 billion, went to technology advances and industrial restructuring. The stimulus has had an effect, with economic growth up 8.9 percent in the third quarter of 2009. Nor has the economic crisis affected military spending. China’s official defense budget increased 14.9 percent in 2009.

In fact, it is possible that the economic crisis could be beneficial for the PLA. Additional stimulus money may be used to spur technological innovation. Additionally, the threat of higher unemployment may make military careers more attractive for those with high tech backgrounds. China’s large cash reserves could also give it the ability to acquire struggling foreign companies at bargain prices. While no high profile mergers or acquisitions have been reported since the economic crisis, Chinese companies are willing to
explore opportunities. These efforts in the past, however, have been blocked by the national security concerns of home countries. Huawei, for example, was blocked in its attempts to acquire Marconi by the British government in 2005 and by the U.S. Government in 2008 to acquire a stake in 3Com.

It is more certain that the PLA’s drive to informationize will have a profound effect on U.S. military operations. The PLA already possesses or is working on weapons systems that threaten or could threaten the U.S. military. These include advanced air defense systems, especially “double digit SAMS,” long range cruise missiles; and anti-ship ballistic missiles (ASBM). While each of these systems poses a threat, they become even more formidable when networked to form a system of systems. While much analysis has been done on individual PLA weapon systems, it is C4ISR systems which will facilitate PLA efforts to deny the U.S. military access to a theater. For example, improved C4ISR systems could improve attacks against U.S. forces and bases in the region by precisely and in a timely manner locating targets and conducting battle damage assessments. Improved C4ISR systems could also greatly improve attacks against U.S. naval forces. PLA authors writing on attacks against aircraft carrier strike groups discuss swarm attacks in which surface, subsurface, and aviation attacks would be conducted simultaneously. A comprehensive C4ISR system would also be integral to ASBM attacks against aircraft carrier strike groups as data from space-based ISR, over-the-horizon radar, and aviation or surface assets would need to fused to form actionable intelligence. Ultimately, this could enable China to become more forceful in its dealings with the United States, Taiwan, or its neighbors.
Over the longer-term, the development of an integrative and comprehensive C4ISR system will enable the PLA to project power globally. As China’s relations with Africa deepen and as its energy needs increase, a robust C4ISR system will permit China to defend its global interests by supporting forces well beyond its borders. China’s C4ISR developments will then be one indicator of China’s rise as a global power.

ENDNOTES - CHAPTER 5


2. Gangyao has been defined as “outline” or “regulations.” This chapter will leave the term gangyao undefined since the exact contents of gangyao are unknown.


10. Ibid., p. 6.


12. See, for example, a series of books published by The Naval Equipment Demonstration Research Center Command Automation Research Institute in 2002 on command systems that emphasize the study of C4ISR systems: C4ISR 系统现状与发展 (The Current Situation and Development of C4ISR Systems), 联合作战中的指挥自动化建设 (Joint Operation’s Command Automation System Building), and 军事运筹与系统工程 (Military Planning and Systems Engineering).


15. Ibid.

16. Ibid.

17. Ibid.


20. Ibid., p. 63.


25. Ibid., pp. 65, 140.

26. Ibid., p. 140.

27. Ibid., p. 146.


34. 战旗报 (*Battle Flag*), February 14, 2006.


40. Ibid.


48. Liu Hongtao and Han Zongcheng, “Joint Construction Before Joint Combat, Joint Communication Before Joint Training—Coordination Meeting for Construction of New


54. Ibid., p. 45.


57. Zhang, *A Course in Joint Campaign Command*, p. 7. The quote from the *gangyao* is identified by the source as taken from the PLA’s 1999 *Joint Campaign Gangyao* (联合战役纲要).


62. See, for example, the criticism of the PLA’s conception of jointness in Bai Fengkai, Fang Jiayin, and Bai Haiwei, “装备联合能力一体化研究” (“Study on Equipment Joint Capabilities Integration”), 装备指挥技术学院学报 (*Journal of the Academy of Equipment Command & Technology*), June 2005, pp. 11-14.


68. Li, Zhang, Ding, and Zhang, “Take the Initiative to Take the Momentum.”

69. Pan.

70. Ibid.


72. Pan.


74. Li, Zhang, and Bi.

75. Fan Qingjun and Liu Xuenong, “三军联手渡天堑硝烟未散康报传” ("Hand in Hand, the Three Service Arms Cross the River; the Report Is Spread Before the Smoke Has Cleared"), 前卫报 (Frontline Defense News), September 26, 2008, p. 1.


84. Liu, “Possessing a Strategically Significant and Deep Reform.”


86. Li Yadong, Zhang Xicheng, Ding Feng, and Zhang Guoyu, “主动作为乘大势殚精竭虑抢先机 — 济南战区联合训练试验论证筹划会纪要” (“Take the Initiative to Take the Momentum, Make Every Effort to Seize the Preemptive Opportunities Minutes on the
Demonstration and Planning Meeting for Joint Trainings Test in Jinan Theater”), 解放军报 (PLA Daily), March 26, 2009.


88. Li, Zhang, Ding, and Zhang, “Take the Initiative to Take the Momentum.”


92. Ibid., p. 83.

