PLA System of Systems Operations: Enabling Joint Operations

by

Kevin McCauley

The JAMESTOWN FOUNDATION

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Key Judgments

- The theoretical development of integrated joint operations and system of systems operations represent two of the most important developments in the PLA. The foundation enabling integrated joint operations is what the PLA describes as a "system of systems" operational capability (体系作战能力). This capability will be based on an integrated C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) structure, that will link systems and forces to facilitate jointness and information sharing amongst the heretofore stove piped services. Successful implementation of these twin theories can significantly increase the PLA's warfighting capabilities, and are driving many of the PLA's modernization requirements, including training and education reforms, acquisition of precision weapons systems, and construction of an integrated command information system. The establishment of theater joint commands, Joint Logistics Support Force, Strategic Support Force, and planned improvements in military education and training represent critical factors for moving forward toward an advanced joint operations capability.

- The People's Liberation Army (PLA) is undergoing a broad and deep transformation based on their analysis of the information technology-driven revolution in military affairs. The military reforms announced in November 2013 are intended to accelerate the long-term military modernization program that has been slowed by institutional inertia and obstruction. The current reforms specifically target operationalizing a joint operations doctrine through a joint command system, enhancing joint officer development, and improving joint training.

- This current round of reforms include an announced 300,000 personnel force reduction by the end of 2017, the transformation of the seven military regions (MR) into five joint theater commands, the transformation of the four powerful General Departments (General Staff, Political, Logistics and Armaments) into fifteen organizations within the Central Military Commission (CMC), the establishment of an Army headquarters, elevation of the Second Artillery Force to the PLA Rocket Force, and the creation of the PLA Strategic Support Force and PLA Joint Logistics Support Force. The new flatter command structure provides the CMC greater control and oversight over PLA affairs. Each service headquarters will supervise their force development and training, while the theater joint headquarters will command operational forces and organize joint training focused on wartime missions. The reforms underway also address a number of critical issues by enhancing professional military education, joint training, the noncommissioned officer corps, doctrine and tactics, logistics, standardization, as well as researching and

establishing joint command and coordination procedures to support the continuing weapons and equipment modernization. While the reorganization and formation of theater joint commands represents the most significant military reform effort since 1985 and could accelerate the long-term PLA modernization effort, the joint commands, education and training, and other reforms need to be successfully implemented for the PLA to gain significant benefits. This current reform program will reportedly be completed by 2020, with a focus on refinements to the numerous changes during the final three years.

- Failure to fully achieve these current military reform goals would not only indicate that President Xi's influence and control over the military is more limited than generally thought, but also would impede the PLA's development of an advance joint operations capability and overall warfighting capabilities. *PLA Daily* articles boosting reform efforts indicate that some level of resistance remains toward the more far reaching reform elements. To date, President Xi's anti-corruption campaign appears to have removed opposition within the military that slowed PLA reform efforts in the past and strengthened his overall position.

- Even if successful, the overall PLA transformation effort represents a long-term, difficult process as evidenced by the three-stage, long-range modernization plan that extends to the middle of this century. However, the PLA has been testing and implementing aspects of both theories for over a decade, including experimentation with joint logistics in the former Jinan MR, exercising joint campaign formations (联合战役军团) and joint tactical formations (联合战术兵团), refining joint command and coordination procedures, and fielding an integrated command platform. While full realization of integrated joint operations remains a goal, PLA joint operations capabilities are improved over a decade ago, and should continue to rise with the successful implementation of the current reform program.

- Eventual implementation of an advanced integrated joint operations doctrine is key to the PLA's ability to optimally employ modern weapons and equipment, form and employ integrated modular task forces at the campaign and tactical levels in order to generate increased combat effectiveness to fight and win local wars and conduct diverse missions globally. The PLA's joint operations research and experimentation have highlighted deficiencies in the military educational institutes, officer's joint proficiency, joint training, doctrine and tactics, logistics, and command structures and procedures that are being addressed in the current military reforms.

- Successful implementation of a system of systems operational capability will provide a synergistic effect that generates increased combat effectiveness of various component systems (weapons, equipment, units, etc) beyond the sum of their individual capabilities.

This concept is portrayed by the PLA as 1 + 1 > 2. Acting as a force multiplier, system of systems operations can enhance capabilities for real time intelligence fusion and sharing, precision control of operations, long-range precision strike, rapid maneuver, full-dimensional force protection, and comprehensive logistics support. Streamlined decision-making can accelerate operational response times and shorten sensor-to-shooter times, allowing PLA commanders to get inside an opponent's decision cycle. However, a continued preference for centralized command, even among forward thinking PLA academics and theorists, will require a change in institutional culture.

- Establishment of a system of systems capability based on integrated information systems and operationalization of integrated joint operations supports the informationized transformation of the PLA, and will result in system of systems confrontation (体系对抗) in conflicts. This informationization will also support the development of various warfighting capabilities discussed in the PLA, including for example precision operations (command, strike, maneuver, logistics, and intelligence), the "Three Warfares," non-contact warfare, nonlinear combat, information confrontation, and information firepower. In particular, PLA academics view precision operations as a method of reducing risk, consumption, and collateral damage during operations with limited objectives. The PLA believes that precision operations can provide a quick victory with minimal losses, and combined with a belief in the ability to control the scale of a conflict, this attitude could make the use of military force in a potential crisis with limited objectives appear manageable with limited risk.

- Modular force groupings at the campaign and tactical levels are a key development for future PLA joint operations that the PLA is testing in exercises. This operationalization of integrated joint task forces within the PLA promotes jointness and greater flexibility at the campaign and tactical levels that will facilitate the formation of optimal force groupings to better execute assigned missions, with the capability to recombine to meet subsequent mission requirements.

- PLA academicians are influenced by U.S. developments in joint operations, network-centric warfare, and systems theory. The PLA thoroughly studies foreign military operations and theory. While the PLA is influenced by U.S. and other countries' military advancements and combat operations, they do not simply copy others, but adopt aspects that fit the PLA's characteristics and development requirements. This makes comparisons between the PLA and other militaries inexact at best.

- The focus on realistic training emphasizing theater wartime missions, and increasing the combat capabilities of the force through realistic exercises is in part an effort to reduce the time needed for units to transition to wartime readiness and prepare personnel

psychologically for combat in the event of a sudden crisis. High combat readiness combined with peacetime training focused on wartime missions could allow PLA units to rapidly mobilize and deploy, requiring little pre-battle training preparation, which could lead to reduced warning time and indicators during a crisis, particularly when denial and deceptions measures are employed.

Introduction

The People's Liberation Army is developing a theoretical basis for a new joint operations doctrine—integrated joint operations (一体化联合作战). When fully developed, this capability can greatly enhance PLA capabilities to execute contingency operations in potential crises. Developing this advanced joint operations capability has also provided impetus to move the PLA away from an army centric force towards one that is more balanced. Significantly, the current military reform plan announced in November 2013 has established theater joint commands, replacing the PLA Army (PLAA) dominated military regions. The PLA Navy (PLAN) and PLA Rocket Force (PLARF) as well as the PLA Air Force (PLAAF) should experience additional modernization emphasis and possible expansion of their force structure.[1] As important as equipment modernization is to achieving the PLA's transformation plans, joint training and education reforms, standardization of equipment and procedures, and theoretical research into new operational methods are required to support the evolving system of systems operations and integrated joint operations theories. The PLA has made incremental improvements in many areas, but recognizes that an acceleration of the transformation process is required in response to ongoing developments in the world's advanced militaries and the revolution in military affairs. The current reform plan appears to be breaking through institutional barriers and positioning the PLA to quicken progress towards this joint capability. The PLA's development of system of systems and integrated joint operations provides a holistic approach to address the myriad of PLA systemic problems.

Deployment of an integrated command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) architecture will form the foundation of an integrated joint operations (IJO) capability. Modernization of the equipment and weapons systems, however, is not enough. It is the integrated functioning of the various information systems providing information fusion and linkage between informationized weapons and equipment, and joint forces that is required to generate increased combat effectiveness that will enable IJO. The PLA refers to this process as "information system-based system of systems operational capability" (基于信息系统的体系作战能力), which has been a major focus of theoretical research as well as training experimentation for much of the last decade. Both IJO and system of systems operations are heavily influenced by U.S. military theoretical developments.

The twin development of system of systems operations and IJO is having a significant effect on many aspects of PLA transformational efforts. Warfighting theories, campaign and tactical task organized force groupings, organizational restructuring, education, training and exercises, and equipment modernization are transformational issues aimed at implementing a system of systems operational capability and eventually operationalizing a mature IJO capability. Understanding

[1] *China Brief*, September 9, 2015

system of systems operational theory and its related terminology, which now permeates PLA theoretical writings, is critical for analysts' understanding of PLA transformation and evolving operational theories.

Though these two concepts are largely aspirational at present, they are supported by ongoing modernization combined with testing and experimentation in exercises, as well as providing modernization requirements for the ongoing PLA transformation. The PLA appears to have a well-developed and flexible plan for its broad and deep transformation, and is making steady progress executing the plan and operationalizing the concepts. Successful implementation of the modernization plan will lead to an advanced, modern PLA. However, the process of fully modernizing weapons and equipment, implementing new operational methods and enhanced training and education will be long and difficult.

Integrated Joint Operations

Revolution in Military Affairs

The First Gulf War alerted the PLA to the impact of the Revolution in Military Affairs (RMA) based on information technology, as well as the requirement to develop an advanced joint operations capability. The application of information technology to weapons and equipment (informationization) is revolutionary in that it is requiring change in all aspects of the military, including military art (strategy, operational art, and tactics), organization, equipment modernization, force structure, and training and exercises, although change experienced in each area represents an evolutionary process. The PLA has intensively examined joint operations since the early 1990's. U.S. joint operations since Operation DESERT STORM, including the NATO ALLIED FORCE operations in Kosovo, Operation ENDURING FREEDOM in Afghanistan, and Operation IRAQI FREEDOM have continued to influence PLA research and analysis.

Intellectual Foundation

To internalize and respond to the RMA and analysis of foreign military operations, the PLA's National Defense University (NDU) held three seminars on joint operations theory in 1996, while the Academy of Military Science held a forum on research into joint battles in high-tech local war the same year. These events promoted PLA research on joint operations theory by examining operational force composition, formation of joint force groupings, joint command structure, and logistics support. In the past, the PLA has demonstrated a lengthy research timeline to develop and operationalize new theories, and even then continues to reexamine and revise its operational art and tactics as required. President Xi's current reform effort intends in part to accelerate the transformation effort by breaking this past paradigm by making decisions to operationalize PLA

theoretical research on aspects of joint operations, with continuing refinements in the future as needed.[2]

The Nanjing Army Command College (NACC) appears to play an important role in developing the theoretical basis for integrated joint operations and other operational issues. This college published the first book on IJO in the PLA, "Integrated Joint Operations Command," and its course "Combat Command Under Informationized Conditions" was highlighted by the former General Staff Department (GSD), indicating that command and control is a key focus in developing IJO capabilities. The NACC established a teaching and research group gathering select personnel, and utilizing the reorganized offices of "Command Automation," "Intelligence Information," and "Military Planning," combined with two other offices in the college—"Operational Command" and "Military Theory." A teaching and research base was established under the auspices of the Nanjing MR to include units of the PLA Air Force, PLA Navy and PLA Second Artillery Force (now the PLA Rocket Force). The college's expertise in IJO theory grew out of its research into U.S. Iraq operations in 2003.[3]

Five PLA command colleges joined to improve and develop officers in intermediate-level command, and lay the foundation for developing commanders' joint knowledge. The intent in particular was to promote better understanding between the services and gain knowledge of each services' special capabilities. This was required since exercises had demonstrated that service centric attitudes prevailed with limited knowledge of other services among the officer corps. The agreement sent instructors to create joint education centers at the military educational institutes to-educate intermediate-level officers on the other services and joint operations concepts. These five command colleges are:[4]

- Nanjing Army Command College
- Shijiazhuang Army Command College
- Air Force Command College
- Naval Command College
- Second Artillery Command College (now the Rocket Force Command College)

[2] *PLA Daily Online*, February 26, 2009, "Joint Training Is Like a Big, Tightly Structured Machine: Its Operational Speed and Efficiency are Determined by Whether Its Crucial Chains Are Strong—'Strengthening Chains' of Joint Training"

[3] *PLA Daily*, November 21, 2006, "Innovations in Teaching and Research by Nanjing Army Command Academy's Department of Information Operations Command"

[4] *PLA Daily*, December 19, 2006, "Joint Operations and Training Call for Joint Efforts in Nurturing Efforts – Sidelights on Five Command Academies of the Armed Services Signing an Agreement to Provide Joint Education and Training"

Joint Operations in Transition

The PLA's ongoing in-depth analysis of the RMA, and U.S. military operations are driving a dramatic shift in its joint operations theory. The PLA is in the process of transitioning from coordinated joint operations to what they consider a more advanced stage of joint operations—integrated joint operations.[5] Coordinated joint operations are the services conducting operations towards the same operational goals, but with limited interaction at lower echelons. The PLA believes that developing IJO is a requirement for building a modern armed force, and for fighting and winning local wars under informationized conditions.[6]

The PLA views integrated joint operations as highly integrated and networked operations and joint force groupings down to the tactical level. The PLA views the U.S. military as having achieved a mature level of integrated joint operations capability that has been tested in combat, and continues to closely examine U.S. military operations for lessons learned to support research, doctrinal development, and improve courses at military educational institutes.[7]

Development and fielding of an integrated communications architecture allowing the services to communicate with each other at all echelons and achieving a common operating picture is critical to provide the foundation for the PLA's vision of joint operations. The PLA is fielding components of this C4ISR architecture, including the regional integrated electronic information system (区域综合电子信息系统) and the integrated command platform (一体化指挥平台). However, PLA press reports indicate problems remain, especially in the area of integration of the system of systems, operator training, and in the ability of commanders to coordinate at the campaign and tactical levels.[8]

The PLA believes that integrated joint operations is a more advanced form of joint operations, with greater flexibility through the employment of modular organizations utilizing whatever force mix is required across organizational divisions and between services, all integrated through a joint

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[5] *PLA Daily*, September 20, 2005, "Road to Explore Integrated Joint Operational Command" cited on http://www.china.com.cn/chinese/junshi/975191.htm viewed on 3/19/11; *Wen Wei Po*, July 31, 2007, "PLA Moves to integrated Combat Operations: Nine Newly Established Service Branches Capable of All-Position Precision Attacks"

[6] *PLA Daily*, July 7, 2004, "Analysis of 'Integrated Joint Operations'"

[7] *PLA Daily Online*, August 19, 2010, "Have an Inkling of Changes From the 'Self-cutting' Move – Idea About the Indication of the Closing of the US Joint Forces Command"

[8] *PLA Daily Online*, February 13, 2009, "South Sea Fleet Explores, Breaks Through Maritime Joint Command Training Problem—Three-Service Arm Communications: Can We Stop Speaking 'Dialects?'"; *PLA Daily*, February 7, 2006, "Modern Military Review: Trend of Integrated Joint Operations"; *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?"; *Xinhuanet*, October 26, 2005," Ultra-Wide-Area Broadband Wireless Internet Network: The Soul of Integrated Joint Operation": *PLA Daily*, April 12, 2005, "Modern Military Review: Analysis of the Integrated Joint Operation," cited on mil.news.sina.com.cn

command and communications systems architecture. The PLA believes there are four key conditions to achieve an integrated joint operations capability:[9]

- "Operational theory integration" to standardize the actions of the various services. Joint operations orders are formulated and issued as a way to define the level of independence of the various service elements.
- Establishment of a joint command structure, with the joint commander given the authority to make decisions and issue orders.
- Integrated C4ISR architecture down to the tactical level to support the joint command posts and subordinate service forces.
- Knowledge integration. The joint commander must have extensive knowledge of the operations and capabilities of all the services to fully and successfully employ the forces at his disposal.

The current military reform effort addresses each of these issues. PLA academics and theoreticians are researching joint command and coordination procedures, as well as developing new operational methods (operational art and tactics), including joint tactics. The current reforms establishing permanent theater joint commands is a significant move to promote jointness within the PLA, with the services now routinely working together in the joint command structure. In addition to the fielding a modern C4ISR architecture, the current reforms aim to improve joint officer education.

PLA theorists understand the joint headquarters will face extensive requirements to ensure the command, coordination and integration of the service forces and joint task forces down to the tactical echelon in different operational directions and through the various operational phases. The PLA has been testing joint logistics, joint command and coordination procedures, and joint force groupings at the campaign and tactical levels during exercises for over a decade. The Jinan MR had been tasked with joint experimentation and testing of concepts. The Nanjing and Guangzhou MRs (now ETC and STC) have been conducting joint exercises based on their operational missions during a Taiwan conflict. These exercises have likely produced a cadre of officers with operational joint experience, in addition to the work of the command colleges and other educational institutions.[10]

The PLA is executing a long-range, three stage military modernization plan to support these transformational efforts. As part of this modernization plan, the PLA has the goal of completing mechanization of the force and achieving major progress toward building an informationized force by 2020, the completion date set for President Xi's current reform and reorganization effort. There

[9] Ibid.

[10] *PLA Daily*, July 7, 2004, *"Analysis of 'Integrated Joint Operations'"*

are some indications that this modernization plan is being supplemented with a more focused plan to accelerate the process to implement a system of systems and integrated joint operations capability.[11] According to "*China's National Defense in 2010*" the PLA is establishing the foundation for a joint operations capability as part of this modernization effort, including the following:[12]

- Intensifying research and building the theoretical foundation for integrated joint operations and the command theory to support joint operations
- Developing new types of combat forces using modularized groupings of forces at both at the joint and combined-arms levels
- Improving joint C4ISR systems to support service integration
- Enhancing integrated joint logistics capabilities to support joint task forces at the campaign and tactical levels
- Implementation of a strategic project to develop talented personnel
- In accordance with the new *Outline for Military Training and Evaluation*, intensify command and control training, joint training of force groupings, trans-regional exercises, improve large-scale integrated training bases, and develop simulation training

Information System-Based System of Systems Operational Capability

A major focus of PLA theoretical writings since 2005 is information system-based system of systems operational capability considered a key requirement and enabler for integrated joint operations. The PLA intends to use system of systems operations to unify forces down to the tactical level through information technology to create seamless networked information systems that will generate increased combat effectiveness.[13] PLA theory in this area is influenced by U.S. joint developments, network centric warfare and systems theory.[14] However, the PLA is not merely copying U.S. military concepts, but integrating their own theoretical concepts based on PLA developmental characteristics and requirements. This makes comparisons between the PLA and U.S. or other militaries inexact at best.

Integrated information systems, and command and control procedures that will provide greater agility are fundamental requirements for integrated joint operation capabilities. These areas also

[11] *China Briet*, July 17, 2015.
[12] *Xinhua*, March 31, 2011, "China's National Defense in 2010"
[13] *Information System-Based System of Systems Operational Capability Building in 100 Questions* (Beijing: National Defense University Press, June 2011), pp. 30–31; *PLA Daily, July 7, 2004, "Analysis of 'Integrated Joint Operations'"*
[14] PLA writings also indicate an influence by the futurist writings of the Tofflers.

represent key areas of research, experimentation, and modernization.[15] As the PLA modernizes, it has come to realize that the development of operational and support capabilities are based on the integration of the armaments and equipment of entire units and entire systems at different echelons, grouped into flexible structures, and in different ways to create a synergy boosting overall capabilities and combat effectiveness.[16]

As the system of systems and integrated joint operations concepts became dominant and more fully developed within the PLA, system of systems confrontation (体系对抗) became a basic element of informationized warfighting. System of systems confrontation is already having an impact on training at the campaign and tactical levels as the PLA operationalizes more advanced joint operational capabilities than existed in the past. This system of systems confrontation requires the integration of weapons and equipment platforms, operational units, and warfighting capabilities in order to fight and win future local informationized conflicts. Staff training during exercises and simulations in intelligence and reconnaissance, data link operations, complex electromagnetic environments, precision strike, denial and deception are important components as well as effective training evaluations. The existence of multiple generations of equipment within units creates difficulties and requires multiple types of weapons and equipment integration. However, this situation is not unique for the PLA as military equipment modernization for other militaries is also evolutionary and incremental to various degrees. In the systems of systems operations concept, the goal of system of systems destruction (体系破击) is to destroy key components of the enemy's war potential, weaken the will to resist, paralyze the opponent's command information system and destroy key warfighting capabilities to achieve strategic and operational objectives and gain victory.[17]

The PLA is developing and fielding an advanced C4ISR structure and capabilities to integrate forces and and provide information fusion in order to generate increased combat effectiveness by means of a complex system of systems approach. This system of systems operations has developed new terms that can make the concept difficult to understand. These terms are used now in PLA publications and press articles, and analysts need to grasp the new terms in order to follow PLA warfighting developments.

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[15] *PLA Daily Online*, April 24, 2010, "Incorporating Joint Military Training Into Track of System of Systems Operations Capability Building;" *Research on Information System-Based System of Systems Operational Capability, Vol. 5 Information Systems*, (Nanjing Army Command College. Beijing: Military Yiwen Press, 2010), p. 3

[16] *PLA Daily Online*, September 9, 2010, "Ten Years of Explorations: Abbreviation Becomes Vivid Summary of Continuous Generation of Military Fighting Strength….."

[17] *The Transformation of the Generating Mode of the Warfighting Capability* (Beijing: Military Science Press, 2012), pp. 59-65 and 93

System of Systems Operations Terms

The PLA has developed a series of terms that are essential to following discussions and fully understanding the complex theoretical foundation for system of systems operational capability. This section examines key terms to gain a deeper understanding of system of systems operations.[18]

Information System-Based System of Systems Operational Capability

Information system-based system of systems operational capability[19]—a focus of PLA research and experimentation since the end of 2005—is one of the most important theoretical developments in the PLA today that can affect future warfighting. Successful implementation through an integrated command information system will support the development of an advanced joint operations capability, which in turn will greatly increase combat effectiveness and warfighting capabilities. System of systems operational capability represents the key method to achieve integration within the force in order to generate warfighting capabilities required to implement integrated joint operations, as well as supporting precision operations, combined arms combat, and diverse military tasks.[20] System of systems operational capability, as conceived, will enable complex confrontation between systems of systems rather than single system on system confrontation of the past. The PLA considers system of systems operations a transformation in generating combat capabilities, often portrayed by the PLA as 1 + 1 > 2. The capability relies on information systems, specifically the military information system. In particular the linkage and interoperability capabilities of the command information system will unify and optimize integrated joint force groupings, provide real-time information sharing, and precision control of combat operations. System of systems operations serves as a multiplier for the capabilities of real-time battlefield awareness, efficient command, precision strike, rapid maneuver, full-dimensional protection, and comprehensive support.[21]

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[18] Some PLA academics disagree on the definitions of terms associated with system of systems operational capability. The Academy of Military Science (AMS) and National Defense University (NDU), however, appear to have settled on official definitions for the various terms based on AMS's *Military Terms* and the NDU publication Research on *Information System-Based System of Systems Operations.*

[19] Translated by the PLA as "system warfighting capability based on information systems," *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 79.

[20] The series *Information System-Based System of System Operations* (Nanjing Army Command College. Beijing: Military Yiwen Press, 2010) discusses the subject in relation to ground force combined arms combat; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) p. 101.

[21] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 79; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press,

A system of systems operational capability will quicken operational response times to enhance firepower and maneuver, particularly by shortening and streamlining decision-making and sensor to shooter times to get inside an opponent's decision cycle. Additionally, it will enable units to operate with greater independence in dispersed deployment in a nonlinear battlespace, yet synchronize operations within a centralized command structure with some allowance for initiative at lower echelons.[22]

System of systems operations is described as essentially a process, based on information systems, to optimize and allocate operational forces and resources to generate combat power, increase combat effectiveness, and streamline and integrate systems and organizations.[23] System of systems operations has the following requirements: support of the military information system, and in particular the subset command information system; real-time sharing of battlefield information through the interconnection, interoperability, and intercommunication of the integrated information system; establishment of a centralized but geographically distributed interactive command network to synchronize the combat of dispersed forces; linkage of operational elements; the ability to rapidly recover and regenerate capabilities after enemy strikes; and the ability to dynamically reorganize modular task forces to meet changing operational requirements.[24]

Operational System of Systems

A related concept is operational system of systems[25] (作战体系). This represents a network information system based on the combination of various operational systems (作战系统) and forces formed into an organic whole.[26] It refers to the entire system that conducts combat operations including systems, forces and support—an integrated force grouping. For example, the air defense forces of a service could represent a branch-level operational system of systems that are linked together with air defense units from other services to build an integrated multi-service joint

June 2011) p. 3 and 8; *PLA Daily Online*, January 27, 2011, "Clarifying the Basic Connotations of 'System of Systems' Operations …"

[22] *PLA Daily Online*, November 11, 2010, "System of Systems Operations: Rules Draw Out Abilities to Construct a 'Road Map'"

[23] *PLA Daily Online*, April 24, 2010, "Incorporating Joint Military Training Into Track of System of Systems Operations Capability Building;" *PLA Daily Online*, August 18, 2011, "Gossips on 'Three Kinds of Capabilities'"

[24] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 3–7; *PLA Daily Online*, April 24, 2010, "Incorporating Joint Military Training Into Track of System of Systems Operations Capability Building;" *PLA Daily Online*, August 18, 2011, "Gossips on 'Three Kinds of Capabilities'"

[25] The PLA translates both *zuozhan tixi* (作战体系) and *zuozhan xitong* (作战系统) as "operational system" in *Military Terms* (2011). To avoid confusion, operational system of systems, which more accurately describes the concept, will be used for the former and operational system for the latter.

[26] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 63

operational system of systems that has redundancy and reorganization capabilities for greater survivability, agility, and lethality. While operational system of systems represents the theoretical concept, joint and service campaign formations (战役军团) and tactical formations (战斗兵团) represent the actual force groupings the PLA employs in exercises and that would execute actual combat operations.[27]

PLA writings discuss forming operational system of systems with a three- or four-tiered structure. A three-tiered structure would include the following: operational system of systems, service- or branch-level operational units (作战单元), and operational entities (作战实体). A four-tiered structure could be formed with the following components: operational system of systems, service-level operational units, branch-level operational units, and operational entities.[28]

An operational system of systems, essentially a campaign or tactical level force grouping, will be task organized depending on the mission. For example, in a large-scale joint island landing campaign in a potential Taiwan scenario, the operational system of systems could be composed of informationized joint forces including rapid maneuver forces as a vanguard, precision strike forces as the main body, with backing by other forces.[29]

Operational Units

Operational Units (作战单元), comprising various operational elements, are task organized to meet mission requirements, and represent a basic unit that can complete an operational task. They can be combined to form higher level operational units and operational system of systems. Examples include: an armor brigade or regiment task organized for an assault, or various force groupings such as an assault group (集团), in-depth defense group (群), or special operations group (组).[30]

Operational units are the basis for understanding the PLA concept of modular units. Operational units are force groupings task organized for a specific mission primarily at the tactical level. They can independently accomplish certain combat missions and represent basic "plug and play"

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[27] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 7–11; *PLA Daily Online*, September 23, 2011, "Plotting the Blueprint for the Scientific Development of Military Training in the '12th Five-Year Program' Period…."

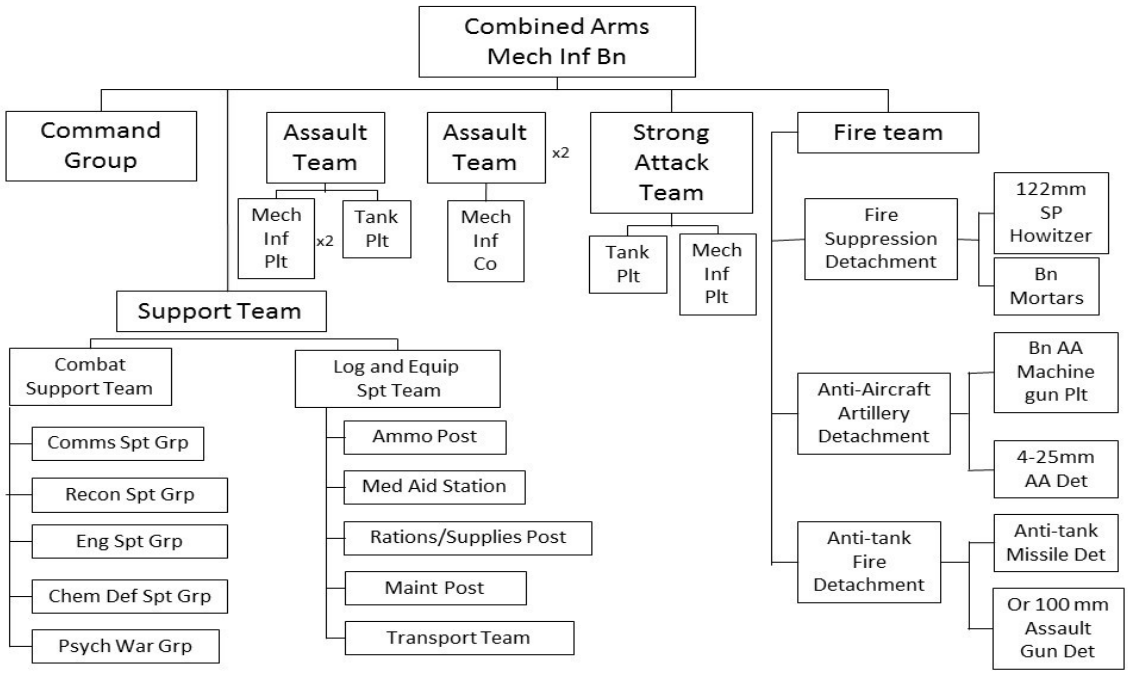
[28] *Information System-based System of Systems Operational Capability Building in 100 Questions* (Beijing: National Defense University Press, June 2011) pp. 28–29.

[29] *Information System-based System of Systems Operational Capability Building in 100 Questions* (Beijing: National Defense University Press, June 2011) pp. 48–49.

[30] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 63; *Research on Information System-Based System of Systems Operational Capability, Vol. 1 Operations*, Nanjing Army Command College. Beijing: Military Yiwen Press, 2010, pp. 5–7; *Information System-based System of Systems Operational Capability Building in 100 Questions* (Beijing: National Defense University Press, June 2011) pp. 27-28.

building block modular units. These task organized operational units can be rapidly formed into larger modular force groupings and restructured during the course of an operation to meet changing operational requirements. Within the ground forces, combined arms battalions (see Figure 1) are considered the basic operational unit to be used as a modular force for building larger task organized groups or tactical formations (战术兵团), which in turn form joint campaign formations (战役军团). These campaign and tactical formations represent the theoretical operational system of systems (作战体系).[31]

Figure 1 Example of Combined Arms Battalion Task Organization



The PLA defines four general categories of operational units that usually would include multiple operational elements or capabilities. These four categories are as follows:[32]

- Assault Unit: Units within an operational system of systems with a comprehensive assault capability, that usually include the capabilities of reconnaissance and intelligence, command and control, strike/attack, firepower, and support.

[31] Research on *Information System-Based System of Systems Operational Capability: Vol. 1 Operations*, (Beijing: Military Yiwen Press, 2010), pp. 5–6.

[32] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 37–41; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 27–28; *Research on Information System-Based System of Systems Operational Capability: Vol. 1 Operations*, (Beijing: Military Yiwen Press, 2010), pp. 5–7.

- Command Unit: A command post (basic, rear, alternate, or forward) to ensure control and coordination by means of the integrated information system through information sharing, distributed decision-making, parallel planning, real-time control as well as effective evaluation and assessment capabilities.
- Firepower Unit: Comprehensive firepower strike capability, including air defense forces, with the capabilities of reconnaissance and intelligence, command and control, firepower, and firepower effects assessments.
- Support Unit: Combat, logistics and equipment support, usually including the capabilities of reconnaissance and intelligence as well as command and control.

The modular force is formed and restructured during the course of a combat operation using the building block operational units with multiple operational elements capabilities. The modular forces constitute building blocks to form various operational system of systems.

Operational Elements

Operational Element (作战要素): Operational elements constitute the requisite capabilities of operational units and operational systems (系统).[33] Operational elements represent the key capabilities of operational elements and systems that are fused by the integrated information system to generate greater combat effectiveness for operational units. They represent the capabilities the PLA is developing in integrated joint training and supported by modernization efforts, and as yet are not highly developed according the PLA. Operational elements are as follows: reconnaissance and intelligence,[34] command and control, precision strike, three-dimensional maneuver, information confrontation, full-dimensional protection, comprehensive support, and the "Three Warfares."[35] The following descriptions of the operational elements provide a glimpse into the capabilities the PLA intends to develop through its modernization and integrated training efforts.

Reconnaissance and Intelligence

Reconnaissance and intelligence are required to support commanders at all levels to maintain initiative and successfully conduct combat operations on the dynamic battlefield. System of systems operations require the timely fusion of accurate multi-source intelligence and

[33] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 63.
[34] Referred to as Reconnaissance and Early Warning in some PLA writings, and often intelligence is used during discussions of the subject.
[35] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 63, Military Terms does not include "Three Warfares" or political work as an operational element; *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 41–68

reconnaissance information to provide a common operating picture displayed to commanders and staffs to meet the requirements of operational units, and shorten the sensor-to-shooter time to optimize joint fire strikes. The battlefield situation map currently employed by the PLA is a digital display providing a common operating picture of friendly and enemy forces, the air situation, geographic and weather information, electromagnetic environment, and other relevant operational information. The PLA is moving from a fragmented and stovepiped intelligence architecture to a fusion system that will include intelligence databases for operational units to query for needed intelligence information.[36]

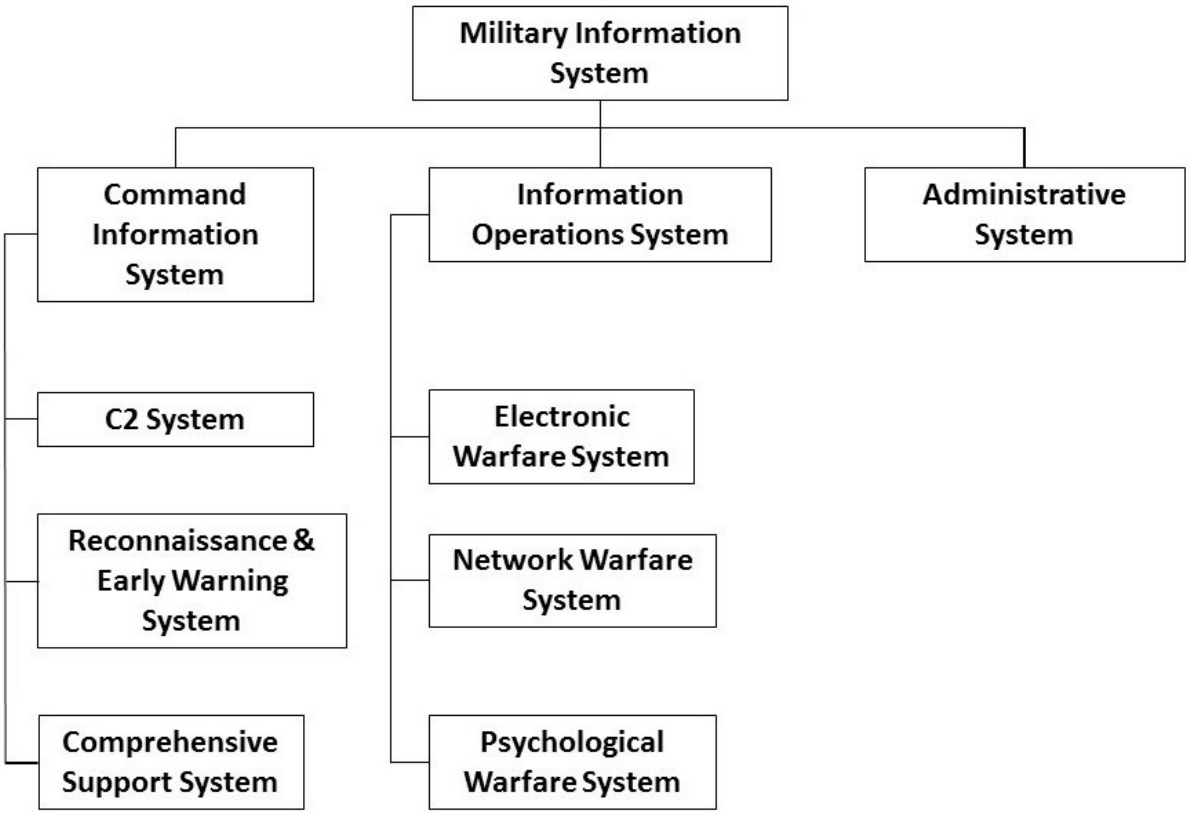
Command and Control

Operational forces dispersed over a vast battlespace conducting complex operations will stress the ability to conduct efficient and smooth Command and Control (C2). Effective C2 is the core of joint operations directly determining success or failure. As important as equipment modernization is the construction of an integrated information system. The PLA realizes that training qualified personnel, particularly joint commanders, is critical to developing this operational element.[37]

Within the military information system, the command information system plays a fundamental role for combat operations (see Figure 2). The command information system is composed of the following sub-systems: command and control system, reconnaissance and intelligence system, comprehensive support system and military infrastructure system. The command and control system provides the core function supporting the planning and execution of combat operations for the various services from the strategic to the tactical levels. The reconnaissance and intelligence system provides situational awareness, targeting data, and assists decision making by commanders. The comprehensive support system provides the basis for achieving precision logistics and operational support. This system includes the following: meteorological and hydrological support, mapping and navigation support, logistics support, equipment support, and engineering and chemical defense support information systems. Other main components of the military information system include the information operations system (electronic warfare system, network warfare system, and psychological warfare system), and the day-to-day administrative system.[38]

[36] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 41–45.
[37] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press), 2012, pp. 46–50.
[38] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 11–22.

Figure 2: Military Information System



The main command and control processes are operational decision-making, planning, coordination, and control capabilities. According to PLA sources, an important aspect of C2 will be distributed joint decision making, which represents a significant break from the past. This entails various commanders and their staffs dispersed at different locations—but connected by the integrated command information system—supporting the planning and execution of operational missions through sharing information, understanding the intent of superior headquarters, assessing the situation, and making recommendations. Subordinate commanders, thus, would provide greater input to the planning process. While centralized C2 remains the preferred method, the PLA realizes that more decentralized command, which provides for greater initiative by subordinate commanders within prescribed limits, will be required on a fast-paced, future battlefield.[39]

Precision Strike

The PLA believes that precision strikes or information firepower strikes will represent a basic operation and effective means of achieving operational objectives and even strategic aims during

[39] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 47–50.

future IJO. Precision strikes are planned to effectively attack and destroy the enemy's operational system of systems, disrupt the enemy's decision cycle, as well as their will to resist to successfully achieve war aims. The precision strike process includes precision reconnaissance, C2, joint strikes, damage assessment, and re-strikes if required to achieve the planned destruction or neutralization affect. An accurate assessment of the strike's damage is particularly important to provide the basis for decision-making on whether to conduct subsequent strike operations against the same target. A related concept put forth by the PLA is the information fire strike (信息火力打击) combining "soft" and "hard" destruction means to paralyze and then destroy key enemy nodes. In addition to military targets, the PLA also stresses political, economic, transportation, energy, and infrastructure targets that can deprive the enemy of the ability to continue operations and its war potential or deliver a powerful psychological shock to weaken military and civilian morale.[40]

Three-Dimensional Maneuver

Three-dimensional maneuver includes deployment by land, air and sea to or within an operational area, or maneuver during combat by land, air (including air assault, paradrops, and airlanding operations), or sea (including amphibious landings) to seize and maintain operational initiative. It can include movement of forces for force projection or operational maneuver from dispersed locations to concentrate superior forces at the decisive time and place. The PLA believes that the modern battlefield has nonlinear characteristics that create opportunities for rapid maneuvers to attack enemy weaknesses, avoid enemy detection and precision strikes, and defeat the enemy's decision cycle forcing the enemy into a reactive mode.[41]

Information Confrontation

Information offensive and defensive operations precede and are the prerequisite for the smooth conduct of combat operations, continuing throughout the course of combat. Information offense represents proactive action to disrupt enemy operations as well as to seize and maintain information superiority. Information offense and defense integrate a variety of means to interfere, suppress or destroy the enemy's information and information systems, while protecting one's own information and information systems.[42]

Information operations include traditional electronic warfare methods, emerging cyber- and network-based techniques, as well as directed energy weapons to supplement conventional kinetic

[40] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 50–54.
[41] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 54–57.
[42] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 57–60.

operations. Such operations, however, go beyond efforts to destroy or paralyze an enemy's information systems and include efforts to manipulate the information reaching enemy decision makers. Because system of systems operations and IJO requires greater reliance on information systems—and awareness of the resulting vulnerabilities—PLA sources make information and network protection a high priority, recommending various defensive measures such as the establishment of network emergency response forces to ensure network resilience.[43]

Full-Dimensional Protection

As firepower strikes increase in accuracy and lethality based on precision intelligence detecting high value targets throughout the battlespace, various active and passive force protection measures increase in importance to ensure the security and stability of one's own operational system of systems. Full-dimensional protection includes defense against enemy reconnaissance and surveillance, electronic and network attacks, psychological operations, precision strikes, and chemical, nuclear, and biological weapons. Active protection includes offensive actions to disrupt or eliminate enemy threats, and explicitly includes preemption. Passive measures include maneuver, withdrawal, concealment and camouflage, air and missile defense, and information protective measures. Information protection covers technical and psychological measures to preserve the integrity of the PLA's information processing system—collection, processing and dissemination —including the personnel operating the equipment.[44]

Comprehensive Support

The PLA considers comprehensive support difficult in future wars featuring a multi-dimensional and extensive battlespace with fast paced, dynamic operations, as well as high consumption and destruction rates posing complex support requirements. The PLA views precision support as the basic mode of support, including combat, logistics, and equipment support. Precision logistics support (后勤精确保障) can improve overall efficiency, while reducing duplication and resource waste. Precision logistics uses the minimum resources to meet support needs at the precise time and place—a military version of the business concept "just-in-time" logistics. It focuses on integration of joint military assets at the strategic, campaign, and tactical levels, as well as military-civilian support functions—including civil air, maritime and ground transport. An integrated support network is required to link all support organizations and forces, provide unified C2, requirements analysis, and resource allocation for the timely and accurate distribution of materials,

[43] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 57–60.

[44] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 60–63.

including adjacent combat zones.[45] The construction of the Beidou Satellite Navigation System and fielding of terminals throughout the PLA is particularly important for logistics units providing critical supplies to dispersed units on the battlefield, and has been observed in exercises.[46]

Logistics support for informationized warfare requires the following: civil-military integration of strategic projection forces, including civil air transport and large transport ships; an integrated combat zone with a base system focused on fixed support forces including general purpose and special integrated logistics support bases to service the combat zone and adjacent combat zones; groupings of flexible strategic logistics contingency support forces, mobile maritime support forces including large supply ships, and PLAAF emergency mobile support groups and air refueling forces; and small, light, mobile, modular tactical logistics groups. The establishment of the Joint Logistics Support Force in September 2016 is intended to support the construction of a modern joint logistics system. Equipment support includes material and technical support. Requirements for future combat include a combination of echelon-by-echelon and skip echelon support, with strengthening of the skip echelon method for flexible and rapid support to major combat equipment, high-tech systems, and movement of spare parts, ammunition and other material; and a combination of fixed and maneuver support.[47]

"Three Warfares"

The "Three Warfares" are psychological, public opinion, and legal warfares, and their integrated employment is designed to seize political advantage, foment the psychological disintegration of the enemy, influence other countries, and support one's own morale. These actions begin during peacetime and continue through all operational phases of a conflict. The ideal goal is to achieve one's objectives without fighting or subdue the enemy with minimal destruction and material consumption. Public opinion warfare uses mass media to promote one's own political positions, and block the enemy's media offensive to influence domestic and foreign public opinion. Psychological warfare uses principles of modern psychology to select strategies against specific audiences, to consolidate one's own psychological line of defense, and to influence enemy military and civilians to achieve military and political objectives. Legal warfare substitutes for conventional military methods to gain initiative and achieve political and military objectives.[48]

Information Systems

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[45] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 63–67.

[46] *China Brief*, August 22, 2014.

[47] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 63–67; *PLA Daily Online*, September 13, 2016.

[48] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 67–69.

Information systems (信息系统) provide the material foundation, consisting of various civilian and military information systems. These represent individual types of information systems that are configured with other types of information systems to construct a system of systems comprising multiple types of information systems.[49]

Operational Systems

An operational system (作战系统) is composed of operational units formed into an organic whole, constituting basic functions of the operational system of systems, such as firepower strike systems, information confrontation systems, and comprehensive support systems.[50]

Operational Entities

Operational entities (作战实体) represent the smallest unit in an operational system of systems. For example, this could be a squad, individual weapon or equipment platform.[51]

Additional Concepts Associated With System of System Operations

Several important associated concepts related to IJO and system of systems operations are discussed in PLA doctrinal publications and are important in fully understanding these theoretical developments. These include precision operations, modular force groupings, information firepower strike, noncontact and nonlinear operations. These areas are important components of IJO that are likewise driven by PLA analysis of the RMA and enabled by development of system of systems capabilities. The areas are dependent on integrated C4ISR systems, with precision strike capabilities promoting non-contact and nonlinear operations.

Precision Operations

The PLA has examined U.S. military precision operations in local wars with limited objectives since the 1990s, believing that precision operations have become the basic pattern of joint

[49] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 11–22; *Research on Information System-Based System of Systems Operational Capability, Vol. 5 Information Systems*, Nanjing Army Command College. Beijing: Military Yiwen Press, 2010, pp. xx ; *PLA Daily Online*, November 11, 2010, "System of Systems Operations: Rules Draw Out Abilities to Construct a 'Road Map'"

[50] *Military Terms* (Academy of Military Sciences. Beijing: Military Science Press, 2011), p. 63

[51] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) p. 29.

operations, and will become a key capability for integrated joint operations. The PLA believes that precision operations include precision command, strike, maneuver, and logistics.[52]

Information systems linking various military forces, weapons and equipment systems are a key requirement to implement precisions operations (精确作战). The integrated information network must exhibit rapid flow and efficient use of information and intelligence to support precision command and precision operations.[53]

Integrated intelligence and reconnaissance capabilities are required to assess rapid changes on the dynamic battlefield in a timely and accurate manner to support decision-making. Intelligence collection, analysis and dissemination will be critical to executing precision command and combat missions, providing intelligence support to precision strikes and other operations. The PLA is developing and fielding a real-time situational awareness capability with a common operating picture for operational forces. It is working on the theoretical basis for intelligence procedures to provide actionable intelligence to headquarters at various echelons. Higher-level units will have access to all available intelligence, but information will be filtered as it is disseminated to lower echelons based on intelligence requirements to successfully complete assigned mission objectives. An important consideration in filtering relevant information to lower echelons is the realization that units can rapidly become overburdened with irrelevant information or more information than they can process with available resources. The PLA plans to establish intelligence databases that can be queried for information.[54]

Precision strikes in the context of precision operations with limited objectives are not intended to cause widespread destruction, but to control and paralyze the opponent. The goal of precision strikes is to deliver a direct blow to the enemy's center of gravity to gain a quick victory. The PLA has identified the following key enemy targets to strike to cause paralysis: command network and automation system; main and elite forces vital to the enemy's operations; firepower systems; and logistics bases and supply lines. Battle damage assessments of precision strikes are an important task, facilitated by modern reconnaissance architecture and intelligence fusion to assess the damage effect by firepower strikes on the targets to determine whether operational requirements have been achieved, and support decision-making to determine future courses of action such as re-striking targets or initiating strikes on newly discovered targets.[55]

According to one of the basic PLA works on the subject, *Precision Operations*, the benefits of precision operations include the following: reduced combatant and civilian casualties; minimized

[52] *Precision Operations*. (Beijing: National Defense University Press, 2011) pp. 1–18.
[53] *PLA Daily*, "Revolutionizing Command Methods: Acceleration the High-Speed Engine of Change," October 7, 2011.
[54] *PLA Daily Online*, July 8, 2012, "Big data is Perplexing and Requires Orderly Circulation and Distributions for Defeating the Enemy"
[55] Contact author for additional sources

destructiveness of combat, including collateral damage; improved operational effectiveness and efficient force employment through precision command, strike and maneuver; control of the scale of conflict through precision strikes that rapidly achieve objectives and limit an opponent's response; and affecting the enemy psychologically as the result of devastating and rapid operations.[56]

The PLA is fielding modern communications, reconnaissance, precision strike weapons and munitions to support the evolving precision operations capability. Success in operationalizing precision operations capabilities will provide the PLA greater flexibility to concentrate and release combat power with high efficiency, potentially employing smaller, modular force groupings with greater effect.

Modular Force Groupings

Creation of modular force groupings forms the basis of establishing operational systems of systems (integrated force groupings) that are a key component of system of systems and integrated joint operations. Modularity provides great flexibility in task organizing an optimal joint force grouping to conduct a specific mission, with the capability to reconfigure the force grouping rapidly for follow-on missions, to meet changing requirements during the various phases of an operation.

The integrated information system represents a dynamic network linking operational forces and weapons platforms with precision command, which will support this flexible organization and restructuring forces. This will theoretically allow the PLA to deploy the correct force mix with precise capabilities for a given battlefield mission.[57]

The PLA is developing and fielding a networked communications architecture capable of lateral information flow and coordination between services and branches to support joint task force command and coordination. The PLA has conducted joint exercises featuring testing of joint command and coordination procedures, joint logistics, and joint campaign and tactical formations for at least a decade (see Appendix A for examples of joint tactical formation exercises, and Appendix B for examples of joint campaign formation exercises).[58]

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[56] *Precision Operations*. Beijing: National Defense University Press, 2011 pp. 1–18.

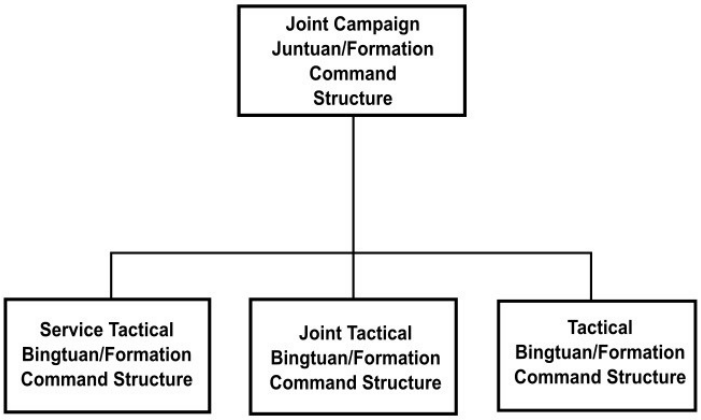
[57] *Research on Information System-Based System of Systems Operational Capability, Vol. 1 Operations*, Nanjing Army Command College. (Beijing: Military Yiwen Press, 2010); *Research on Information System-Based System of Systems Operational Capability, Vol. 2 Operational Command*, Nanjing Army Command College. (Beijing: Military Yiwen Press, 2010) pp. 15–24.

[58] *Research on Information System-Based System of Systems Operational Capability, Vol. 2 Operational Command Systems*, Nanjing Army Command College. (Beijing: Military Yiwen Press, 2010) pp. 23–25 and 41–51; *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?"

The PLA has experimented with different joint and combined arms modular groupings, for example: Figure 3 is a generic example of a joint campaign formation, while figure 4 is an example of a joint landing tactical formation.[59]

- Joint Campaign Formation (联合战役军团)[60]—this campaign force grouping of two or more services represents a PLA version of an operational level joint task force[61]
- Joint Tactical Formation (联合战术兵团)—tactical level grouping (division or brigade level and below) from two or more services representing a tactical level joint task force[62]
- Combined Arms Battalion—tactical groupings based on armor, mechanized infantry, and infantry battalions reinforced for a specific mission with ground force combat and support units. The battalion command—normally consisting of the commander, deputy commander, political commissar and deputy political commissar—is expanded to 12 to 14 officers and noncommissioned officers for a combined arms battalion. This expanded structure includes personnel from within the battalion and deployed from regiment, brigade or division headquarters. An Army Aviation liaison can be attached, and a target guidance group from the PLAAF can be deployed to coordinate firepower support from fixed wing aircraft.[63]

Figure 3: Example of a Modular Force Grouping



[59] *PLA Daily Online*, October 14, 2010, "How Do Joint Operations Bring Into Play Their Integral Operational Efficacy?..."; *Science of Joint Tactics*, (Beijing: Military Science Press, 2014), p. 120.

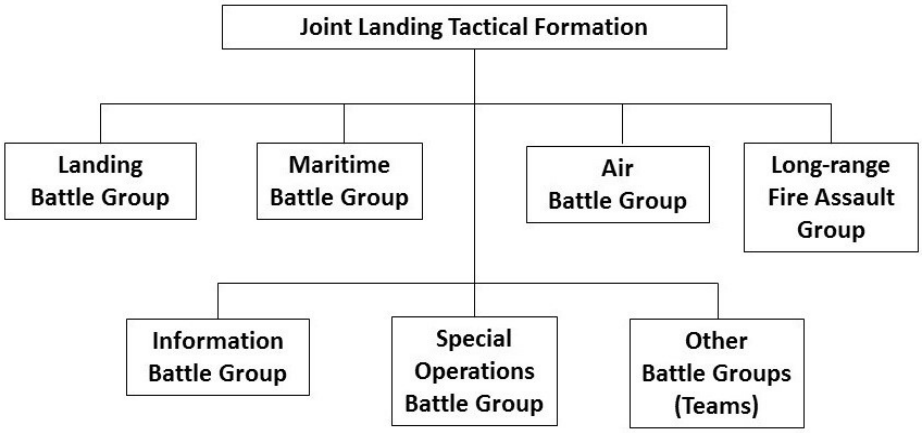
[60] Since 2009, the PLA has turned to examining how to establish a campaign-level joint formation on the basis of a service-level basic campaign large formation [基本战役军团] for joint operations, *PLA Daily Online*, March 26, 2009, "Take the Initiative to Take the Momentum, Make Every Effort to Seize the Preemptive Opportunities 'Minutes on the Demonstration and Planning Meeting for Joint Trainings Test in Jinan Theater'"

[61] *China News Service*, October 11, 2009, "People's Liberation Army 'Vanguard 2009' Joint Exercise Takes the Stage—Eleven Branches of the Army and Air Force, and Nearly 10,000 Officers and Men Participate;" *Xinhua Domestic Service*, September 22, 2008, "Five-Dimensional Confrontation in Exercise 'Lianhe-2008' in Bohai Gulf"

[62] *PLA Daily*, December 26, 2006, "Exploring Ways to Change Campaign Training Under Informationized Conditions"

[63] *PLA Daily*, December 26, 2006, "Exploring Ways to Change Campaign Training Under Informationized Conditions;" *PLA Daily Online*, December 15, 2009, "Learn How To Fight Battles in Exercise—Analysis of PLA's Training Reform from Military Exercises in 2009 (III)".

Figure 4: Joint Landing Tactical Formation



As the PLA developed its concept for joint force groupings they have also characterized these task forces based on participating forces, including the following:[64]

- Ground-air formation: for example, designed to conduct various ground force campaigns, joint border defense and counterattack campaigns, or "anti-terrorism and maintaining stability" operations (counterinsurgency or internal stability operations).
- Naval-air formation: for example, to conduct attacks on enemy maritime groupings, blockade or counter-blockade operations.
- Ground-naval-air formation: for example, to conduct a joint island landing campaign.
- Ground-naval-air-Rocket Force formation: to conduct a joint firepower strike.

A key component in implementing IJO within the PLA is pushing joint operations capabilities down to the tactical level and creating integrated modular forces and tactics at those echelons.[65] The PLA is experimenting in exercises with the creation of joint task forces at the campaign and tactical levels.[66] The PLA recognizes the need to strengthen joint training with smaller combat modules and command organizations to support implementation of the concept.[67]

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[64] *PLA Daily Online*, October 14, 2010, "How Do Joint Operations Bring Into Play Their Integral Operational Efficacy?..."

[65] *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training – Joint Training is the Key to Rendering Combat Capability, It Could Serve as the Driving Force for the Transformation of Military Training to Steadily Reach Towards the Projected Goal;" *PLA Daily Online*, May 2, 2009, "Forge Core Military Capability in Sync with Times;" *PLA Daily Online*, September 2, 2008, "On Strengthening 'Eight Integrations' in Joint Operations;" see *Science of Joint Tactics* (Beijing: Military Science Press, 2014) for a discussion of PLA joint command and coordination, joint tactical formations, and joint offensive and defensive tactics.

[66] *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?"

[67] *PLA Daily Online*, May 2, 2009, "Forge Core Military Capability in Sync with Times"

The PLA additionally recognizes the complexity of coordination issues for these joint task forces, particularly within a multi-service grouping. The PLA notes the complexity of coordination during the course of the joint operation:[68]

- Coordination within an individual service
- Coordination of actions between the services
- Coordination between the various types of action
- Coordination between different operational directions
- Coordination during transitions between campaign phases, particularly as the positions and roles of various service units change during the progression of the joint operation

PLAN exercises have provided examples of a single service modular grouping. Training in 2013 exhibited a modular force during an exercise in the western Pacific. The modular grouping was referred to as a "joint maneuver formation" (联合机动编队) composed of four different ship types and supported by helicopters. This combined arms grouping trained at diverse missions such as amphibious assault, strikes on enemy naval forces, defense, anti-submarine, anti-terrorism, and search and rescue operations.[69]

The PLA considers joint and service campaign and tactical formations as key to constructing operational system of systems. The joint and service level tactical formations would provide modular groupings in the composition of a joint or service campaign formation. The PLA also believes that campaign and tactical formations are a key method for integrating operational systems, operational units, and operational elements to promote system of systems operations. PLA exercises strive to improve the information system-based system of systems operational capability through training of joint campaign and tactical formations' command structure integrating the command information system, operational units and operational elements into an operational system of systems.[70]

These highly integrated force groupings can conduct integrated joint operations and are viewed as a key to winning future conflicts. The modular force concept provides for flexibility in tailoring the optimal force composition to meet changing requirements as progressing through various operational phases on the future battlefield.

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[68] *PLA Daily Online*, October 14, 2010, "How Do Joint Operations Bring Into Play Their Integral Operational Efficacy?"
[69] *China Military Online*, April 7, 2013, "Ships of South China Sea Fleet joint mobile ship formation return to home port;" *Xinhua*, April 3, 2013, "Chinese navy fleet returns home from West Pacific drill;" *chinamil.com.cn*, April 2, 2013
[70] PLA Daily, March 15, 2016; PLA Daily, October 14, 2015

Information Firepower Strikes

The PLA believes that information and firepower supremacy are closely intertwined and that firepower with effective information support are critical to paralyze or destroy key nodes and ultimately defeat enemy operational system of systems or destroy critical infrastructure targets in order to achieve wartime objectives. The subject of information firepower strikes (信息火力打击) was initially addressed by PLA writings in 2002, and is now receiving increased attention as it is viewed as a key element of system of systems operations. A fusion of information and firepower is required to support precision strike capabilities. Information systems integrating and multiplying the capabilities of the entire force, reconnaissance and intelligence supporting decision making for targeting and battle damage assessment, and information protection are all considered key information requirements to support joint firepower strikes. According to the PLA, precision strikes combined with information and electronic warfare—forming a soft- and hard-kill strike operational system of systems—to paralyze, destroy, and suppress key enemy forces and capabilities. The rapid, simultaneous destruction of key enemy assets can deliver a strong adverse psychological impact on enemy military and civilians, contributing to a quick victory in a future war.[71]

Nonlinear and Non-Contact Operations

Both of these terms have come into usage by the PLA and other armed forces primarily in response to improvements in precision strike, rapid maneuver, and reconnaissance and intelligence capabilities. The PLA believes that nonlinear operations (非线式作战) is increasingly becoming a modern combat method. Non-linear operations characteristics include dispersion and irregular deployment of forces in the battlespace, in-depth attacks including long-range hard- and soft-kill strike systems, rapid maneuver into the enemy's rear area by armor, special operations forces, air assault and airborne units, quick transitions between offense and defense, high requirements for denial and deception, and increased requirements for command and coordination of forces widely dispersed across the battlespace. Greater dispersion and intermingling of forces on a battlefield without defined frontlines is considered a method to mitigate the enemy's reconnaissance and precision strike capabilities. Nonlinear combat, however, places great demands on command and control, coordination, reconnaissance, and intelligence processing.[72]

The PLA views modern military operations from Operation DESERT STORM to Afghanistan as featuring non-contact operations (非接触作战) characterized by long-range strikes against enemy

[71] *On Information and Firepower Supremacy*, Nanjing Army Command College (Beijing: Military Science Press, 2010) pp. 1–11 and 264–299

[72] *Chinese Military Encyclopedia (Second Edition), Tactics Volume 1* (Beijing: China Encyclopedia Press, 2007) pp. 114–115; Military Terms (Beijing: Military Science Press, 2011), p. 72

military and infrastructure targets with limited or no ground forces deployments. The ability to effectively strike the enemy throughout his depth is based on information, reconnaissance and surveillance capabilities making the battlefield transparent, combined with stand-off strike and advanced command information systems that create the foundation for non-contact combat. Accurate battle damage assessment capabilities are important for decision making to ascertain whether operational objectives have been achieved.[73]

[73] *Chinese Military Encyclopedia (Second Edition), Tactics Volume 1* (Beijing: China Encyclopedia Press, 2007) p. 117

System of Systems Operations: Impact on PLA Transformation

Successful development of a system of systems operations capability is dependent on PLA modernization and reform efforts, but the intention to implement a system of systems and joint operations capability is providing requirements that are focusing and driving the modernization plan. These requirements are broad and include the following: an integrated C4ISR system linking the services in a joint operations command system down to the tactical level; realistic joint training, battle labs and simulation centers for experimentation and innovation in joint operations and tactics; improved military colleges and universities to provide a quantity of quality joint talent; optimization of the force structure, changing the force ratio between the services, and continued creation of new type operational forces.

The desire to accelerate military modernization has been highlighted by the PLA. This is in part a response to a complex security environment, as well as a perception that a quickening pace in the revolution in military affairs and modernization of advanced militaries in the world is threatening to leave the PLA further behind. The possibility remains for external conflicts and internal instability, including strategic containment and geopolitical competition, territorial disputes, ethnic and religious unrest, and separatist and terrorist threats.[74]

Preparation for military struggle is also a prominent PLA theme; of course, preparation for combat is a basic task for any armed force. For China, this is related to views on the potential for conflict, becoming more proactive strategically, particularly in regards to territorial disputes, the need to improve warfighting capabilities, and meet new and expanding military requirements. Preparations include improving strategic planning and innovation, as well as crisis prevention, deterrence, and limiting or controlling a crisis or conflict.[75]

The PLA has a long-range three stage modernization plan it has been following since 1999. The objectives announced in the plan are designed to essentially create an advanced armed forces by mid-century (see Table 1). A researcher at the Academy of Military Sciences has proposed a more focused and holistic approach to accelerate modernization based on developing a system of systems operations capability to generate warfighting capabilities and implement an integrated joint operations capability. However, the researcher does not provide timelines for his proposal, and it is not clear whether his proposals have been adopted to supplement or supplant the official modernization plan.[76]

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[74] *Diversified Employment of China's Armed Forces*, (Beijing: Information Office of the State Council, 2013); this is a theme of the publication, *Transformation of Generating Mode of War Fighting Capability*, (Beijing: Military Science Press, 2012); *Global Times*, August 31, 2014; *PLA Daily* August 31, 2014.

[75] *Xinhua*, March 15, 2014; *China Military Online* November 21, 2014.

[76] *China Brief*, July 17, 2014.

Table 1: Military Modernization Three Phase Plans

<table>
<tr><th colspan="2">Strategic Plan for National Defense and Armed Forces Building
(official plan with general timeline)</th><th colspan="2" rowspan="2">System of Systems Warfighting Capabilities Generation
(proposed plan to accelerate military modernization, no timeline provided)</th></tr>
<tr><td>Stage One</td><td>Lay a solid foundation by 2010</td></tr>
<tr><td>Stage Two</td><td>Accomplish mechanization and make major progress toward informationization by 2020</td><td>Stage One</td><td>Operational Elements (combat capabilities) Generation</td></tr>
<tr><td rowspan="3">Stage Three</td><td rowspan="3">Basically reach the strategic goal of modernization by mid-21st Century</td><td>Stage Two</td><td>Operational System of Systems (integrated force grouping) Generation</td></tr>
<tr><td>Stage Three</td><td>New Operational Methods (operational art and tactics) Generation</td></tr>
<tr><td colspan="2">(Representing an accelerated completion of the long-range modernization plan)</td></tr>
</table>

Several recent People's Liberation Army publications discuss requirements for implementing system of systems operations in order to fully implement IJO. The requirements are both broad and deep, indicating that these two theoretical developments are driving many of the changes that are part of the PLA's transformational efforts, and in particular, the recent reform efforts by President Xi. This section examines reform of training, exercises, and education; modernization and integration of information systems; and streamlining and modernization of the force structure to support development of system of systems operations and modernization of key warfighting capabilities. Many of the modernization and restructuring efforts have been evident in the past, such as reorganizations of lead agencies for joint training and information technology modernization.

A National Defense University publication notes that equipment modernization is not the main impediment to the PLA's transformational efforts. The main constraints are the need to cultivate quality personnel, and eliminate parochial interests of the services and institutional conflicts, which the current reforms under President Xi are addressing. Existing barriers between the services are being broken down, adjustments to the force structure are planned to create greater balance between the ground forces and other services, and increase cross service understanding and knowledge. For example, there are differences in formats and content for operational documents between the services that make joint integration and coordination difficult.[77] While

[77] *PLA Daily Online*, "Promoting the Scientific Development of Academy Education at the New Starting Point," June 5, 2012; *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012), pp. 264–266.

the PLA is working to improve joint operations and high-tech knowledge amongst personnel, reform efforts prior to President Xi's reforms appear to have had mixed results so far.[78]

The reforms announced by the Third Plenary Session of the 18th Central Committee were headlined by economic pronouncements, but also contained ambitious language on the reform and restructuring of the Chinese military.[79] According to the communique and subsequent press articles, areas affected include adjusting the force mix according to the security requirements of various strategic directions, reducing non-combat institutions and personnel, greater innovation in military theory, strengthening military leadership, building a system to generate greater warfighting capability, reform of military colleges and unit joint training, noncommissioned officer (NCO) system, strengthening military-civilian integration, improving weapons development and procurement, and improving the joint operation command system. This current round of PLA reforms appear to be establishing the foundation to have a significant impact and accelerate the course of PLA transformation—altering the PLA's organization and command structure more than previous reductions and reorganizations since the 1980s.[80]

President Xi's announced a 300,000 personnel reduction with a completion by the end of 2017 at the 70th anniversary military parade in September 2015. A flatter command structure has been created with the CMC at the apex of a bifurcated system. The functions of the former four General Departments (Staff, Political, Logistics and Armaments) have been integrated into the CMC providing centralized control, management and oversight. The command structure reorganization has transformed the seven ground force dominated military regions into five new theater joint commands. A force development system now runs from the CMC to the service headquarters—including a newly established Army headquarters, PLA Rocket Force, Strategic Support Force, and Joint Logistics Support Force—to oversee modernization of the force and service specific training. Operational command runs from the CMC to the five theater joint commands to the operational forces. The theater commands (TC) are responsible for warfighting, development of operational methods (operational art and tactics), and joint training focused on wartime operational requirements. This new structure places the CMC in full control over the military and the People's Armed Police Force, as well as creating a flatter command structure advocated by PLA academics as a key objective of command transformation efforts. The CMC provides leadership, macromanagement, and command functions to the overall force. Of interest, little has been said of the Ministry of National Defense and its limited responsibilities.[81]

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[78] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) p. 244; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 196–197.

[79] *China Brief*, November 20, 2013

[80] See China Brief, September 30, 2011 and *China Brief*, November 28, 2011

[81] *Xinhua*, November 26, 2015; *South China Morning Post*, December 20, 2015; *Bowen Press*, December 13, 2015; *MOD*, January 11, 2016; *MOD*, February 4, 2016

The fifteen new CMC organizations are as follows:

- Three commissions:
  - Discipline Inspection Commission 纪律检查委员会
  - Politics & Law Commission 政法委员会
  - S&T Commission 科学技术委员会
- Five institutions:
  - Strategic Planning 战略规划办公室
  - Reform & Organizational Structure 改革和编制办公室
  - International Military Cooperation 国际军事合作办公室
  - Audit 审计署
  - Agency for Offices Administration 机关事务管理总局
- Seven Departments/Office:
  - General Office 办公厅
  - Joint Staff Department 联合参谋部
  - Political Work Department 政治工作部
  - Logistics Support Department 后勤保障部
  - Equipment Development Department 装备发展部
  - National Defense Mobilization Department 国防动员部
  - Training & Administration Department 训练管理部

The CMC also has a Joint Operations Command Center (军委联合作战指挥中心) in addition to the new Joint Staff Department. The Joint Staff Department is responsible for operational planning, command and control, operational command support, research on military strategy and requirements, assessment of combat capability, guidance on joint training, combat readiness and war preparations, and other functions. Identified subordinate offices of the Joint Staff Department includes an Operations Bureau, Battlefield Operations Bureau, Intelligence Bureau, Information Communications Bureau, and Navigation Bureau. The Joint Staff Department's Overseas Operation Division is established under the Operations Bureau is responsible for planning, preparation, and execution of overseas non-war military operations. This includes international peacekeeping, overseas naval escort mission, international relief, protection and evacuation of overseas Chinese, and military exercises and training with foreign countries. President Xi serves as the Commander-in-Chief of the Joint Operations Command Center which exercises strategic command over the theater joint commands.[82] There appears to be potential overlapping responsibilities between the Joint Operations Command Center and the Joint Staff Department. It is likely that the Joint Staff Department is primarily responsible for operational planning and preparation for war, strategic research, guiding joint training, and command of overseas non-war operations, while the Joint Operations Command Center provides CMC strategic command over theater wartime operations.

[82] *Global Times*, April 12, 2016.

The five new theater commands include:

- Northern TC (北部战区)
- Eastern TC (东部战区)
- Souther TC (南部战区)
- Western TC (西部战区)
- Central TC (中部战区)

The Second Artillery Force was renamed the Rocket Force and elevated in status. Rocket Force units are subordinate to the CMC. The CMC can assign PLARF units to support theater command joint firepower strikes as required. The Rocket Force as well as the other services have assigned high quality officers to the new joint commands. The PLARF reportedly assigned approximately 100 officers to the five new theater commands to support operational planning and joint training with theater forces.[83]

The Strategic Support Force was established on December 31, 2015. The main mission of the new force is to support joint operations to gain regional advantages in space, cyber and electromagnetic space warfare. Missions include reconnaissance and early warning; strategic command, control and communications; navigation and management over the Beidou Navigation Satellite System; space reconnaissance; and defending the electromagnetic and cyberspace domains. The force will also focus on new cutting edge technologies such as big data, cloud computing, 3D printing, and nanotechnology. The force is intended to reduce redundancy between the services overlapping operational support forces, although the exact division of responsibilities between the Strategic Support Force and the services operational and tactical operational support forces is unclear.[84]

The Joint Logistics Support Force was created on September 13, 2016. The new force includes the Wuhan Joint Logistics Support Base and Joint Logistics Support Centers in each of the new theater commands as follows: Wuxi Joint Logistics Support Center (JLSC), Eastern Theater Command; Guilin JLSC, Southern TC; Xining JLSC, Western TC; Shenyang JLSC, Northern TC; and Zhengzhou JLSC, Central TC. The Joint Logistics Support Force will provide strategic joint support to the theaters of general-purpose material and equipment, while service logistics will provide specialized support.[85] The new Logistics Support Department within the CMC is responsible for logistics planning, policy research, setting standards, inspection and supervision functions, adjust and optimize the support forces, and leadership and command relations.[86]

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[83] *Global Times*, February 4, 2016; *Xinhua*, April 6, 2016; *China Military Online*, April 7,2016; *Global Times*, April 12, 2016; *China Military Online*, May 10,2016; *PLA Daily*, March 2, 2016

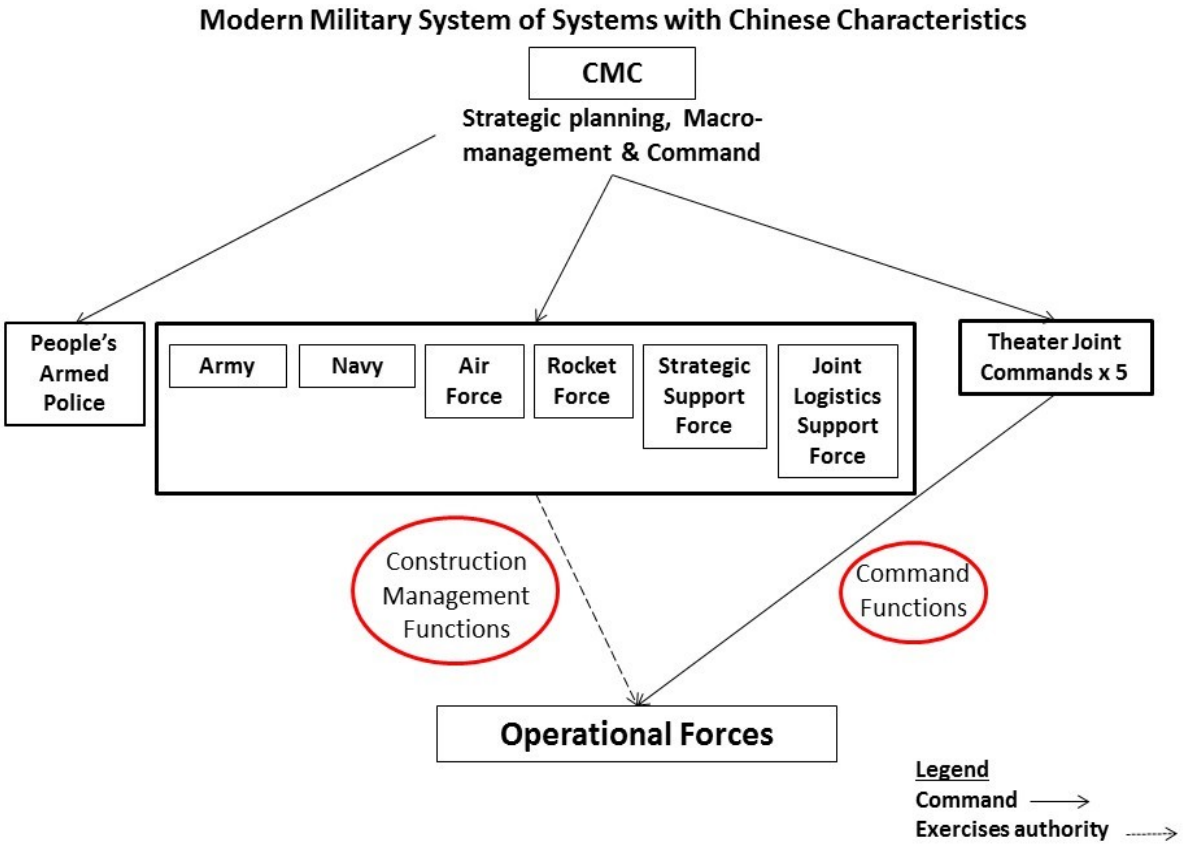
[84] *China Military Online*, January 6, 2016; *China Daily*, January 23, 2016

[85] *MOD*, September 13, 2016; *China Military Online*, September 14, 2016

[86] *MOD*, January 11, 2016

The PLA has been discussing joint command structures in detail since the 1990's, so the rapid stand up of the new theater commands is not surprising as the conceptual foundation was laid over the past fifteen years or more. A *PLA Daily* article examining the Russian establishment of their theater commands noted that it took less than five months for the commands to stand up after the announcement. The article notes that rapid transition establishing the theater commands shortens the period of risk until the new command systems is functional. However, numerous *PLA Daily* articles suggest that command and coordination issues remain to be resolved. Another *PLA Daily* stated that the establishment of the force development system focused on the service headquarters would be a gradual process. The PLA press has also indicated that the latter three years of the current reform effort will refine the changes announced so far. Overall transformation efforts, however, will still take 20 to 30 years.[87]

Figure 5: New Flat Command Structure



President Xi's reforms are significant in that they eliminated the four powerful General Departments and a command level, incorporating their functions into the CMC. The CMC has now assumed direct control over the PLA as well as the People's Armed Police. This should provide

[87] *Global Times*, December 25, 2015; *PLA Daily*, December 9, 2015; *PLA Daily*, December 2, 2015

greater high-level direction and oversight for important transformation efforts to ensure implementation. The establishment of the theater joint command structure is the most significant measure of the announced reform plan, and clearly the most contentious as it involved the elimination of the former Military Region system dominated by the ground forces. A major shift in high-level military personnel has occurred under President Xi either through the anti-corruption campaign and promotions that has strengthened Xi's authority within the military and reduced opposition to the more contentious aspects of the military reform plan that stymied former Presidents Jiang Zemin and Hu Jintao in the past. There are indications in the PLA press that there is some resistance and confusion within the ranks over the more difficult aspects of the reform plan with continuing calls for loyalty and discipline. The formation of theater joint commands is important in reducing ground force primacy, but also critical to moving forward to an advanced joint operations capability. The significance of these structural changes cannot be over emphasized, as previous reform efforts focused primarily on force reductions rather than significant structural change. The creation of theater joint commands will eliminate the need to stand up joint commands for a conflict, thus easing the transition to war.[88]

President Xi's reforms reinforce less contentious reform measures underway since the initiation of the long-term modernization plan. Some of these issues being reinforced by the current reform effort include exercises, training, and cultivation of quality talent; modernization of information systems; and force development.

Exercises, Training and Education

System of systems and joint operations theory are changing operational patterns and methods which in turn are leading to new educational and training requirements to address the lack of personnel with high-tech and joint operations experience, train units on integrated information systems to promote the establishment of operational system of systems, and, move to greater testing and demonstrations in exercises to advance theoretical concepts. Cultivating skilled personnel, especially joint commanders and staff, is viewed as critical to this effort.[89] Interestingly, the PLA also cites the problem of limited funding for training as leading to the search for more effective, efficient, and cost effective training methods to save money, material, manpower and time.[90]

Past efforts to improve training included the creation of the Military Training Department in the former GSD in December 2011—which was formed from Military Training and Arms Department—with more authority as the lead agency responsible for training management,

[88] *China Briet*, February 4, 2015; *China Briet*, September 9, 2015

[89] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press) 2012, pp. 342–344.

[90] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) p. 226.

decision-making, and greater standardization across the PLA. The new Training and Administration Department in the CMC will likely act as the CMC lead agency to provide high-level direction and tasked to oversee and direct joint training in a more scientific and rational manner focusing on the strategic and operational levels; and establish a standardized training system and regime to improve training coordination, support, and evaluation system. As stated above, the service headquarters will direct service specific training, and the theater commands are responsible for joint training, but likely with oversight and instructions by the new CMC department.[91]

PLA press reporting has highlighted the need to conduct realistic combat training and strengthen the psychological and physical toughness of troops to meet the demands of future combat operations. The PLA is concerned with the lengthy process to convert from peacetime to wartime status in response to a sudden crisis. Training based on realistic combat conditions will better prepare troops psychologically, maintain a higher level of combat readiness, and shorten the time for units to convert to wartime readiness levels. The Chinese Defense White Paper released in April 2013 stated that the PLA has three levels of unit readiness as they transition to wartime. The establishment of theater joint commands in peacetime is part of this preparation for a possible sudden conflict.[92] Increased readiness levels within the PLA should shorten mobilization times for units to deploy, as well as reduce the need for pre-battle combat training as units train during peacetime for their potential theater combat missions. These developments could reduce warning time and indicators of combat preparations during a crisis.

The PLA has initiated several training reforms in recent years. The former Jinan MR has been at the forefront of joint training experimentation such as joint logistics efforts for well over a decade, possible a training mission for the new Central Theater Command. The Central Military Commission and the former GSD tasked the Jinan MR to establish the first theater joint training leadership institution in 2009.[93] In October 2011 Jinan MR unveiled an integrated joint command system.[94] The Jinan MR was assigned the first pilot project on joint campaign training evaluation on March 29, 2013. In coordination with military educational institutes, the Jinan MR was tasked

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[91] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 344–347; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 225–226 and 232; *PLA Daily*, December 22, 2011

[92] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 218 and 230; *The Diversified Employment of China's Armed Forces*, Information Office of the State Council (Beijing: 2013).

[93] *PLA Daily Online*, February 25, 2009, "In Order to Conscientiously Implement the Important Instructions of Chairman Hu on Strengthening the Joint Training, Headquarters of the Central Military Commission Conferred Jinan Theater the First Pilot Mission 'first theater joint training leadership institution of the whole army officially put into operation"

[94] *PLA Daily Online*, December 14, 2011, "Chengdu Military Region Skills Contest," *China Military Online*, November 21, 2012, "PLA's command information system becomes normalized and standardized;"

to promote standardization of a joint evaluation system to solve problems with content, quality index, and evaluation means and methods.[95] A number of exercises since 2012 have featured greater participation by military educational institutes, including confrontation exercises. This increased involvement of military colleges and universities improves the knowledge and experience of both the educational institutions and operation forces. The PLA's former General Departments (Staff, Political, Logistics, and Armament) held a conference in March 2012, which resulted in the launching of a pilot program on command and confrontation training. This pilot program was assigned to the Nanjing Army Command College to more effectively and uniformly support command training across the PLA and development the use in exercises of a simulated "Blue Army" using experts and professors. The Nanjing Army Command College has been the source of advanced research on transformational issues.[96]

Integrated Joint Training

The PLA views integrated joint training as an advanced training method to achieve an integrated joint operations capability.[97] This type of training will assist in forming system of systems capabilities through the vertical and lateral integration of operational elements, units, and systems between branches and services in order to generate greater combat effectiveness and win an informationized war. Integrated joint training requirements include the following:

- Command information system linking informationized equipment training to further the integration of weapons, equipment, and units;
- Training focused on theater combat missions such as joint fire strikes, large-scale amphibious landing operations, or isolating near-shore islands;
- Integration of key operational elements, particularly intelligence, command and control, joint strike, full-dimensional protection, and comprehensive support that are viewed by the PLA as critical to implementation of IJO;
- High-level direction to prioritize training objectives, system demonstrations, and pilot projects for experimentation; and modular group training.[98]

Operational unit integrated training is focused on optimizing and integrating modular grouping of forces, information systems interoperability and integration, and operational elements. Integrated training of operational elements is focused on horizontal and vertical integration, system configuration and functions, and networking. System protection is an important aspect of the training, including protection against enemy reconnaissance, cyber-attacks, precision strike,

[95] *China Military Online*, April 1, 2013, "PLA's first pilot project of joint campaign training evaluation launched"
[96] *PLA Daily*, March 9, 2012, "PLA explores new model of command training;" *PLA Daily*, July 11, 2012, "Reform of PLA command training mode deepened"
[97] *China Brief*, March 6, 2015.
[98] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 241–253.

and nuclear, chemical or biological weapons attacks, with a focus on rapidly restoring the systems. Intelligence, command and control, joint strike, full dimensional protection, and comprehensive support are the key operational elements in integrated training.[99]

Training Bases

The PLA believes that integrated training bases are also a key component to implementing its warfighting concepts, promote continued theoretical research, develop new tactics, and enhance combat capabilities. Its large training bases have been upgraded in the past decade, but the PLA believes further modernization is required. The PLA hopes to create multi-functional training bases that are teamed with military educational institutes to promote greater interaction and rigor in evaluating training exercises. Some of the suggested facility upgrades include: simulation and network training; multi-media class rooms; equipment simulators; and officer educational centers. On a larger scale, authoritative PLA writings recommend expanding training bases to better support high-tech combat, confrontational, complex electromagnetic, and non-combat contingency training environments; as well as sufficient capacity to enable large-scale unit rotations. Additional recommendations to improve training management in order to coordinate, monitor and evaluate training include the following:

- Greater standardization of exercise programs for uniformity in training quality;
- Real or near real-time monitoring and tracking of training events;
- Objective and accurate joint and combined arms training examination and evaluation standards for units focused on combat effectiveness;
- Improved digital evaluation system embedded into weapon systems with rapid recording, processing, feedback, and assessment capabilities.[100]

The combined-arms tactical training bases (合同战术训练基地 - CATTB) originally one in each of the former military regions are included in the recommendation to further upgrade and establish large, multi-functional training bases. These bases were originally constructed for complex ground force training, but training with the PLAAF is conducted at the bases. The PLA also conducts area coordination training (区域协作训练) within training coordination zones (训练协作区 - TCZ)[101] in each MR. The training coordination zones cover large geographical areas to accommodate joint training between the three services and SAF, and have included cross-MR training. The TCZs have relied less on fixed facilities and defined training areas compared to the

[99] *Chinese Military Encyclopedia (Second Edition) Military Training Vol. 2* (Beijing: China Encyclopedia Press, 2008) pp. 337–338.
[100] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 344–347; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 220–241.
[101] Also military training coordination zone (军事训练协作区).

CATTBs, but would likely require upgrades to include exercise monitoring and evaluation, simulation centers, and other training facilities to better support multi-service joint training (see Appendix C for additional information on joint training). While the CATTBs were primarily regional training centers, the theater reorganization leaves the most sophisticated base at Zhurihe in the former Beijing MR, now in the Northern Theater Command, but far from the command's subordinate units. Zhurihe has been featured in cross-regional training in the past, and could be positioned to become the PLA's equivalent of the U.S. Army's National Training Center.

Simulation and Network Training

The PLA plans to improve and expand use of simulation and network training as part of its informationized training effort. The PLA views this type of training as an efficient and cost effective method that can flexibly increase the complexity of training scenarios, provide repetition of scenarios, simulate future operational environments for experimentation, and validate campaign and tactical combat theories while reducing equipment wear and material consumption. In parallel with other recommendations for high-level management and direction, the PLA proposes the establishment of a national-level simulation institution, perhaps within the CMC Military and Administration Department. Such an institute would be used to establish and manage uniform training technology and standards, comprehensively promote computer simulation training, cultivate combat simulation system research and development specialists, as well as develop simulation software and equipment including a high-tech simulation platform for training multiple command levels.[102]

The former Guangzhou MR in 2012 conducted large-scale computer wargame exercises with units across the MR. The three services and the former Second Artillery Force participate in this joint training which reached from the theater down to low-level tactical units.[103] This type of simulated joint training to supplement joint field exercises can provide a cost efficient means for the PLA to experiment and repeat certain aspects of joint operations, particularly C2 and coordination methods. Since this simulated wargaming defeats various collection methods, it will complicate analysis of PLA joint operations developments.

The PLA considers Battle Labs as an important information age simulation and wargaming means to test new operational theories, and verify concepts before moving to expensive field testing. However, the PLA considers its Battle Lab system as incomplete. Some Battle Labs have been established, but they are independent rather than coordinating work with other military operations laboratories. With the recent emphasis on standardization and high-level direction on important

[102] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 344–347; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 218–236.
[103] *PLA Daily*, August 26, 2012, "Gun Smoke Everywhere; Armed Forces Engaged in Fierce Battle….."

issues, it would seem likely that the PLA will take a more centralized approach toward establishing a network of Battle Labs with coordinated research efforts. This is likely a mission of the new CMC training department.[104]

Cultivating Quality Personnel

The PLA realizes that military personnel are a critical resource to support modernization and meet the needs of future joint warfare. The PLA also notes that compared to highly advanced armed forces, the PLA's current information literacy is low and its lack of specialized and technical personnel is constraining modernization and cannot meet the requirements of winning informationized wars.[105] The PLA began an examination of professional military education in the late 1990s to improve the education system and structure including graduate and post-graduate studies. Beginning in 2007 PLA educational institutions began to focus on measures to improve joint operations and joint command education, and improving joint education remains an important objective of President Xi's reform plan. The PLA initiated a strategic project for talented individuals to fully develop officers, noncommissioned officers, and scientists with the joint command knowledge, technical skills and expertise required to support the transformation effort.[106] Personnel training recommendations to cultivate high quality personnel include: reform academic training program content, particularly high-tech and joint command knowledge; increase job rotation and cross-training efforts; expand opportunities for joint command personnel to study abroad; integrate academic institutes with exercises; and increase use of online courses.[107] As with other recommendations to improve various transformational efforts, the PLA recognizes that greater high-level direction, standardization, and systematic programs need to be established across the PLA.

The quality of officers and men is viewed by the political and military leadership as inadequate, with additional resources needed to develop the specialized skills in core competencies to conduct modern joint operations and support the broad modernization effort. The personnel evaluation and selection process also requires improvements to correct significant problems, as evidenced by press reporting on PLA corruption cases related to promotions and conscription. Establishment

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[104] *Transformation of Generating Mode of War Fighting Capability*, (Beijing: Military Science Press, 2012) p. 37; *PLA Daily*, December 9, 2010, "Pre-Practice: Dispersing Informationized Warfare Fog?;" *PLA Daily*, June 28, 2012, "'Battle Lab' Aids Transformation of Warfighting Capability Generation Mode;" *PLA Daily* , February 4, 2010, "Naval Battle Starts on Land;" *Zhongguo Tongxin She*, July 22, 2007, "Informationized Warfighting Capability of the PLA is Multiplied;" China's National Defense 2008

[105] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 208 and 224.

[106] *China's National Defense in 2010*.

[107] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 347–351; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) p. 236.

of a standardized selection process based on qualifications is also seen as a means to attract and retain skilled personnel. Xi's reform program intends to further improve military educational institutes with increased funding, enhanced scientific and technological education, and joint operations training. Problems include weak and out of date courses, instructors that are out of touch with modern operational requirements, lack of innovation, and fraud and corruption within the educational institutes which is polluting the academic environment.[108]

The former Shenyang MR provided an example of an individual MR's attempt to cultivate military talent. In 2004, the Shenyang MR created a nurturing coordination zone to improve joint operations command talent, break down service centric thinking, and improve the combined-arms knowledge of its officers. The initiative coordinated with 18 units in the MR including the three services, the former Second Artillery Force, local universities, and military educational institutes. Cross-training, assignments to other service units and attendance in other service academies were employed to provide greater joint experience to MR officers, including the following initiatives through 2009:[109]

- 200 officers conducted cross-college training. For example, 30 ground force officers at division and regiment level spent a month at the Navy Command College, the Air Force Command College or the Second Artillery Command College (now the Rocket Force Command College)
- 100 officers served in another service
- 87 percent of "primary commanders" conducted cross-training
- A high tech training base was established jointly with the National University of Defense Technology for officers at division, brigade, and regiment
- An Engineering Master's class established at Northeast University and Dalian Institute of Technology for command personnel
- Training class established at Shijiazhuang Army Command College to prepare regiment and battalion officers for joint operations command
- 10,000 officers at regiment and below exchanged positions within their service for greater combined-arms experience
- 63 officers at regiment and above studied or visited foreign countries
- 200 officers participated in peacekeeping operations or acted as military observers

The PLA reform of the noncommissioned officer corps to create a foundation for technical expertise to master weapons and equipment is part of this effort. Other plans include an improved examination and evaluation mechanism to recruit, select, and promote information technology talent and students with better skills for military education institutes; and a greater training focus

[108] *China Military Online* July 16, 2014; *China Military Online* December 30, 2013

[109] *PLA Daily Online*, February 2, 2009, "Who Is Going to Command the Next War' Interviews and Reports on the 'Joint Operations Command Talents Nurturing Coordination Zone' in Shenyang Theater"

on use of digital maps, satellite navigation and positioning, intelligence, and communications systems.[110]

The ongoing reform of the military colleges and universities will likely take some time to improve joint training and produce a quantity of quality joint officers. However, intensive joint operations exercises for wartime missions against Taiwan have been conducted in the former Nanjing and Guangzhou MRs since the early 2000s, as well as joint exercises testing command, coordination, logistics, and campaign and tactical forces have been conducted in the former Jinan MR for at least a decade. It is likely that these exercises provided on-the-job joint training and actual joint operations experience to a large pool of operational officers.

NCO reform is having an important impact on modernization by providing greater stability and skilled personnel compared to the two-year conscripts. The increasing reliance on career NCOs throughout the force and especially in high-tech areas is creating a volunteer force to operate and maintain increasingly advanced equipment, and providing leadership at the lowest levels of the PLA. NCO reform combined with efforts to recruit students from colleges and advanced technical schools is improving the overall educational level of personnel. These reform efforts are still relatively new, and the PLA NCO corps is more technically focused and limited in its responsibilities compared to the U.S. NCO system, but already appears to be having a positive effect on PLA modernization. The recent NCO reform to establish a Master Chief System in the PLA is a move to assign greater responsibility and leadership to NCOs by taking some of the duties and posts from officers.[111]

Modernization and Integration of Information Systems

C4ISR represents the foundation for system of systems operations, and the PLA has been fielding components of the regional integrated electronic information system (区域综合电子信息系统)—a key program in C4ISR modernization efforts.[112] The integrated information system represents a transition from the traditional communications architecture—the PLA often describes this as a tree command system—to a mesh or matrix network that is integrated horizontally and

[110] *Information System-based System of Systems Operational Capability Building in 100 Questions* (Beijing: National Defense University Press, June 2011) pp. 210–224

[111] *PLA Daily*, October 13, 2004, "Reform of Chinese Army's NCO System Brings Historic Change to Military Personnel Structure;" *PLA Daily Online*, November 4, 2009, "Interpretations of Policy Regarding Deepening Reform in System of Noncommissioned Officers;" *PLA Daily Online*, November 12, 2008, "Matrix of High Quality Noncommissioned Officers is Rising at Military Camps"; *China Military Online*, January 21, 2015.

[112] *PLA Daily Online*, April 24, 2010, "Incorporating Joint Military Training Into Track of System of Systems Operations Capability Building," *Research on Information System-Based System of Systems Operational Capability, Vol. 5 Information Systems*, (Nanjing Army Command College. Beijing: Military Yiwen Press, 2010), p. 3.

vertically.[113] Various PLA publications have described problems with the information systems, including lack of integration, fragmentation, and outdated software. Integration, particularly between the services, has appeared as an ad hoc effort left to the local commands to develop solutions to problems. A major recommendation to correct identified problems is to establish a high-level management institution for research and development issues, such as instituting comprehensive information system construction norms and standards. The new CMC Equipment Development Department apparently has this mission.[114] The PLA has been deploying an integrated command platform, although problems are still reported. The PLA did announce the debut of an integrated command information system in early 2012 linking the former General Departments and services, although the extent and success of this system was not clear. Improvements in the information systems are being made, such as providing a common operating picture through a digital battlefield situation map.[115]

Reflective of this commitment to improve the command information system, the former Jinan MR in October 2011 debuted an integrated joint command system touted as an example of progress. This effort was probably part of a pilot project launched in 2010 in the former Beijing, Jinan, and Nanjing MRs experimenting with the employment of information systems. This pilot project included the Academy of Military Sciences, Shijiazhuang Army Command College, Nanjing Army Command College, and the Communication Command College. The inclusion of these high-level organizations in the process indicates the project's importance.[116]

Force Restructuring and Modernization

Efforts to improve efficiency, particularly operational command efficiency, across the services include reduction of staffs and redundant organizations to eliminate overlapping functions and mandates as well as flattening command levels. According to PLA publications, failure to resolve

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[113] *Research on Information System-Based System of Systems Operational Capability, Vol. 1 Operations*, Nanjing Army Command College (Beijing: Military Yiwen Press, 2010) pp. 1–24 ; *Research on Information System-Based System of Systems Operational Capability, Vol. 2 Operational Command*, Nanjing Army Command College (Beijing: Military Yiwen Press, 2010) pp. 13–24.

[114] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 243–244; ; *Research on Information System-Based System of Systems Operational Capability, Vol. 2 Operational Command*, Nanjing Army Command College. Beijing: Military Yiwen Press, 2010 p. 3 ; *PLA Daily Online,* December 14, 2011, "Chengdu Military Region Skills Contest"; *PLA Daily Online,* March 10, 2011, "Promoting the Scientific Development of Informationization Building from a New Starting Point"

[115] *China Military Online*, January 8, 2013, "Changes and progress of China's military exercises in 2012"; *PLA Daily*, September 16, 2015.

[116] *PLA Daily Online,* December 14, 2011, "Chengdu Military Region Skills Contest," *China Military Online*, 21 November 2012, "PLA's command information system becomes normalized and standardized;"

these issues will limit operational command efficiency, resulting in passive, reactive combat operations.[117]

Recent major force reductions and restructuring occurred in the late 1990's and again in 2003-2005, and now President Xi has announced a reduction of 300,000 personnel to be completed by the end of 2017. Recommendations for all the services include streamlining staffs and force structure, optimizing the force composition and combined arms capabilities, and compression of non-combat units. The reduction up to late 2016 appears focused on demobilizing redundant personnel. Demobilization of ground force units could occur during 2017, with Group Armies in the Central Theater Command likely candidates. The transformation to theater commands has left the CTC with five Group Armies, and two of them—20th and 27th Group Armies—have experienced a low modernization rate and neither have Army Aviation or Special Operation forces indicating a low priority. There are several other low priority Group Armies—14th in the STC, 40th in the NTC, or the 47th in the WTC—in other TCs, however the distribution of forces make their demobilization unlikely. In contrast to the reductions, new type operational units represent high priority areas that will continue to expand, including Army Aviation, special operations, offensive and firepower forces, psychological warfare, cyber operations, and space operations forces.[118]

One impediment to PLA transformation is situation where many units have mixes of weapons and equipment spanning two RMA stages.[119] General equipment modernization trends are focused on developing key operational elements across the services including the following capabilities: long-range precision strike, maneuver and force projection, reconnaissance, air defense as well as information and electronic warfare. Robotic and stealth technologies also are highlighted. There is little discussion of Rocket Force modernization in PLA publications, and space operations are discussed primarily within the context of foreign defensive and offensive developments. However, these two areas are high priority areas that will continue to experience modernization priority.[120] The Taiwan Ministry of National Defense stated in a recent report to the Legislative Yuan that the former Second Artillery Force had recently increased from 140,000 to 150,000 personnel, and the

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[117] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 241–243.

[118] *Research on Information System-Based System of Systems Operations*, (Beijing: National Defense University Press, 2012) pp. 341; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 177–183.

[119] *PLA Daily*, November 28, 2006, "The Strategic Policy Decision for Invigorating Military Training and Strengthening the Army in the New Period of the New Century—On the Scientific Connotations and Epoch-Making Significance of Transforming Military Training;" *PLA Daily*, July 25, 2006, "Concentrating Efforts on Improving Integrated Joint Combat Capability—Third Commentary on Promoting Transformation from Mechanized to Informationized Military Training"

[120] *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 165–189.

recent white paper *China's Military Strategy* stated the importance of the aerospace, maritime and cyber domains, indicating that capabilities as well as forces in these areas will increase.[121]

Conclusion

System of systems operations and integrated joint operations are two of the most important ongoing developments in the PLA. The PLA has stated that it remains relatively weak in joint operations capabilities and joint training, but successful implementation of system of systems and integrated joint operations can greatly enhance future combat capabilities, providing the PLA with greater agility and lethality during diverse contingencies. Operationalizing these concepts is having a wide-ranging impact on ambitious transformational efforts, including reform to training, exercises, and education, organizational restructuring, and equipment modernization. Understanding the terminology developed to support the evolving system of systems operations theory is critical for analysis, as the terms appear regularly in PLA press articles and publications.

System of systems operational capabilities based on information systems is viewed by the PLA as a key enabler for integrated joint operations.[122] It represents the integration of systems and forces, providing significantly enhanced capabilities, including situational awareness, precision command, strike and logistics, as well as rapid maneuver and force projection. The importance of these capabilities to meeting future warfighting requirements explains the PLA's focus on this subject in theoretical writings and joint training.

Operational system of systems is a new way of the PLA to address force groupings at the campaign and tactical levels incorporating a system of systems building block approach that, if successful, should support modular grouping or recombination of forces to meet operational requirements or readjust the force mix during transitions from one operational phase to another. The PLA has been employing joint and service campaign formations and tactical formations in exercises for at least a decade gaining valuable experience in joint task force operations.

Many of the reform and modernization efforts proposed in PLA publications are either underway or proposed in President Xi's new military reform effort, although continued and improved efforts are required. The establishment of the five theater joint commands supplanting the former Military Region system dominated by the ground forces is a significant first step to overcome the identified problem of parochial service interests and institutional impediments to transformation efforts that have limited the PLA's modernization efforts in the past. Education reform to cultivate a new generation of joint officers will take time, although intensive joint training in the former Nanjing, Guangzhou, and Jinan MRs since the early 2000s has provided actual joint operations experience

[121] *Central News Agency*, August 31; Information Office of the State Council, May 2015

[122] *PLA Daily Online*, September 26, 2011, "Deep Integration: New Targets Pursued in Joint Training"

to a pool of operational officers. The current round of reorganization has concentrated control and oversight within the CMC to provide the badly needed high level direction required to standardize information systems modernization, joint training efforts across the services and theaters, as well as other initiatives, and could prove decisive in overcoming difficult problems and accelerating PLA transformation. Implementation of theater joint commands provides a significant indication that the political and military leadership is serious about moving away from an army centric mentality, reducing institutional barriers to reform, as well as accelerating significant military reforms compared to past efforts. Time will tell, but President XI appears to be laying the foundation for an accelerated transformation effort.

Professional military education, training, and exercise reform can have significant impact on the success or failure of transformation efforts. The PLA is experimenting with IJO and systems of systems integration in exercises, and analysis of integrated joint exercises can provide insights into IJO progress. However, the recommendation to rely to a greater extent on simulations and network wargaming for joint training, combined with units conducting field training at dispersed locations but under a joint exercise scenario, or combined with simulation training, could make exercise-based analysis difficult to assess the extent and quality of the PLA's progress.

The former Jinan MR had been the focus of a number of pilot programs related to joint operations, command and evaluation. It is likely that the Central Theater Command will now take over some of this joint experimentation and testing. Beginning in 2012 the military educational institutes have become involved with exercises to a greater degree, including providing experts to simulate blue forces in training. The addition of colleges, universities and academies' expertise with field exercises and war games should enhance realism of unit training, confrontation drills, and provide valuable feedback to academics in order to improve course content.

The focus on realistic training, exercising theater combat missions, and increasing combat capabilities is in part an effort to reduce the time needed for units to transition to wartime readiness and prepare personnel psychologically for combat in the event of a sudden crisis. High combat readiness combined with peacetime training focused on wartime missions could allow PLA units to rapidly mobilize and depart their garrisons, and require less pre-battle training preparation, which could lead to reduced warning time and indicators during a crisis, particularly when denial and deceptions measures are employed. The creation of permanent theater joint commands also promotes a more rapid transition to a wartime posture.

As a precision operations capability is further developed, the PLA will gain greater flexibility and control to conduct operations with modular joint force groupings designed to meet specific operational requirements. Once the current hurdles are overcome and these capabilities are achieved throughout the force, the promise of quick victory with minimal losses, combined with a

belief in the ability to control the scale of a conflict could make the use of military force in a potential crisis with limited objectives appear manageable with limited risk.

It is worth repeating that system of systems operations and IJO are in an early stage of development, and the broad range of modernization and reform efforts required will likely make their implementation a long, difficult process. Success in operationalizing these theories, however, can lead to a PLA that is an advanced military force capable of rapidly meeting new and diverse contingencies. Currently the PLA is transitioning from coordinated joint to integrated joint operations. While full implementation of an advanced integrated joint operations capability remains aspirational, the PLA has been incrementally improving their joint operations capabilities for more than a decade in the areas of joint command and coordination, fielding a more modern C4ISR system, and exercising modular integrated joint task forces. While problems remain, the PLA's capability to conduct joint operations is continually improving while it works to identify and eliminate deficiencies, and with the continuing implementation of military reform efforts, the PLA should continue on an upward trajectory and eventually achieve a fully realized system of systems and integrated joint operations capability.

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Science of Joint Training Course of Study (联合训练学教程). Beijing: Military Science Press, 2013.

The Transformation of the Generating Mode of the Warfighting Capability (战斗力生成模式转变). Beijing: Military Science Press, 2012.

Appendix A: Examples of Joint Tactical Formation Exercises 2004 through 2015

The PLA stated in 2009 that joint operations was in the research and demonstration stage.[123] While the PLA is making progress in incrementally implementing elements of integrated joint operations, the PLA assesses that tactical level joint operations would be difficult due to technology and capability limitations. More advanced communications systems are deployed within the PLA, however difficulties with integrated joint communications have been cited in the Chinese press as impediments. The PLA is developing joint tactics and conducting exercises with modular joint tactical formations (兵团).[124] While these assessments are likely true for the PLA force wide, there are units conducting advanced experimentation, such as the 38th Group Army in Beijing Military Region, that are more adept in employing more advanced operational theories in field exercises.

The PLA has identified issues inhibiting joint tactical training. These include the following: continuing problems with integrated communications systems; joint tactical literacy; partitions that have existed between the services leading to a lack of knowledge of other services procedures, capabilities, and tactics; the required high level of specialized branch training within the services which limits the amount and quality of joint training; and coordination within and between services that has proved difficult for commanders and staffs to overcome at the tactical level.[125]

The PLA is emphasizing joint tactical command training for commanders and staffs using wargaming/simulations and confrontation training. This is intended to overcome deficiencies in joint command and coordination procedures, as well as the transfer and use of command posts in joint tactical formations.[126]

The PLA views integration of joint forces down to the tactical level as an important joint operations requirement, yet this will stress command and coordination measures in future operations. As in other research areas on joint operations, there are divergent views on forming joint operations forces. The preference moving forward is to form modular groupings combining multiple functions—firepower, information, aviation, and support for example—based on mission requirements, which the PLA believes, is the better solution even though command and support will be complex. The PLA has researched and experimented in exercises with modular groupings

[123] *PLA Daily Online,* March 26, 2009, "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'"

[124] *Joint Operations Research*, (Beijing: National Defense University Press, 2013) pp. 113–114.

[125] *Joint Tactical Training* (Beijing: Tide Press: 2008) pp. 23–26.

[126] *Joint Tactical Training* (Beijing: Tide Press: 2008) pp. 68–71.

for at least a decade, and continues to employ both joint campaign formations and joint tactical formations in exercises.[127]

The PLA considers joint and service campaign and tactical formations as key to constructing operational system of systems. Joint tactical formations are also the key element in pushing joint operations down to the tactical level. The joint and service level tactical formations would provide modular groupings in the composition of a joint or service campaign formation. The PLA also believes that campaign and tactical formations are a key method for integrating operational systems, operational units, and operational elements. The PLA intends to push joint operations down to the brigade tactical formations, joint tactical groups (群）, and even company-level attack teams (连规模攻击队).[128]

This annex examines joint tactical formation exercises, while Annex B discusses select examples of joint campaign formation exercises.[129] Select examples of exercises from 2004 to 2011, probably representing an experimental and testing phase, featuring JTFs include the following:

- The *Lianhe* (联合) series of exercises are conducted by the Weifang Training Coordination Zone in the former Jinan MR, now in the Northern TC. *Lianhe*-2004 began testing joint command models for joint tactical formations. *Lianhe*-2004 created a unified joint command staffed by participating army, navy and air force commanders. The PLA discovered that this unified group joint command model for a JTF worked well enough for a short-duration, small-scale operation. However, the PLA believed that it would be hard to implement in a larger-scale joint operation, and that it was hindered by the force structure systems currently in effect (probably referring to the differences between the services in conducting operations and conducting staff operations).[130]
- *Lianhe*-2005 exercise at the Weifang TCZ conducted a live-fire exercise. A multi-service joint tactical formation was formed, establishing a unified joint command with the 26th Group Army (GA), PLAAF and PLAN elements.
- 124th Amphibious Mechanized Infantry Division, 42nd Group Army, former Guangzhou MR (now in the Southern TC) formed a multi-service joint tactical formation with the division commander acting as the joint commander. PLAAF and PLAN elements were integrated into the joint task force during this 2007 training event, presumably to train at amphibious assault combat.[131]

[127] *Joint Operations Research*, (Beijing: National Defense University Press, 2013) pp. 123–125.
[128] *PLA Daily*, March 15, 2016
[129] *PLA Daily Online*, May 2, 2009, "Forge Core Military Capability in Sync with Times"
[130] *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone 'Lianhe-2008' ['Joint-2008'] Exercise"
[131] *PLA Daily*, November 30, 2007, "'Precise Calculation' Has Become Key Word on Training Ground"

- *Lianhe*-2006 and *Lianhe*-2007 tested a "distributed coordination" joint command model for a multi-service JTF. *Lianhe*-2007 also tested joint logistics capabilities in a confrontation exercise supporting multi-service combat. During these two exercises, the PLA relied on the existing force structures and dispatched coordination groups to various units. The liaison officers participated in operational planning and command of the service arm they were dispatched. The liaison officers made suggestions on how their own service arms could be used and conducted coordination. The PLA found that this reduced the conflicts in the existing service command systems, and promoted a certain level of jointness. However, the coordination was lax between the services in the joint tactical formation which weakened the joint integration the PLA hopes to achieve.[132]
- *Libing*-2008 (砺兵)—trans-regional opposing force exercise from the former JMR to BMR Zhurihe CATTB (now located in the Northern TC), with ground-air JTF based on the 58th Mechanized Infantry Brigade, 20th GA, former Jinan MR (now in the Central TC). The 54th GA, former Jinan MR now in the Central TC, Army Aviation Regiment supported the JTF. The brigade CP containing PLAAF and Army Aviation officers, including PLAAF firepower support and tactical airborne operation in support of the brigade. This exercise was viewed by foreign attaches.[133]
- *Lianhe*-2008 – Weifang TCZ trans-regional exercise with amphibious multi-service JTF embarking on Shandong Peninsula, crossing the Bohai Gulf, and landing on the former SMR's Liaodong Peninsula (now the Northern TC), with an opposing Blue Force and operations conducted in a complex electromagnetic environment. Planning for the September exercise began in March.
    - A joint command post was formed around the 138th Motorized Infantry Brigade, including PLAAF and PLAN officers, and issued orders to service elements within the JTF. The JTF operated under the command of a joint command large formation headquarters, presumably formed around the 26th Group Army that is responsible for the TCZ. [134]

[132] *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone 'Lianhe-2008' ['Joint-2008'] Exercise;" *China News Service*, September 4, 2007, "'Joint 2007' [Lianhe 2007] Real Troop Military Drill in Jinan Military Region Demonstrates Fast and highly Efficient Joint Logistics Capability in Three Services of the PLA"

[133] *PLA Daily Online*, September 18, 2008, "Reporters Observation of Troops Toughening 2008 Real-Troops Confrontation Drills: Keep in Mind Tactical Level during Joint Trainings;" *PLA Daily Online*, October 13, 2008, "Three Transformations Bring Continuous Developments to Military Training;" *PLA Daily*, September 17, 2008, "Diversified modes of command embraced in 'Sharpening 2008' exercise;" *PLA Daily*, September 26, 2008, "Combined tactical corps of PLA exercises have been extended to the brigade and regiment level"

[134] *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone 'Lianhe-2008' ['Joint-2008'] Exercise"

- The main purpose of the exercise was to continue the joint command and control, and coordination experimentation for a JTF that had begun during *Lianhe*-2004.[135] This time a "distributed embedding" joint command model was employed. Instead of dispatching "coordination groups" to each service unit as occurred in *Lianhe*-2006 and *Lianhe*-2007, this time "command coordination groups" were dispatched. These groups had both coordination and command authority. The JTF commander discussed operational issues with subordinate commanders to determine key operational issues and make decisions. There was a shift in command based on phases of the operation. For example, during the embarkation and sea crossing phases, the navy joint commander played the main role. Exercise participants thought this joint command method was an improvement over the previous models, but they recognized that the PLA was still in an initial stage of joint development.[136]
- While this exercise was primarily focused on examining joint issues, particularly command and control, the operational methods it develops could support a joint island landing campaign against Taiwan. The exercise could also represent a reinforcing operation or landing operation in support of a North Korean contingency.

- "*Bei Jian* 2008" (北剑) exercised a ground-air joint tactical formation at the Zhurihe CATTB in October 2008. Some of the joint training topics included firepower strikes, offense and counterattacks, and operational support. The confrontational exercise included the use of a laser simulation system employed in the various CATTBs, and the introduction of a complex electromagnetic environment application system, reportedly the first system of its kind in the PLA. The PLA reported that the system simulates and monitors various types of complex electromagnetic environments.[137]
- Ground-air JTF exercised at the former Lanzhou MR TCZ in the fall of 2008 based on a ground force division with Second Artillery Force (now Rocket Force), PLAAF, Army Aviation, People's Armed Police and militia in support. Electronic warfare, integrated defense and counterattack operations were exercised over five days.[138]
- A JTF conducted a joint firepower strike exercise organized by the former Lanzhou MR in October of 2010. The exercise reportedly occurred at the Lanzhou MRs TCZ in the Tianshan Mountain area (now in the Western TC). The former General Departments, National Defense University, PLAAF, and SAF (now Rocket Force) representatives

[135] *PLA Daily Online*, October 13, 2008, "Three Transformations Bring Continuous Developments to Military Training;" *Xinhua Domestic Service*, September 22, 2008, "Five-Dimensional Confrontation in Exercise 'Lianhe-2008' in Bohai Gulf;" *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone 'Lianhe-2008' ['Joint-2008'] Exercise"

[136] *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone 'Lianhe-2008' ['Joint-2008'] Exercise"

[137] PLA Daily, October 22, 2008, "'North Sword 2008' field drill wraps up"

[138] *PLA Daily Online*, November 7, 2008, "Flashing Swords on Tianshan Mountain"

observed the exercise, indicating its importance. The JTF included the 61st Infantry Division, 21st GA, and elements of the PLAAF, Second Artillery Force, Army Aviation, People's Armed Police and Militia. The joint exercise focused on joint reconnaissance, joint planning and command issues, accurate battlefield damage assessments, joint air defense, joint air-to-ground attack, and operating in a complex electromagnetic environment.[139]

- The experimental "*Qianwei*-211" (前卫) exercise, held at the Queshan CATTB in mid-summer, was directed by the former Jinan MR employing a ground-air joint task force testing multilevel joint command and control, mobile command posts, transfer of command between command posts, and integrated command systems against a simulated "Blue Force."[140]
- The former Shenyang MR held the *Lianhe*-2011 joint exercise in October exercising a ground-air joint task force coordinating air firepower support and a precision logistics system, as well as testing a joint tactical integrated communication system.[141]
- The "*Qianfeng*-2011 *Queshan*" (前锋-2011 确山) exercise held at the Queshan CATTB in the fall featured a joint tactical exercise by an armored brigade and PLAAF airborne troops to test innovations in command methods to improve the command process, combat planning and preparation; reduce redundancy in command functions; and improve target planning, preparation, and decision making.[142]
- The former Guangzhou MR directed a joint amphibious exercise in the fall of 2011 with a multi-service joint campaign task force comprised of the 42nd Group Army, PLAN and PLAAF units testing a joint command system. The joint exercise was dispersed across thirteen training sites testing the ability of the exercise headquarters to simultaneously control units from multiple services over a wide area of operations within a single scenario.[143]

Joint exercises in 2012 featured increased involvement by military educational institutes at both the tactical and campaign levels. "*Hongxing* 2012" (红星, Red Star) led by Shijiazhuang Army Command College was touted in the PLA press as a symbol of the new pilot project to regularize military educational institute joint education and joint training.[144] These institutes now play an important role in providing experts and professors to form blue forces in confrontation training,

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[139] *PLA Daily*, November 3, 2010, "Lanzhou MAC organizes first fire strike exercise of joint tactical corps;" PLA Daily, November 3, 2010, "Joint Operational exercise in Tianshan Mountain"

[140] *Xinhua*, July 6, 2011, " The Large-Scale Informationized Training Exercise Dubbed 'Vanguard-2011' Entered the Phase of Confrontation Drills and Modern Large-Scale Training Information Systems Were Deployed for the First Time;" *Xinhua*, July 6, 2011, "'Vanguard-2011' Large-Scale Informationized Exercise of Jinan Military Region Successfully Concludes"

[141] *PLA Daily Online*, November 7, 2011,"Observations from Shenyang Military Region's Joint-2011 Military Exercise"

[142] *PLA Daily Online*, November 2, 2011, "The Curtain is Lowered on the Jinan Military Region 'Vanguard-2011 Queshan Exercise Involving Foreign Militaries"

[143] *PLA Daily Online*, November 7, 2011, "Research Drills Around the Same Mission on 13 "Battlefields"

[144] *Xinhua Domestic Service*, November 1, 2012, "'Red Star–2012' Field Command Post Exercise Begins"

with the former GSD Military Training Department (the new CMC Training and Administration Department has likely taken over these responsibilities) promulgating regulations on confrontation drills. This effort is in part to standardize efforts in confrontation training.[145] After examining the issues of command confrontation training based on information systems, the former General Departments held a conference in March 2012, which resulted in the launching of a pilot program of command and confrontation training. This pilot program was assigned to the Army Operations Command Training Center of the NACC and was initiated in the latter half of 2012 to more effectively support command training across the PLA and development the use a simulated "Blue Army" using experts and professors.[146] PLA colleges and universities continue their active support of field training, which should benefit both the educational institutions and operational forces. The following are examples of 2012 JTF exercises:

- The former Chengdu MR exercised a ground-air JTF in August 2012 with a mountain infantry brigade and an air division. The air division and army aviation provided firepower support to the infantry brigade conducting an assault against a defending enemy force to test ground and air force coordination procedures.[147]
- "*Lian Jiao*–2012 *Queshan*" (联教-2012 确山) exercise held in the former Jinan MR in June at the Queshan CATTB involving a JTF and 19 military educational institutes, including cadet participation, led by the Shijiazhuang Army Command College. The exercise included joint planning, joint firepower strikes, joint maneuver and offense, and employment of the command information system. According to the PLA, this was the first multi-dimensional "joint teaching and joint training" exercise among PLA colleges and academies, and ground forces, PLAN, PLAAF and Second Artillery Force (SAF - now the Rocket Force).[148]
- The former Lanzhou MR conducted a ground-air JTF exercise in the fall of 2012 including special operations, joint firepower strikes, and a complex electromagnetic environment to test joint integration.[149]

Exercises continue to feature joint tactical formations from 2013 through 2015. Examples of these joint exercises include the following:

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[145] *China Military Online*, November 28, 2012, "Military Expert: Five highlights of "2012 Confrontation in Nanjing" attract attention;" *China Military Online*, November 27, 2012, "PLA pushes forward confrontation training reform"

[146] *PLA Daily*, March 9, 2012, "PLA explores new model of command training;" *PLA Daily*, July 11, 2012, "Reform of PLA command training mode deepened"

[147] *PLA Daily*, August 15, 2012, "Chengdu MAC troops explore fighting and training methods for highland joint operations"

[148] *China Military Online*, June 7, 2012, "All personnel participating in "Joint Teaching 2012 Queshan" joint drill arrived"

[149] *PLA Daily*, October 18, 2012, "Xinjiang MAC organizes actual-troop test drill of joint tactical corps"

- *Queshan Qianfeng*-2013B (确山 前锋-2013B) was conducted at the former Jinan MR CATTB before foreign attaches, observers and foreign military students from three military universities and colleges in November 2013. The joint exercise with a JTF composed of the 58th light mechanized infantry brigade from the 20th GA, a special operations detachment, and PLAAF JH-7 aircraft included the use of ground-air firepower and coordination, reconnaissance unmanned aerial vehicles (UAV), Army Aviation attack helicopters, joint operational planning and combined arms battalion combat planning. Operations were launched against an enemy force conducting a mobile defense, and included long-range maneuver, nighttime combat preparation, logistics, and political work.[150]
- *Queshan Juesheng*-2013A (确山 决胜-2013B, also referred to as *Queshan*-2013A or *Juesheng*-2013A) exercised a joint tactical formation based on the 127th Light Mechanized Division, 54th GA. The division conducted a long-range maneuver by road, rail, and air while under harassment. Movement was followed by training at the Queshan CATTB against a brigade acting as the "Blue Army." The exercise focused on informationized warfare and system of systems operations. Training included PLAAF ground attack and Army Aviation helicopters, command and control, information confrontation and network attack, and employment of an integrated force.[151]
- A *PLA Daily* article in December 2014 discusses a JTF exercise with a mechanized infantry division (probably 1st amphibious mechanized infantry division in the former Nanjing MR, now the Eastern TC), PLAN and PLAAF forces training at system of systems operations and joint command at an informationized training area. The exercise examined joint tactical command training.[152]
- *Taixing Tieqi*-2015 (太行铁骑-2015) organized in early May 2015 by the Shijiazhuang Mechanized Infantry Academy. The exercise tested a JTF based on a mechanized infantry battalion conducting a water crossing and landing. Forces also included artillery, air defense, reconnaissance UAVs, PLAAF forces. The training focused on water crossing and landing, offense and defense, urban combat, battlefield repair and medical care, communications and other actions.[153]
- Joint Action-2015D (联合行动—2015D) by the 14th Group Army, now in the STC, exercised a JTF in a confrontation exercise in mountain warfare in September 2015. The JTF trained at joint reconnaissance and joint firepower strikes. The joint firepower strikes included testing the joint firepower coordination of air strikes. The exercise exposed a number of joint officer shortcomings that were addressed by the party committee.[154]

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[150] *PLA Daily*, November 7, 2013; *China Military Online*, November 6, 2013; *China Military Online*, November 6, 2013; *PLA Daily*, November 8, 2013.

[151] *Xinhua*, November 4, 2013; *China Military Online*, November 1, 2013; *mil.cnr.cn*, October 31, 2013; *guancha.cn*, November 3, 2013.

[152] *PLA Daily*, December 16, 2014.

[153] *PLA Daily*, May 19, 2015.

[154] *PLA Daily*, September 29, 2015.

- Bei Jian-1510(S) (北剑—1510(S)) in December 2015 exercised a tactical formation from the 38th Group Army, former Beijing MR (now CTC), in a confrontation exercise. Transitions between offense and defense were executed. The training included mountain and urban combat, mobile defense, and nonlinear combat. The tactical formation appears to have been a service task force, which could have formed a modular element in a joint campaign formation.[155]

Conclusion

Experimentation and exercising joint tactical formations is important for pushing joint operations down to the tactical level, and forming operational system of systems. The PLA views them as a key to integrate operational systems, operational units, and operational elements. Exploring and adopting joint command and coordination procedures are critical steps in this process, as is the fielding of integrated command platforms providing the C4ISR links between the services at the tactical level that are the foundation of this effort.

Since at least 2004, the PLA has exercised joint tactical formations testing command structures. The former Jinan MR took the initial lead in this experimentation in the *Lianhe* series of joint training. The former GSD and military university and college involvement in some of these exercises exhibit the high-level interest, as well as the effort to involve military educational institutes with exercises to a greater degree to provide a synergy with operational forces. Joint firepower strikes, logistics, amphibious landings, ground-air coordination, joint reconnaissance, and operations in a complex electromagnetic environment have been featured in these training events focused on important wartime operational missions. The exercises have also included trans-regional movement and confrontation training. Many of the training events occurred in training coordination zones or combined arms tactical training bases, which PLA writings identify as important exercise areas for developing joint operations capabilities.

[155] *PLA Daily*, December 19, 2015

Appendix B: Examples of Joint Campaign Formation Exercises 2009–2015

The PLA initially proposed beginning joint training at the tactical level, and then progressing up echelon. In 2009–2010, perhaps experiences difficulties with tactical level joint communications hindering training, the PLA appeared to begin focusing more on joint training at the campaign level, after experimentation at the tactical level with JTFs. The PLA also began advocating a greater role of higher headquarters in directing exercises and determining content, particularly at the former MR level, indicating a previous lack of direction by higher level headquarters. The PLA also is emphasizing the acceleration of the lengthy process of implementing new operational methods, by experimenting in the field to determine what works, and then writing the theoretical foundation and doctrinal manuals. The normal five-step approach is theoretical study, researching operational problems, separate drills for each service, grouped joint training, and then joint exercises. PLA units initially appeared to lack high level direction, resulting in various units developing individual solutions to joint communications problems, as well as solutions to joint command and organizational structure.[156] For example, the former Nanjing MR held an amphibious exercise in autumn of 2009 where the 1st Amphibious Mechanized Infantry Division (AMID) for the first time successfully established a command information system that linked the campaign and tactical units of the three services.[157]

A problem for both joint campaign and tactical formations has been the lack of established joint command structures, which is compounded by the fact that each service has its own command organizations that are unique, and the construction of an integrated command information system still experiences problems. The solution that surfaced during these joint exercises was that the commander and the staff of the primary service unit will form the basis of the joint command for the joint task force, augmented by officers from the participating service units. The PLA has also experimented with a more independent and dispersed approach with the participating service command elements remaining apart instead of sending officers to an established joint command post, basically forming a virtual joint command post for the dispersed units. Although differences of opinion exist, the PLA does appear to be establishing joint command and coordination procedures, evidenced in the recent Academy of Military Science publication *Science of Joint Tactics*.[158]

The CMC and former GSD assigned a joint pilot training program, considered a "major strategic task," to the former Jinan theater, which established a theater joint training leading group in 2009

[156] *PLA Daily*, January 21, 2010, "Studying the Problem of Basic Campaign Army Corps Joint Training"
[157] *PLA Daily*, August 31, 2012, "Amphibious combat equipment of PLA army reaches world advanced level"
[158] *PLA Daily*, January 21, 2010, "Studying the Problem of Basic Campaign Army Corps Joint Training;" *Science of Joint Tactics*, (Beijing: Military Science Press, 2014) pp. 123–183.

to supervise the joint training experiment that began with *Qianfeng*-2009 at the Queshan CATTB. The *Qianfeng*-2009 exercise experimented with a joint ground-air campaign formation based on a service level basic campaign formation (in this case a group army), and featured the following:[159]

- *Qianfeng*-2009 前锋-2009 was an evaluation exercise and represented the first time that joint operations planning and C2 was exercised from the theater-level (MR) to the joint basic campaign formation. The exercise also represented experimentation in the field with the ground force basic campaign formation. The exercise examined joint command structures, establishment of a joint command and control platform, joint reconnaissance and intelligence support, joint operation command decision-making, coordination of information for firepower support and the electromagnetic spectrum, ground-air coordination including firepower support, precision operations through precision decision-making, operational methods, and support methods. The coordination PLAAF firepower support for the ground force reportedly included using planned firepower support as the main method, supplemented by "impromptu' requests for firepower support.[160]
- The Group Army (probably the 20th Group Army) formed the joint campaign command post. While Chinese press reported that a joint ground-air task force was exercised, *PLA Daily Online* reported that PLAN, SAF, and People's Armed Police were also present, possibly as observers, since none of the reports indicate PLAN, SAF, or People's Armed Police involvement in the training.[161]
- The training, representing a mountain offensive campaign, included long-range mobilization and movement in a complex electromagnetic environment, integration of PLAAF airborne troops and aircraft with an armored brigade.[162] The armored brigade formed a combined arms force consisting of army aviation, artillery, special operations, combat engineers, signals, air defense, and electronic countermeasures units. The PLAAF provided aerial firepower support with the airborne force conducting direct action in the

[159] *China News Service*, October 11, 2009, "People's Liberation Army 'Vanguard 2009' Joint Exercise Takes the Stage—Eleven Branches of the Army and Air Force, and Nearly 10,000 Officers and Men Participate;" *PLA Daily*, January 21, 2010, "Studying the Problem of Basic Campaign Army Corps Joint Training;" *Xinhua Domestic Service,* August 2, 2010, "PLA Air Defense Units To Hold Training Exercise in Shandong, Henan"

[160] *China News Service*, October 11, 2009, "Lieutenant General From the People's Liberation Army Reveals Eight Major Innovations in the 'Vanguard-2009' Joint Exercise for Basic Campaign Army Groups;" *PLA Daily Online*, October 13, 2009, "Jinan Theater Three-Service Joint Exercise Enters the Live Soldier Test Phase—The Curtain is Drawn on the Basic Campaign Army Corps Joint Exercise;" *Xinhua Domestic Service*, October 13, 2009, "Exercise Director; 'Vanguard-2009' Demonstrates Four Highlights"

[161] *PLA Daily Online*, October 13, 2009, "Jinan Three-Service Joint Exercise Enters the Live Soldier Test Phase—The Curtain is Drawn on the Basic Campaign Army Corps Joint Exercise"

[162] Only the 20th Group Army had an armored brigade at the time.

enemy's rear area. The army aviation regiment provided reconnaissance, firepower support, and air landings.[163]

In 2010, the former Jinan MR continued to build on the campaign-level joint training with the theater continuing to lead the efforts. The main focus continued to be on ground-air campaign formations as occurred in the *Qianfeng*-2009 exercise, although multi-service and military-civilian integration issues were also explored as in the previous year's *Lianhe*-2009 exercise in Jinan MR. While the Chinese press did not specifically mention the formation of a joint campaign formation in *Lianhe*-2009, the press did report the three services formed into an integral whole in the exercise, suggesting that a joint task force at the campaign level was established.[164] The Jinan MR 2010 joint training objectives were formation of the joint task force, systems integration, enhancing the intelligence/reconnaissance system operations, and supporting joint fire strikes.[165]

The trans-regional Mission Action-2010 (使命行动-2010) exercise employed both joint campaign formations and joint tactical formations, with a theater joint command issuing orders to both echelons.[166] Mission Action-2010A exercised a ground-air joint campaign formation based on the former Beijing MR's 27th Group Army (now in the Central TC) and MR Air Force elements.[167] The integrated joint operations training included:[168]

- Establishment of a joint campaign formation and organization of a joint basic (main) command post
- Command operational planning, network and electronic countermeasures training, operating joint forces in a complex electromagnetic environment, and organization of joint campaign-level comprehensive support
- Force deployment and maneuver and joint counterattack

[163] *PLA Daily Online*, December 14, 2009, "Joint Training of PLA Basic Campaign Corps Standardized"
[164] *PLA Daily Online*, March 1, 2010, "Joint Training Pilot of Jinan Theater in 2010 Starts Up;" *Xinhua Domestic Service*, December 10, 2009, "Learn How To Fight a Battle from Exercises—To Understand Training Reform of the People's Liberation Army (PLA) Through China Military Exercises in 2009;" *PLA Daily Online*, November 2, 2010,"
[165] *PLA Daily Online*, February 28, 2010, "Pilot 2010 Joint Training for the Jinan Theater Kicks Off;" *PLA Daily Online*, March 4, 2010, "Training on Elements Integration for System-of-Systems Operations Must be Strengthened Even More"
[166] *Xinhua Domestic Service*, October 21, 2010, "'Mission Action-2010A' Trans-Region Mobile Exercise of the Beijing Military Region Shows Three Major Highlighting Features"
[167] *PLA Daily Online*, October 21, 2010, "Actual-Troop and Live-Shell Drill of 'Mission Action 2010' Exercise Kicks Off;" *Xinhua Domestic Service*, October 16, 2010, "PLA Air Force Units Get Involved in the 'Mission Action-2010' Trans-Region Mobile Exercise"
[168] *Xinhua Domestic Service*, October 10, 2010, "Mission Action 2010A' Cross-Region Mobile Exercise Unfolds On an Unnamed Combined Tactical Base of the Beijing Military Region"

- Beijing MR Air Force (MRAF) provided transport, reconnaissance, air defense, and firepower support for the joint task force[169]

Joint campaign formation exercises in 2011 include the following examples:

- A former Nanjing MR (now the Eastern TC) joint amphibious landing exercise in August with 1st Group Army leading a multi-service joint task force with the PLAAF and PLAN. The exercise tested joint command integration of the force, based on an MR effort initiated in 2009 to construct an integrated command information system extending to units at the campaign and tactical levels designed to correct difficulties experienced over the past decade. This effort also included cross training service personnel and developing joint operations staff personnel. The command information system allowed the campaign-level joint task force to exercise joint firepower strikes, joint maritime defense, and ground and air electronic countermeasures. Although the system was considered to function at a basic level and was incomplete, the press report did state that it integrated the joint forces and allowed the services to share operational information.[170]
- The experimental "*Lianmeng* 211" (联盟) joint exercise, held from 22–26 October 2011, featured a multi-service joint task force formed by former Jinan MR units and led by the North Sea Fleet. Personnel from the former GSD, Jinan MR, and other PLA organizations observed the exercise indicating its importance.[171]
    - This is an example of the PLA following through on its stated plan to alternate lead services for joint exercises to give each service experience in leading a joint task force. However, it should be noted that a unit given the lead in an exercise to gain joint experience does not mean this will be the case in wartime.
    - This joint exercise, which had an amphibious landing phase, included PLAN, PLAAF, ground forces, SAF, People's Armed Police, and reserve units. Training objectives were joint campaign planning, joint command coordination, political work, and comprehensive logistics support.
- "*Fuxiao*-11," (拂晓) a former Lanzhou MR opposing force exercise in October 2011, included the 21st Group Army providing the joint operation group commander. A multi-service joint task force included a ground force division and PLAAF and SAF elements. Integrated command and control, including coordination of air and ground firepower strikes, and synchronization of unit movements and actions during operational phases

[169] *Xinhua Domestic Service*, October 16, 2010, "PLA Air Force Units Get Involved in the 'Mission Action-2010' Trans-Region Mobile Exercise"
[170] *PLA Daily Online*, September 26, 2011, "Deep Integration: New Targets Pursued in Joint Training"
[171] *PLA Daily Online*, December 8, 2011, "Theater Joint Training: Getting Ready for Future 'Joint Hearts' Operations;" *PLA Daily*, October 27, 2011, "Jinan Theater achieves new breakthrough in maritime joint defense combat drill"

were exercised from mobile joint command posts to test multi-service command and a new joint C4ISR system.[172]

- "*Jingwei*-2011" (经纬) in the former Chengdu MR exercised a ground-air joint task force in late October 2011 testing informationized mapping and navigation support. Qi Jianguo, Director of the First Department (Operations) of the former GSD, directed the exercise. Qi was accompanied by personnel from the four former General Departments, national level organizations, each MR, and scientific research institutes. In addition to mapping and navigation support to joint campaign planning, joint objectives included precision command, coordination, fire strikes, and logistics.[173]
- The former Guangzhou MR directed a joint amphibious exercise in the fall with a multi-service joint campaign task force comprised of the 42nd Group Army, PLAN and PLAAF units testing a joint command system. The joint exercise was dispersed across thirteen training sites testing the ability of the exercise headquarters to simultaneously control units from multiple services over a wide area of operations within a single scenario.[174]

Examples of joint campaign formation exercises in 2012 include the following:

- A Jinan MR exercise in 2012, probably occurring at the Weifang TCZ, included the North Sea Fleet providing the joint force commander, with participation by the 26th Group Army, MRAF, and SAF. Joint command, reconnaissance, joint firepower strikes, electronic warfare, and air defense were the training focus.[175]
- A tri-service exercise in October2012 involving the East Sea Fleet featured an amphibious landing with a ground force division, possibly the 1st AMID.[176]

The "*Chaoyue*-2012" (超越) online command confrontation, consisting of four exercises involving four divisions from the former Nanjing, Jinan and Chengdu MRs, PLAAF, and the NACC. Some 60 experts and professors from NACC comprised the blue force. Firepower strikes, three-dimensional maneuver, reconnaissance and intelligence, information confrontation, and psychological warfare were operational elements featured in the exercise. This exercise demonstrates the PLA's increased use of simulation war games with units at dispersed locations, and included military educational institutes. A PLAAF airborne division that took part in the

[172] *PLA Daily*, October 31, 2011, "Group army conducts "Dawn 11" comprehensive drill;" *PLA Daily Online*, 29 October 2011, "Watching Command in a 'Mobile Command Tent'—Observation of the Fuxiao-11 Comprehensive Exercise of a Lanzhou Military Region Group Army"

[173] *PLA Daily Online*, October 30, 2011, "The Curtain is Lowered on the 'Longitude-Lattitude-2011' [Jingwei-2011] Real-Soldier Campaign Exercise"

[174] *PLA Daily Online*, November 7, 2011, "Research Drills Around the Same Mission on 13 "Battlefields"

[175] *PLA Daily*, August 7, 2012, "The Battlefield Diary of an Operation and Training Section Chief"

[176] *PLA Daily Online*, November 9, 2012, "Keeping Close Watch on Modern Sea Battlefield…."

training used a new airborne force command information system.[177]The following are examples of exercises with joint campaign formations occurring during the period of 2013 through 2015.

- In November 2013 the exercise *Lianhe*-3013D exercised a JCF composed of some 5,000 troops from ground force units, PLAAF and PLAN conducting a nighttime joint landing in the Bohai Bay. The maritime transport phase occurred during daylight with the beach landing and ground combat occurring at night. Training focused on joint reconnaissance and early warning, maritime transport, information and fire strikes, and beach assault.[178]
- In December 2013 a large joint exercise, *Lianhe Juesheng*-2013, occurred in former Jinan MR in the Weifang TCZ (now in the Northern TC) involving all three services and SAF with nearly 20,000 personnel formed into a JCF. The 138th Motorized Infantry Brigade commander, 26th Group Army, acted as the JCF commander. The exercise experienced difficulties in joint coordination and deconfliction of joint firepower. The training included night combat, integrating joint reconnaissance, and confrontation by a blue force.[179]
- A joint exercise in November 2014 featured the 21st Group Army, former Lanzhou MR (now in the Western TC), the PLAAF, SAF forming a JCF. The exercise featured joint command, joint fire strikes, logistics in a cold plateau environment, and a confrontation blue force. Although initially it was believed that the joint command system of systems operated efficiently, the after action review determined a number of problems existed at all command levels. These included a lack of equipment, an incomplete joint structure, undeveloped joint firepower procedures with some units failing to achieve the desired effect, and lack of talent and joint literacy. The exercise reinforced the conclusion that joint tactical training formed the foundation for higher level joint training.[180]
- The Joint Action-2014 series of large-scale exercises (联合行动-2014) conducted at various locations exercised joint campaign formations. More than twenty division and brigade-level units trained at various aspects of joint operations in a more realistic exercise environment. The exercises included joint command and coordination, strategic and campaign reconnaissance, blue force confrontation, logistics, political work, as well as more realistic live-fire targets with the replacement of large chalk circular targets with static and remote controlled moving targets using old tanks and vehicles. Joint campaign formations included ground force, PLAAF, SAF, People's Armed Police, and reserve and militia units. Joint firepower including ground-air coordination was featured. Evaluation

[177] *PLA Daily*, August 28, 2012, "Beyond 2012C" airborne force confrontation drill held in Nanjing;" *China Military Online*, July 31, 2012; *Xinhua Domestic Service*, July 16, 2012, "Our Military Organizes Command Confrontation Exercises…."

[178] *Chinamil.com*, November 19, 2013; *Xinhua*, November 18, 2013.

[179] *PLA Daily*, December 7, 2013.

[180] *PLA Daily*, November 25, 2014; *PLA Daily*, November 25, 2014.

teams composed of experts provided assessments to identify and resolve joint operations problem areas.[181]

- The Joint Action-2015 series of five exercises (consisting of the former Chengdu, Lanzhou, Nanjing, and Guangzhou MRs, and the PLAN) focused on joint command training for joint campaign formations, as well as support for joint operational system of systems. Joint command training included joint communications systems, joint reconnaissance, joint firepower strikes, and ground-air coordination.[182]
    - The 14th GA, former Chengdu MR (now in the Southern TC) in Joint Action-2015 D formed a JCF with the PLAAF to exercise joint reconnaissance and joint fire strikes. Staff calculations decided that airstrikes would be the most efficient method to attack a target, and quickly prepared an aerial fire strike plan consisting four elements: the time the aircraft would enter the area, the flight angle entering the area, strike and return times. The Group Army had to develop their own four step training and qualification program to address the lack of officers competent at joint command functions.[183] It appears that a lack of standardization and high level direction in joint training for staff officers remains, with units formulating their own training programs.
    - In October 2015 the 47th GA, former Lanzhou MR (now part of the WTC) formed a JCF including the PLAAF and a Rocket Force base in the Joint Action-2015 exercise. The exercise conducted joint firepower strikes, and strove to improve joint command and planning, and improve the information system-based system of systems operational capability. The training also focused on JCF command structure integrating the command information system, operational units and operational elements into an operational system of systems.[184]
- In October 2015 a Henan Province militia emergency unit supported a campaign formation maneuver exercise.[185]

Conclusion

Joint campaign formation exercises are an important component in the PLA's exploration and development of a joint operations capability, and have been an important training focus since 2009. Former Military Region headquarters (now the responsibility of the theater joint commands) began to provide high level direction and command to some of these training events. This indicated the realization of the need to have higher level direction and standardization of joint training,

[181] *Xinhua*, October 27, 2014; *Xinhua*, October 31, 2014.
[182] *PLA Daily*, December 18, 2015; *China Military Online*, October 14, 2015.
[183] *PLA Daily*, September 29, 2015.
[184] *PLA Daily*, October 14, 2015.
[185] *PLA Daily*, October 22, 2015.

which is now a responsibility of the five theater commands. As at the tactical level, command and coordination within these joint task forces have been an important feature of the exercises. Many of the potential operational mission areas exercised at the tactical level were also evident at the campaign level exercises. Training coordination zones were likely the location for many of these higher-level exercises. This campaign level training was also important in identifying problem areas, in particular with regards to deficiency in joint command and personnel skills. This highlights the need to improve instructors and joint curriculum at military colleges and universities.

Appendix C: Joint Training and Training Areas

Training Transformation

Military reform efforts emphasize improvements in training, especially joint training, to approach actual combat conditions. The need to approach actual combat in training is in part to overcome the lack of PLA combat experience in modern warfare. The continued upgrades to large training bases to support joint training should help in this area. Additional reasons include the following: the need to achieve and maintain a high combat readiness in order to prepare for and win a potential conflict; focus on actual operational requirements to shorten the transition to wartime readiness levels in a crisis; provide rigorous and complex training to strengthen troops toughness and fighting spirit; eliminate a perceived peacetime mentality within the PLA; overcome continuing problems of scripted exercises, indifference to realistic training, and fear of accidents that limits training intensity; standardize evaluation methods to eliminate falsification of training results; and conduct specialized non-war military training to support emergency response. The PLA will need to revise and synchronize combat regulations, the training outline, and actual combat requirements to resolve conflicts in order to improve complex realistic training.[186]

Training reform is focused on improving joint capabilities, and increasingly sophisticated combined arms tactical training bases and training coordination zones have been identified in PLA writings as critical components in improving joint training at the campaign and tactical levels. Dedicated opposing force units (OPFOR) created at training bases are particularly important for improved confrontation training. An important development is the move to increase standardization of training across the military regions, although each strategic direction has some training requirements peculiar to its specific mission focus.[187]

Base training, use of simulators, simulation or wargaming, including the integration of training bases with simulations at battle labs and simulation centers are becoming important components of the PLA's training evolution. In addition to combining field exercises with simulation training, the PLA is conducting training at multiple locations under the same scenario.[188]

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[186] Xinhua, November 15, 2013; Xinhua March 20, 2014; *Information System-based System of Systems Operational Capability Building in 100* Questions (Beijing: National Defense University Press, June 2011) pp. 218 and 230.

[187] *PLA Daily*, December 19, 2006, "Joint Operations and Training Call for Joint Efforts in Nurturing Efforts—Sidelights on Five Command Academies of the Armed Services Signing an Agreement to Provide Joint Education and Training"

[188] *PLA Daily*, October 5, 2007, "One Work Unit Faces the Test and Multiple Branches of Service Participate. The Annual Tactical Testing and Assessment of a Certain Motorized Infantry Brigade of the Beijing Military Region Puts Into Practice a Joint Examination;" *PLA Daily*, December 5, 2006, "Establish a Scientific System of Military Training under Informationized Conditions—On the Main Tasks and Basic Approach for Military Training Transformation;" *PLA Daily*, July 25, 2006, "Concentrating Efforts on Improving Integrated Joint Combat Capability – Third

Training in complex electromagnetic environment (CEME) has become essentially a routine element in major training events and exercises since 2006. CEME is seen as a key element of training and an important background for joint training. Operating joint forces in a CEME is used to test the integration of weapons, C4ISR networks, and task organized operations under realistic battlefield conditions.[189]

Joint firepower strike training is another important area as integrated joint firepower strikes in support of campaigns and tactical combat have become critical to battlefield success. The PLA wants to move toward more real-time coordination between the firepower assets of the different services including the Rocket Force. The PLA also wants to enhance the distributive joint firepower planning training. The PLA realizes that this issue is extremely difficult, and recognizes key problem areas that the PLA is experiencing:[190]

- Firepower strike training is commonly planned by the individual services, with the only coordination being done on paper
- Each service has its own command language and requirements, with individual systems for developing firepower plans, making joint coordination difficult
- Lack of "uniform cognitive standards," especially at the tactical levels
- Issues in the decision making process for processing targets, utilizing firepower assets, and selecting strike methods
- Communications difficulties remaining to be resolved

The CMC and former GSD tasked the former Jinan MR (now split between the Central and Northern TCs) to establish the first theater joint training leadership institution in 2009. The theater joint training leadership group includes the leading officers of the three services, the former SAF in Jinan MR, the People's Armed Police, local forces, and the leading personnel in Shandong (now in the Northern TC) and Henan (Central TC) provincial governments. Jinan MR has been entrusted with the pilot demonstration mission for joint training for the entire military. The

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Commentary on Promoting Transformation from Mechanized to Informationized Military Training;" *PLA Daily*, July 25, 2006, "Earnestly Lift Up Integrated Joint Operation Capability"; *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training—Joint Training is the Key to Rendering Combat Capability, It Could Serve as the Driving Force for the Transformation of Military Training to Steadily Reach Toward the Projected Goal"

[189] *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training—Joint Training is the Key to Rendering Combat Capability, It Could Serve as the Driving Force for the Transformation of Military Training to Steadily Reach Toward the Projected Goal;" *PLA Daily Online*, October 13, 2008, "Three Transformations Bring Continuous Developments to Military Training"

[190] *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training—Joint Training is the Key to Rendering Combat Capability, It Could Serve as the Driving Force for the Transformation of Military Training to Steadily Reach Toward the Projected Goal"

institution prepared a three-year plan for theater joint training. A main joint operations problem is selected each year, with the lead revolving through the three services.[191]

The PLA advocates three forms of group training to support the development of integrated joint operations:[192]

- Unit foundational training focused on real warfare conditions to provide basic unit integrated training to support joint training and improve the quality of officers and enlisted
- Key-element integrated training to support tactical training focused on C2, reconnaissance and intelligence, networks and communications, firepower strikes, and logistics
- Group joint training with regional coordination training at the campaign level to strengthen real war capabilities by focusing on operational methods, battlefield initiative, and perfecting operational planning

Combined Arms Tactical Training Bases

Beginning in the 1980's, the PLA began establishing Combined Arms Tactical Training Bases in each of the former military region to improve ground force combined arms training. These are large training areas that incorporate opposing force training, use of MILES (multiple integrated laser engagement system) type equipment, umpires, and training evaluation and monitoring capabilities. Joint training with the PLAAF occurs at these bases. The PLA has established 12 CATTBs for the services including the Rocket Force.[193] The Zhurihe CATTB, originally in the former Beijing MR and now in the Northern TC, is the most developed of the training bases. The CMC decided to expand it in July 1997 from an armored unit training area to become the PLA's largest and most high-tech CATTB. Zhurihe CATTB was confirmed as the PLA ground force's only experimental unit for CEME construction in 2007 and as the ground force joint operations experimental field in 2011 by the CMC and the former General Departments. It has featured joint ground force and PLAAF training, and completed a new airport at the base to support PLAAF and

[191] *PLA Daily Online*, February 25, 2009, "In Order to Conscientiously Implement the Important Instructions of Chairman Hu on Strengthening the Joint Training, Headquarters of the Central Military Commission Conferred Jinan Theater the First Pilot Mission 'first theater joint training leadership institution of the whole army officially put into operation?"

[192] *PLA Daily*, May 13, 2008, "Carrying Forward the Causes Pioneered by Our Predecessors and Forging Ahead Into the Future: Innovations and Development of Army Military Training;" *PLA Daily Online*, July 1, 2008, "Diversified Military Tasks Lead Innovations in Military Training"

[193] *PLA Daily*, November 2, 2007, "How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?;" *Xinhua Domestic Service*, October 9, 2008, "PLA Promotes Informationization, Establishes Operations Training Bases;" *China News Service*, June 22, 2006, "'Blue Force Commander' in China's Strategic Missile Unit;" *PLA Daily Online*, September 28, 2008, "Iron Wings Fly in Circles to Raise a Hurricane While the White Lotuses Blossom in the Blue Sky—Navy Successfully Implements Helicopter (Land) Parachute Training for First Time"

15th Airborne Corps joint training with the ground forces. Over 100 joint ground-air field exercises or online confrontation war games have been conducted. The base covers over 1,000 square kilometers with advanced facilities including a digital monitoring and assessment system, CEME environment, urban training area, professional blue force, laser-simulation (MILES type equipment), and use of umpires. Several joint tactical formations can train at the base simultaneously.[194]

[194] *PLA Daily Online*, December 9, 2011, "A Certain Training Base Within Beijing Military Region……;" *PLA Daily Online*, October 18, 2012, "Experimental Area for Ground-Air Joint Combat Operations Springs Up on the Northern Frontier;" *China Military Online*, January 23, 2013, "Zhurihe Combined Tactics Training Base—PLA's modern—war-oriented drill ground"

Combined Arms Tactical Training Bases

Base	Location	Remarks
Zhurihe CATTB	Northern TC (formerly in the Beijing MR)	The most developed of the training bases, with an urban warfare area, simulation center, and monitoring and evaluation capabilities. This former Beijing MR CATTB, now in the Northern TC, is located some distance from NTC units. The former Shenyang MR units in the NTC have the Taonan CATTB. The 26th Group Army in Shandong Province, formerly in the Jinan MR, is now in the NTC and will likely continue to conduct joint training in the Weifang MTZ, which in the past has conducted landings on the Liaoning peninsula. It is possible that the Zhurihe CATTB will transition into a national training base, since it has been the focus of many transregional training exercises. Units from the former Beijing MR could also continue conducting training at this training base.
"Xichang" CATTB	Western TC (formerly in the Chengdu MR)	Located in southwest Sichuan Province
Luzhai CATTB	Southern TC (formerly in the Guangzhou MR)	Contains an exercise data analysis center
Queshan CATTB	Central TC (formerly in the Jinan MR)	Large scale subtropical mountain training, and simulation training
Qintongxia CATTB	Western TC (formerly in the Lanzhou MR)	Large-scale Aksai Chin border mock up, urban warfare area, and simulation system
Sanjie CATTB	Eastern TC (formerly the Nanjing MR)	Oldest of the training bases with the first "Blue Army" unit formed in 1987
Taonan CATTB	Northern TC (formerly in the Shenyang MR)	"Kunshan Town" urban warfare area
PLARF CATTB	Baishan, Jilin Province	Reportedly contains a "Blue Force," perhaps for defensive and concealment training
South Sea Fleet CATTB	Sanya, Hainan Province, Southern TC	Marine training base

PLAAF experimental training base	Dingxin, Gansu Province, WTC	Originally a missile test site, expanded for experimental testing and advanced tactical training including CEME training, advanced command and control center, mockups including Taiwan Chingchuankang Air Force Base

Training Coordination Zones

Area coordination training (*Military Terms* translates 协作 as cooperation while the most recent *Chinese Military Encyclopedia* translates the term as coordination) in training coordination zones is considered important to ensure the institutionalized and standardized implementation of joint training and improve integrated joint operations capabilities.[195] The first known training coordination zone was established in the former Shenyang MR in the 1990's in the Dalian area.[196] The real emergence of TCZ's for joint training came when the CMC approved a plan in 2004 establishing 9 TCZs.[197] At least five to six TCZs had been created earlier, and TCZs for military-police-civilian integrated training were established in the former Jinan and Shenyang MRs in 2008.[198] The TCZs are reportedly established in central locations, and include units from the services, Rocket Force, and military educational institutes. The TCZ focus on integrated joint formations exercises. The TCZ's do not have defined boundaries in order to meet changing joint training requirements and exercise scenarios that might change the focus onto a different service from year to year. The TCZs are pushing PLA units operate in an integrated manner and improve understanding between the services.[199]

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[195] *Chinese Military Encyclopedia (Second Edition) Military Training Vol. 2* (Beijing: China Encyclopedia Press, 2008) pp. 338–339.

[196] *PLA Daily Online*, February 2, 2009, "Who Is Going to Command the Next War' Interviews and Reports on the 'Joint Operations Command Talents Nurturing Coordination Zone' in Shenyang Theater"

[197] *PLA Daily*, November 2, 2007, "How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?"

[198] *PLA Daily Online*, March 11, 2009, "Cross over This 'Watershed of the Era?'—Delegates to the National People's Congress from the People's Liberation Army Held Heated Discussions about the Transformation of Military Training;" *PLA Daily Online*, June 17, 2010, "Building Platform for 'Integrated' Task Performance—Explorations and Practice of Jining City of Shandong Province in Building Military-Police-Civilian Military Training Coordination Zone;" *PLA Daily Online*, December 24, 2008, "Notes on the Birth of a 'Military-Civilian Coordination Area;' *PLA Daily Online*, March 2, 2009, "Build a Joint Training 'Big Special Zone'—Analysis of Guangzhou Theater's Exploration of Joint Operations and Joint Training Process of its Three Branches"

[199] *PLA Daily*, November 2, 2007, "How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?;" *PLA Daily Online*, March 26, 2009, "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;'" *PLA Daily Online*, March 11, 2009,

The former Guangzhou TCZ's established in 2002 reportedly had a difficult beginning. The PLA press stated that initially joint training was poorly implemented. The services deployed to the TCZs, but each service trained hastily at their service training tasks and departed. The training demonstrated a lack of understanding between the services compounded by inadequate communications integration. Only after intervention by the theater command and construction of a theater C4ISR system did joint training improve.[200] Based on press reporting, these issues were not unique to Guangzhou MR, and had to be overcome at other TCZs before integrated joint training could commence.

The TCZs began to shift away from an army centric training focus in joint exercises. The former MRs began to plan joint exercises transferring the lead between the different service elements, which reportedly has raised enthusiasm for joint training within the other services. The TCZs reportedly adopted a three year training cycle with the focus of the exercises changing during the three year cycle.[201]

The TCZs are also improving the exercise assessment and evaluation system. Improving the evaluation system for assessing unit training has been ongoing for several years. The PLA is moving from a manual system of collecting data from exercises which were found to be incomplete, to on-line monitoring and collection of data of unit movement and operations even during large-scale multi-service exercises. The automation of the data collection is allowing the PLA to move to a more dynamic evaluation system. The collection includes battlefield video feeds and compiling troop losses to conduct more thorough and precise evaluations of the training. The goal is to develop an improved unit evaluation system to more scientifically assess and standardize unit training elements. The evaluation system provides feedback to units to identify and correct problems.[202]

"Cross over This 'Watershed of the Era?'—Delegates to the National People's Congress from the People's Liberation Army Held Heated Discussions about the Transformation of Military Training;" *PLA Daily Online*, June 17, 2010, "Building Platform for 'Integrated' Task Performance—Explorations and Practice of Jining City of Shandong Province in Building Military-Police-Civilian Military Training Coordination Zone"

[200] *PLA Daily Online*, March 2, 2009, "Build a Joint Training 'Big Special Zone'—Analysis of Guangzhou Theater's Exploration of Joint Operations and Joint Training Process of its Three Branches"

[201] *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training..;" *PLA Daily Online*, September 28, 2010, "Dynamic Collection of Training Evaluation Information Realized/Guangzhou Military Region Employs Network Platform to Organize Comprehensive Evaluation of Synchronized, Joint Training in Unfamiliar Territory"

[202] *PLA Daily*, April 15, 2008, "Promoting Training Transformation by Intensively Tackling Joint Training..;" *PLA Daily Online*, September 28, 2010, "Dynamic Collection of Training Evaluation Information Realized/Guangzhou Military Region Employs Network Platform to Organize Comprehensive Evaluation of Synchronized, Joint Training in Unfamiliar Territory"

Identified TCZs

TCZ Location	Remarks
Former Beijing MR (exact location unknown)	NFI
Former Chengdu MR (probably now located in WTC)	Chongqing Communications Academy provides communications support; ground-air coordination training
Four TCZs originally in the former Guangzhou MR, and now in the STC: Eastern Guangdong TCZ; Western Guangdong TCZ; Hainan TCZ; and Lianghu TCZ	Established by CMC in 2002, each with a different training focus
Weifang TCZ, former Jinan MR, now NTC	Established in 2001; administered by the 26th GA
Jining TCZ, former Jinan MR, now NTC	Established 2008; PLAA, PLAAF, reserves and militia, People's Armed Police (PAP) Force, and civilian integration training
Tianshan TCZ, former Lanzhou MR, now WTC	NFI
Xian TCZ, former Lanzhou MR, now CTC	NFI
Gansu TCZ, WTC	Integrated air defense training with PLAA, PLAAF, PAP, reserves and militia
ETC MTZ	Joint amphibious training
Dalian TCZ, NTC	NFI
Military-Civilian TCZ, NTC (former Shenyang MR)	NFI
New Military Talent Nurturing Coordination Zone, NTC (former Shenyang MR)	Provides cross service training for personnel to develop joint operations command talent
Possible East Sea Fleet TCZ, ETC	PLAAF and PLAN training

Weifang TCZ

The Weifang Training Coordination Zone in the former Jinan MR (Shandong Province is now part of the NTC) is the most written about of the TCZ's throughout the PLA, and considered a leading training coordination zone according to the PLA press. This is probably due to the former Jinan MR's lead in joint operations developments and experimentation for the PLA. The Weifang

TCZ, which was established in 2001, reportedly includes 12 training areas and facilities.[203] Weifang has been able to consolidate training facilities of the various participating services, which helps foster jointness. The coordination zone has also brought in officers of various non-participating units to observe joint exercises to cultivate joint operational command talent.[204] A number of the joint exercises have featured amphibious landings on the Liaoning Peninsula in the former Shenyang MR, so it is not surprising that the Shandong Province was included in the NTC.

The Weifang TCZ examines, experiments, and perfects new joint operations combat methods and training to promote the transition to integrated joint training. The *Lianhe* series of joint exercises have been held at the Weifang TCZ. One focus of the campaign and tactical-level integrated joint training conducted is joint command and control for multi-service joint tactical formations. Issues of command authority and coordination within the joint formation are central issues examined at Weifang.[205]

Weifang TCZ is administered by the 26th Group Army as the lead work unit. The 26th GA is headquartered at Weifang, and the TCZ includes from 10 to 20 units from the ground forces, PLAAF and PLAN. The GA chief of staff has served as TCZ supervisor, while the GA political officer has served as exercise general director for the TCZ.[206]

The TCZ has also established a blue force for confrontation exercises to improve realism. The joint training directing department selected officers and troops to build up a "blue army" equipped with advanced equipment and technology, particularly reconnaissance equipment. Overall, there is an increased emphasis on use of opposing forces in training events to increase realism, move away from static training scenarios, and force officers at lower levels to display initiative on a fast paced battlefield.[207]

Training Evaluation

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[203] Other reporting indicates Weifang MTCZ was established in 2004.

[204] *PLA Daily*, November 2, 2007, "How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?;" *China News Service*, September 20, 2008, "Coordination Areas for Military Training are an Important Form of Joint Training of the PLA's Three Services"

[205] *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?;" *China News Service*, September 20, 2008, "Coordination Areas for Military Training are an Important Form of Joint Training of the PLA's Three Services"

[206] *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?;" China News Service, September 20, 2008, "Coordination Areas for Military Training are an Important Form of Joint Training of the PLA's Three Services;" *PLA Daily Online*, November 11, 2008, "Discussing 'Jointness' after the Gunsmoke Dissipates—Record of Media Coverage of the Weifang Military Coordination Zone '*Lianhe*-2008' ['Joint-2008'] Exercise"

[207] *PLA Daily*, November 2, 2007, How Can the Military Training Coordination Zone Play a Role in the Training Transition, and What Kind of Impact Will it Produce on Joint Operations?"

The PLA intends to continue improving training assessments and eliminate fraud. The PLA assesses the quality of training based on a number of evaluation elements. These include the overall amount of training time for units, confrontation and simulation training, as well as training content. Live fire, confrontation, and simulation training quality are given more weight in evaluating training.[208]

Collection and analysis of training data is important for unit evaluations, as well as providing valuable data for research to support future training and doctrinal development. The PLA considers conducting exercises approximating actual combat conditions as vital for supporting research for future training and operational methods, as well as a means to overcome lack of combat experience. Data is collected on the following joint operations areas: unit maneuver efficiency; coordination between units; joint fire strike coordination, including detection and destruction effectiveness; joint operations assault coordination; information attack efficiency; and electromagnetic spectrum management. These broad areas are broken down into various assessment points for evaluation.[209]

Conclusion

Combined arms tactical training bases and training coordination zones are viewed by the PLA as critical to improving joint training. These training bases are located in each theater command and support specialized mission training for each strategic and operational direction. Training bases are being improved to better support training realism close to actual combat to help overcome the PLA's lack of combat experience. Establishment of dedicated OPFORs is an important element in improving confrontation training. Training bases now often feature urban warfare areas as well as simulation centers. Training monitoring, data collection systems, and common evaluation standards are important methods to track unit capabilities and identify problem areas in order to improve training.

[208] *Science of Joint Training Course of Study* (Beijing: Military Science Press, 2013) pp. 26–28

[209] *Science of Joint Training Course of Study* (Beijing: Military Science Press, 2013) p. 239; *Joint Tactical Training* (Beijing: Tide Press: 2008) pp. 120–121; *China Military Online*, June 3, 2014.

About the Author

Kevin McCauley has spent the majority of his 30 plus year career in the U.S. Government as the Senior Intelligence Officer with the U.S. Army National Ground Intelligence Center (NGIC), VA. His work included numerous assessments supporting national decision makers, combatant commands, force and combat developers. He represented the U.S. Army at international conferences and on numerous Intelligence Community advisory boards and working groups supporting the National Intelligence Council (NIC), and U.S. Pacific Command (PACOM).

Prior to becoming SIO for China and Taiwan, Mr. McCauley was a senior analyst for the Soviet Union and then Russia. Mr. McCauley additionally headed a special analytic team during Operation DESERT SHIELD/DESERT STORM providing intelligence support to the U.S. Central Command (CENTCOM) and U.S. Army Central Command (ARCENT). Mr. McCauley's new book is titled, *Russian Influence Campaigns against the West: From the Cold War to Putin*.


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