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In a Fortnight: Carrier Operations on Display in the Bohai Gulf

On December 15, the Chinese Navy put its first carrier, the *Liaoning*, through its paces in the Bohai gulf (渤海) near Tianjin and conducted its first exercise with live ammunition (CCTV, December 16). The ship's complement of J-15 aircraft also carried out a series of tactics and weapons tests. Footage of their flight included the launch of a YJ-8 anti-ship missile against a target ship (CCTV, December 16, ref: 1:13). For the carrier itself the exercise tested a number of basic tasks for a carrier group, including reconnaissance and early warning, air interception, assault at sea, air defense and missile defense. Footage from the exercise showed the carrier launching Rolling Airframe (RAM) anti-air missiles and using its close-in-support weapon (CIWS) Gatling gun.

Carrier Aviation Group Commander Xu Ying (徐英) stated that the live fire exercise represented a "major advancement of [the pilots] tactical skills" (CCTV, December 16). Xu has apparently replaced Dai Mingmeng (戴明盟), the first pilot to land on the *Liaoning* and for which he was given the honorary title of "hero test pilot" (Xinhua, August 27, 2014). The Carrier Group Commander Chen Yueqi (陈岳琪) noted that this exercise was the Navy's first combined (综合性;

meaning, coordinated between both traditional surface combatants and the aircraft carrier) live-fire exercise and was acted as a test of the effectiveness of further exercises (CCTV, December 16).

This represents significant progress since last year, when Admiral Sun Jianguo, Commander of China's Navy, observed air operations off its flight deck. At the time, Chinese pilots were still improving their carrier-landing skills, and television footage from the exercise showed J-15 fighter aircraft carrying blue dummy PL-9 and PL-12 air-to-air missiles (CCTV, December 25, 2015).

China plans to build at least three aircraft carriers, one for each of its three Fleets (North, East and South). China's first indigenously produced aircraft carrier, currently designated 001A, is almost complete and will be launched before the end of December, possibly on December 26, Mao Zedong's birthday (Sina, November 28). The new carrier incorporates a number of different design features from its Soviet predecessors, including a shifted axis flight deck and a different configuration of its "island" (the control tower rising from the flight deck). Popular military commentator Yin Zhuo noted that the new carrier could possibly incorporate Electromagnetic Aircraft Launch System (EMALS), a replacement for traditional steam catapults have a superior ability to tailor the launch speed for a range of different aircraft types, reducing wear on airframes and faster reset speed. While the success of weapons integration tests and modern technology could increase the new carriers' combat power, its design will likely fall short of other modern carriers.

The 001A is expected to have a displacement of 50,000 tons (Guanchazhe, January 1). For context, this displacement is roughly half that of U.S. nuclear carriers like the USS *Carl Vinson*. A more likely comparison would be with the U.S. Navy's Landing Helicopter Decks (LHDs), used to transport amphibious assault forces and provide limited close air support, or Japan's 30,000-ton Izumo-class helicopter destroyer. Rather than the center-piece of power projection as it is in the U.S. Navy, China's carriers are likely to act together with land-based air defenses and other naval vessels in defense, or in support of amphibious forces. A Chinese military textbook, the *Science of Campaigns* for example briefly mentions carriers in the context of supporting "operations in island and reef areas far from the mainland." **[1]**

China has built up a system of artificial islands in the South China Sea, which analysts have recently confirmed now have weapons emplacements. China has previously deployed surface-to-air missiles to natural islands it occupies in the South China Sea including Woody Island (永兴岛), prompting its southern neighbor Vietnam to similarly begin upgrading its offshore island defenses (*China Brief*, March 28).

China's speed in building its first indigenous carrier could be an indication that it wants to rapidly deploy forces to patrol the airspace over its territorial claims in the South China Sea. Its lengthy attempt to acquire Su-35 fighters from Russia, though typically depicted as due to a need for their superior engines, could also be motivated by their exceptional range. If acquired in sufficient numbers, the Su-35 would significantly bolster China's ability to conduct long-distance maritime patrols like that which circled Taiwan in late November (*China Brief*, December 5).

As Russia's experience in the Mediterranean, where the Liaoning's sister ship, the *Admiral Kuznetsov* lost two aircraft to mishaps in the space of a month, carrier operations are difficult if not done consistently to build a core of experience pilots and maintenance crews.

The Chinese navy is slowly mastering basic naval operations that the U.S. Navy has performed globally for more than 50 years. But its progress is systematic, and Chinese military publications frequently point out the obstacles remaining to becoming a true "carrier navy." However, to be a truly effective force in China's regional waters, and leverage the fruits of China's other weapons programs, the PLA Navy will need to coordinate more closely with the land-based aviation of the Air Force, the missile brigades of the Rocket Force and the C4ISR support and space/cyber capabilities of the Strategic Support Force. While such operations will certainly become more common as China strives to build a joint force, its current inexperience represents a real bottleneck for Chinese power projection or layered defenses.

Notes

1. *The Science of Campaigns* (战役学), Zhang Yuliang, Chief Editor Beijing: National Defense
   University Press, May 2006

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The Emergence of the Wang Qishan Faction

By Willy Lam

The proverb "mandarins can set big fires, but common folks can't even light a candle" is often used to describe the often-outlandish privileges enjoyed by the authorities. After the recent Sixth Plenum of the Chinese Communist Party (CCP) Central Committee conferred upon Xi Jinping the lofty title of "leadership core," the President has again warned about "careerists and conspirators" setting up cliques in the Party. Yet two top cadres are doing exactly this. Xi himself and his princeling ally Wang Qishan, a Politburo Standing Committee (PBSC) member who heads the Central Commission for Discipline Inspection (CCDI), have built their own factions to enhance their influence within the CCP. Xi has elevated dozens of his former underlings from Zhejiang and Fujian to senior slots in the Party and government (see *China Brief*, November 11). And Wang, who will likely secure a second five-year term at the PBSC at the 19th CCP Congress next year, has also rapidly expanded his bureaucratic empire.

Two promotions announced immediately after the Sixth Plenum demonstrated the clout of the embryonic Wang Qishan faction, which consists partly of cadres who have worked in Party and government units handling the anti-corruption portfolio. Chen Wenqing (陈文清), a former Vice Party Secretary at the CCDI, made Minister of State Security in November, which is dubbed "China's KGB" by liberal intellectuals. Yet another of Wang's underling at the CCDI, Huang Shuxian (黄树贤), was named Minister of Civil Affairs. Wang headed the Ministry of Supervision—which is a wing of the CCDI that deals with civil

servants—for four years before his transfer to civil affairs (Phoenix TV, November 8; People's Daily, November 7).

A number of top graft-busters assigned by Wang to oversee corruption investigation in the provinces have been rewarded with senior regional postings. The best example is perhaps Huang Xiaowei (黄晓薇), a member of the CCDI Standing Committee who was in 2014 "parachuted" to Shanxi Province as a member of the provincial Party committee responsible for clean governance. Shanxi Province has long been deemed a "disaster zone of graft." It was also a base of "big tiger Ling Jihua"—former President Hu Jintao's right-hand-man who was given a life sentence earlier this year for corruption and abuse of power. Huang was promoted Deputy Party Chief of Shanxi last September after having successfully prosecuted close to 30 cadres (Chinenews.com, November 23; Caixin.com, November 23; Ta Kung Pao [Hong Kong], October 10, 2014).

Other members of the fast-growing Wang Qishan faction are up-and-coming cadres who worked with the charismatic princeling when he served in the finance sector. Wang was Vice-Premier in charge of Finance from 2008 to 2013; a top manager of the China Construction Bank and the People's Bank of China from 1989–1997; and Vice-Governor of Guangdong in charge of finance from 1998–2000. Many of Wang's underlings have become movers and shakers in the world of banking. For example, Tian Huiyu, who was Wang's secretary when the latter headed the China Construction Bank, has been President of the China Merchants Bank since 2013 (Straits Times [Singapore], November 10; Xinhua, May 8, 2013). Wang has also played a role in placing several of his protégés in senior slots in regional administrations. A prime example of Wang's finance-sector associates who have succeeded is Party Secretary of Hubei Province Jiang Chaoliang (蒋超良). A former senior executive of the Agricultural Bank of China and the Communications Bank, Jiang's close working relationship with Wang started in the mid-1990s (New Evening Post [Beijing], October 30; Apple Daily [Hong Kong], October 29).

Yet another subset of the Wang Qishan faction consists of his cronies and subordinates while Wang was Beijing Mayor from 2003–2007. For example, Gansu Governor Lin Duo served as the Deputy Party Secretary and Party Secretary of the Xicheng District of Beijing when Wang was head of the Beijing municipal government. Before his promotion to Gansu earlier this year, Lin worked as a member of the Liaoning Provincial Party Committee in charge of party discipline. Wang was said to have recommended Lin's promotion due to his having cracked several corruption cases in the northeastern province (DWnews.com [Beijing], April 21; United Daily News [Taipei], March 30).

Given that fighting corruption is arguably President Xi's most popular policy, it is perhaps not surprising that the "leadership core" allowed Wang to turn the anti-graft apparatus into a formidable bureaucratic fiefdom. The CCDI's staff establishment has more than tripled in the past four years. The CCDI has received special treatment in several ways. The Party's Central Organization Department, led by Politburo member Zhao Leji, is empowered to handle personnel matters for the entire Party-state apparatus. Similarly, the Party's Central Propaganda Department, led by Politburo member Liu Qibao, is supposed to look after publicity-related work for all Party and government units. Despite these rules, the CCDI was uniquely given permission

by the PBSC to establish its own organization and propaganda units (CCDI website, December 27, 2014; Sohu.com, March 28, 2014). Furthermore, according to Chinese sources accessed by this author, the CCDI has received authorization from President Xi to set up a disciplinary police unit. While the CCDI has always had a limited number of investigators, it lacks a police force to do battle with "big tigers" at both the national and local levels. Before the establishment of its own police force, the top anti-corruption body had to rely on law-enforcement officers from the Ministry of Public Security and the Procuratorate to carry out large-scale graft-busting missions. **[1]**

After the Sixth Plenum, whose theme is promoting discipline and moral behavior among Party cadres and civil servants, the CCDI won permission from the Party Central Committee to further boost its power. A Central Leading Group for Deepened Reform on the Supervision System, led by Wang, has been established with the task of setting up Supervision Committees in all state units. Xinhua cited a directive from the CCP General Office that said the aim of the new Supervision System was "to build a national anti-graft organ under the leadership of the Party… [whereby] authorities will mobilize more anti-corruption resources and build a system that ensures that officials dare not, will not and cannot be corrupt." Supervision Committees are expected to assume the powers and functions of the Supervision Ministry as well as those of Anti-Corruption Bureaus within the national procuratorate system. Already, pilot Supervision Committees have been established in the Beijing municipality and the provinces of Shanxi and Zhejiang. While the exact frame of reference of Supervision Committees has yet to be disclosed, there is little doubt that they will further augment the authority of the CCDI—and Wang (Ta Kung Pao, November 27; China.org.cn, November 26; Xinhua, November 7).

At a press conference held the day after the Sixth Plenum, Deng Maosheng, a senior official at the CCP General Office pointed out that there were no stringent regulations within the Party regarding the retirement ages for top-level cadres. Deng asserted that the convention *qishang baxia* (七上八下, cadres aged 68 can no longer be considered for the PBSC) was only "hearsay" (VOA Chinese, November 1; RTHK [Hong Kong], October 30). Owing to the fact that Wang will be 69 at the time of the 19th Party Congress, Deng's statement amounted to a handy excuse for Wang to serve one more five-year term at the PBSC. Moreover, since 2014, the Central Organization Department has reiterated that age or the GDP growth rates within their jurisdiction should not be given excessive weight when assessing the promotion of promising cadres (Nikkei Asian Review, November 11; Xinhua, September 2, 2014).

There are many reasons why Xi should want Wang to serve in the PBSC at least until the 20th Party Congress in 2022. While the "leadership core" has been quite successful in putting together a Xi Jinping faction in the past four years, it cannot yet compare with the Shanghai faction (led by former president Jiang Zemin) or the Communist Youth League faction (headed by former president Hu Jintao) in terms of numbers, influence and geographical coverage. The pooling of the resources of the Xi and Wang Factions means that Xi will be better placed to elevate members of these two "loyalist" cliques to the Central Committee and Politburo that will be endorsed at the 19th Party Congress.

Conclusion

In the final analysis, the "Wang Qishan phenomenon" does not bode well for the advancement of "rule of law with Chinese characteristics." The CCDI has become one the Party's most powerful fiefdoms. Its anti-graft activities, while applauded by average citizens, are conducted outside the country's legal framework. Nor is the Commission subject to the scrutiny of either the National People's Congress or the Supreme People's Court (Hong Kong Economic Journal, October 10; Apple Daily [Hong Kong], June 30, 2014). The likelihood that Wang could defy well-established norms such as retirement ages is yet another frontal blow to the institutional reforms undertaken by late patriarch Deng Xiaoping in the early 1980s.

Liberal cadres and intellectuals alike are concerned Xi will continue to rely on the anti-corruption weapon wielded by Wang's super-powerful CCDI to intimidate and take out opponents to the "leadership core's" relentless self-aggrandizement. But such a tactic undermines his push for rule of law. The anti-corruption campaign has bolstered Xi's popularity and the strategic alliance between Xi and Wang's power groups appears stable. For now, both groups need each other. But Wang's growing power may eventually make him a threat.

Note

1. Author's interviews with two Beijing-based officials close to the Supervision Ministry and the Central Commission for Discipline Inspection; November 25 and 30.

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The Strategic Support Force: Update and Overview

By John Costello

It has been nearly a year since the first round of military reforms responsible for the creation of the Strategic Support Force (战略支援部队; SSF). Although media reports were initially forthcoming with information, references to the SSF quickly dropped off, leaving far more questions than answers. However, as the PLA has started a more serious and concrete implementation of the hard work of reforms, more details have gradually emerged. A year on, there is enough information available to enable a basic understanding of the Force's structure, unit composition, and future direction. The SSF has become a force optimized for combat in space, cyberspace, and the electromagnetic domain that will enhance the PLA's capability to fight and win future informatized wars.

Force Overview

It is important to note that, while the SSF is a unique product of the reforms, it is built from the familiar. The reforms have thus far employed a "bricks not clay" approach to reorganization, repurposing whole, existing institutions and reforming them into new organizations to align with new paradigms, presumably with more minute changes to follow. This is best seen in the reorganization of the former four general departments into the new Central Military Commission functional organs. **[1]** Following from this concept, the SSF appears to be wholly constructed from the operational units and organizations from the former general departments,

particularly the General Staff Department (GSD), General Armament Department (GAD), and General Political Department (GPD) units responsible for space, cyber, and electronic warfare, the SSF's main missions.

The force looks to be primarily designed around two operational imperatives. One, is peacetime-wartime integration (平战结合 or 平战一体). Previous operating concept would have required the PLA to transition to a wartime posture just prior to or shortly after the outbreak of war. For strategic-level information operations, in real terms this would require unprecedented coordination between GSD, GAD, GPD, and Military Region units across different echelons. The SSF simplifies this process dramatically, effectively organizing these units into operational groups under new domain-centric verticals as standard practice, optimized, like the new Military Theater Commands (战区), as a wartime structure.

Two, the SSF is intended to shift the PLA's most strategic, informatized missions from a discipline-centric to domain-centric force structure. Previously, space, cyber, and electronic warfare units were organized according to their mission type—the disciplines of reconnaissance, attack, or defense—rather than their war-fighting domain. This is best seen in the cyber mission, for which espionage was handled by the 3PLA, while the attack elements were handled by the 4PLA. The central concept here is the idea of "integrated reconnaissance, attack, and defense" (侦攻防一体化), which requires that the intelligence, offensive, and defensive elements are integrated together to enable full-spectrum warfighting in a particular domain. This new organizational construct is also intended to enable previously impossible levels of unified planning, force construction, and operations. **[2]**

Force Structure and Composition

Established on December 31, 2015, the Strategic Support Force is a Military Theater-grade (正战区级) or Deputy Military Theater-grade (副战区级) organization commanded by former Second Artillery Force Major General Gao Jin (高津). The political commissar is Major General Liu Fulian (刘福连) (*Xinhua*, January 1). Li Shangfu (李尚福), former director of the GAD Xichang Satellite Launch Center (西昌卫星发射中心; 27th Base) has been identified as a deputy commander of the SSF (Sohu, August 30). Rao Kaixun (饶开勋), former director of the 1PLA, is reportedly another deputy commander (*The Paper*, March 11; NPC.gov.cn). The SSF is responsible for the PLA's space, cyber, and electronic warfare missions. Functionally and structurally, the SSF operates like the former Second Artillery Force (第二炮兵部队; PLASAF), which was similarly a *budui* that functioned like a service and consolidated strategic capabilities under the CMC (*China Brief*, February 8).

Under this leadership, the force appears to have a staff department, equipment department, political department, and, presumably, a logistics department. More operationally, the force appears to have headquarters components for its space and cyber forces, embodied in the Space Systems Department (航天系统部; SSF-SSD) and Network Systems Department (网络系统部; SSF-NSD), respectively. The SSF may create or already have an Electronic/Electromagnetic Systems Department (电子/电磁系统部; ESD) for its electronic warfare force. These departments may be subordinate to the staff department or, more likely, to SSF leadership directly, which would make them Corps Leader grade (正军级) or Deputy Corps Leader grade (副军级) organizations.

Space and Aerospace Mission

Of the known missions of the SSF, the space mission has been the best defined in the year since its creation. Space units are organized into the newly-established Space Systems Department. The former General Armament Department's space mission forms the basis for the Space Systems Department, although the department also draws units and missions from the former General Staff Department. The SSD consolidates nearly every aspect of PLA space operations, including space launch, support, telemetry, tracking, and control (TT&C) and intelligence, surveillance, and reconnaissance (ISR). The current head of the SSD is unknown, though would likely come from the GAD's space cadre.

Launch Facilities:

	English Name and Cover Designation	*Chinese Name*
1	Jiuquan Satellite Launch Center / 20th Testing and Training Base (63600 部队)	中国酒泉卫星发射中心 / 第 20 试验训练基地
2	Taiyuan Satellite Launch Center / 25th Testing and Training Base (63710 部队)	中国太原卫星发射中心 / 第 25 试验训练基地
3	Xichang Satellite Launch Center / 27th Testing and Training Base (63790 部队)	中国西昌卫星发射中心 / 第 27 试验训练基地
4	Wenchang Aerospace Launch Site	文昌航天发射场
Sources: (1) *PLA Daily*, October 20; *PLA Daily*, November 11; (2) Zhejiang University, September 27 (3) Strategic Support, April 17; *PLA Daily*, December 12 (4) *PLA Daily*, May 8; *PLA Daily*, November 1		

Space Telemetry, Tracking, & Control:

	English Name and Cover Designation	*Chinese Name*
1	Beijing Aerospace Flight Control Center	北京航天飞行控制中心
2	Xi'an Satellite Control Center / 26th Testing and Training Base (63750 部队)	中国西安卫星测控中心 / 第 26 试验训练基地
3	Telemetry, Tracking, and Control Stations (e.g., Kashi station)	[喀什] 航天测控站
4	China Satellite Maritime Tracking and Control Department 23rd Testing and Training Base	中国卫星海上测控部 / 第 23 试验训练基地
Sources: (1) Strategic Support, April 10; (2) Zhejiang University, September 27; Weinan Daily, July 30; (3) *PLA Daily*, May 3; (4) Phoenix, June 30; *PLA Daily*, March 11		

The SSD has also incorporated certain units from the General Staff Department, though much fewer than from the GAD, which had comparatively greater number of units responsible for space mission. The Aerospace Reconnaissance Bureau (航天侦察局; ARB), responsible for aerospace ISR, has shifted to the SSF, based on personnel transfers, including that of Zhou Zhixin (周志鑫), head of the ARB (*PLA Daily*, April 9). The Satellite Main Station (卫星通信总站; SMS) from the former GSD Informatization Department (总参信息化部; INFOD) has also been incorporated into the SSF (Dangjian.people.com, February 29). **[3]**

English Name and Cover Designation	*Chinese Name*
Aerospace Reconnaissance Bureau (ARB) 61646 部队	航天侦察局
Satellite Main Station (SMS) 61096 部队*	卫星总站
Sources: *PLA Daily*, April 9; Dangjian.people.com, February 29; CNKI. *Both the ARB and Satellite Main Station have been split off from their former parent units, which have become new bureaus under the General Staff Department's successor, the CMC Joint Staff Department (联合参谋部; JSD). The GSD 2PLA has become the new JSD Intelligence Bureau (情报局; JSD-IB) and the GSD INFOD has become the new JSD Information Communications Bureau (信息通信局; JSD-CIB).	

Although a more comprehensive analysis of where the former General Armament Departments operational and R&D units have moved is beyond the scope of this report, it is worth noting that a number of these organizations that fall outside of the space mission have also moved to the SSF. Some serve administrative or support functions, such as the GAD 306th Hospital, which was transferred from the GAD in July 2016, while others are more germane to the SSF's mission (Sohu. July 30). Such R&D-focused institutes may be housed in the SSD or alternatively could have been transferred to the SSF's Equipment Department, or some equivalent.

	English Name and Cover Designation	*Chinese Name*
1	China Nuclear Test Base / 21st Experimental and Training Base 63650 部队*	中国核试验基地 / 第 21 试验训练基地
2	Aerospace Research and Development Center	航天研发中心
3	Project Design Research Center	工程设计研究所
Sources: (1) *PLA Daily*, January 30; (2) CTTIC, October 17; Zhejiang University, September 27; (3) CTTIC, October 17; Zhejiang University, September 27 *Military researchers affiliated with the GAD 21st Test Base have published journal articles discussing directed energy weapons (DEW), which suggests that this base may have a mission to conduct research into operational uses of lasers or other directed-energy weapons. This aligns with the Strategic Support Forces mission to be a "new-type" (新型) force responsible for "new-type" capabilities, which DEWs have traditionally been characterized as.		

There are key remaining questions regarding the SSF's space mission. For one, it remains unclear whether the Space Systems Department will incorporate kinetic anti-satellite capabilities, such as direct-ascent weapons, or those will remain with the successor to the form PLASAF, the PLA Rocket Force (解放军火箭军; PLARF). It is also unclear whether the SSD will incorporate operational units responsible for hydrology, meteorology, mapping, and navigation, although there are initial indications that some of these units are now part of the SSF (Strategic Support, December 4). These units were previously under the GSD First Department (总参一部; 1PLA; also known as the Operations Department), Survey and Mapping Bureau (总参测绘导航局; SMB).

The 1PLA is now reorganized as the JSD Operations Bureau (作战局; JSD-OB) under the Joint Staff Department, with the new Battlefield Environmental Support Bureau (战场环境保障局; JSD-BESB) taking the place of the former Survey and Mapping Bureau (The Paper, February 19).

Cyber Mission

Although the SSF's cyber mission has thus far been far less defined than its space mission, the details and structure are becoming progressively clearer. The Strategic Support Force's cyber forces appear to be organized under the newly-established SSF Network Systems Department (网络系统部; SSF-NSD). The former General Staff Department Third Department (总参三部; 3PLA) appears to be the central component around which the NSD is organized. The 3PLA is the Chinese military's premiere cyber espionage organization, and their preeminence in this domain makes them a natural fit as the primary "tentpole" for the SSF's cyber force. Although the leadership of the NSD is unknown, Zheng Junjie (郑俊杰), former head of the 3PLA, may have moved over, but this cannot yet be independently confirmed. This would put him in contention as a potential Commander of the NSD.

Multiple organizations subordinate to or affiliated with the former 3PLA have moved over to the Strategic Support Force. Most noteworthy, the GSD 56th and 58th Research Institutes, both formerly under the 3PLA, have moved to the Network Systems Department (yz.chsi.com.cn, yz.chsi.com.cn). The GSD 56th and 58th Research Institutes previously reported directly to 3PLA headquarters, and were tasked with military research, development, testing, and acquisition (RDT&A) in support of 3PLA's mission. **[4]** Additionally, a growing number of public records link former 3PLA units and facilities—in particular, former Technical Reconnaissance Bureau's and the 3PLA headquarters itself—to the SSF (e.g., weain.mil.cn). These moves are reliable indicators not only that the core functions of 3PLA have moved, including its administrative responsibilities but also that the Network Systems Department itself may be synonymous with the 3PLA, essentially acting as a renamed, reorganized version of the former department. **[5]**

Other aspects of cyber warfare, including cyber-attack and cyber defense, should be expected to shift into the NSD, yet there have been no indicators of this so far. Computer network attack (CNA) has traditionally been handled by the GSD Fourth Department (4PLA) and the computer network defense (CND) mission has been handled by the GSD Informatization Department. While elements of both organizations have moved to the SSF, there is no indication that their cyber missions have yet been tasked specifically to the NSD. **[6]** It is likely that these missions will move to the NSD within the coming few years to align with the principles around which the SSF is organized and to fulfill the concept of "integrated cyber-attack, defense, and reconnaissance." **[7]**

Although cyber constitutes one of its primary missions, the 3PLA is also responsible for traditional signals and communications intelligence, which doesn't fit squarely into the Network Systems Department. If the Network Systems Department is solely focused on cyber warfare, as its name implies, then the traditional signals intelligence mission of the nation-wide network of TRB's would need to find a new home. This a substantial portion of the 3PLA's personnel, facilities, and organizational mass. Currently, it is unclear if the Central Military Commission will

split this mission away from the 3PLA, but given the trajectory of the reforms this seems likely.

Electronic Warfare Mission

At this point, the least amount of information is known or can be confirmed about the status of the SSF's electronic warfare (EW) mission. The General Staff Department Fourth Department (总参四部; 4PLA), also known as the Electronic Countermeasure and Radar Department (电子对抗与雷达部), has been responsible for strategic-level, or national level, electronic warfare for the PLA. **[8]** In contrast to the space and cyber missions, which have been scattered across several different in the general departments, the electronic warfare mission had been solely under the remit of the 4PLA. Given these facts, it is likely the 4PLA will have a strong, central role in the electronic warfare mission under the SSF—perhaps even forming a separate systems department of its own—though so far the extent of the 4PLA's move, though assumed, is unclear.

In recent months, there have been some preliminary indicators that suggest portions of the 4PLA have been transferred. The 54th Research Institute, formerly subordinate to the 4PLA, appears to have moved to the SSF, though it is not clear under what administrative structure. (CNITSEC; bjgtz.com, radars.ie.ac.cn; *PLA Daily*, March 11). Previously, the GSD 54th RI reported directly to 4PLA headquarters, and much like the 56th and 58th Research Institutes for the 3PLA, its move is a strong indicator that core components of the 4PLA now report to the Strategic Support Force. The fate of the 4PLA's operational units, alternatively, have been assumed to move but their status is still unconfirmed; however, their primacy in strategic electronic warfare makes their move to the SSF a near-certainty.

Speculatively, the SSF may create an equivalent Electronic or Electromagnetic Systems Department, analogous to the Space Systems Department and Network Systems Department, to oversee a force to fight in the electromagnetic domain. Presumably, the 4PLA would serve as the central "tentpole" around which the rest of the force would be formed. This would mean that each of the SSF's confirmed missions of space, cyber, and electronic warfare would have a main administrative and operational headquarters under the SSF, responsible for warfighting in their respective domains.

This potential structure could answer the question as to the status of the 3PLA's traditional signals intelligence mission, if it is eventually split off from the Network Systems Department. A notional Electromagnetic Systems Department would be a natural home for the 3PLA's technical reconnaissance mission, which would provide the both the domain reconnaissance component supporting the 4PLA's electronic warfare mission as well as the critical intelligence component for the PLA's expanding strategic missions.

Informatization

The Informatization Department and its subordinate units do not appear to have moved to the Strategic Support Force as initially predicted, but rather seem to have remained largely within the Central Military Commission thus far (*China Brief*, February 8). The Informatization Department has been reorganized into the Information Communications Bureau (信息通信局; JSD-ICB) under the CMC's Joint Staff Department. Its former research institute, the 61st Research Institute, has also remained within the CMC but moved to the CMC Equipment Development Department (Gqt.org.cn). **[9]**

Operationally, the CMC has appeared to have retained units for force-wide information support. The highest-echelon organization responsible for command and control, the Information Support Base (联合参谋信息保障基地; JSD-ISB) formerly under the Informatization Department, has remained under the CMC Joint Staff Department, presumable directly reporting to Information Communications Bureau (duxuan.cn). Before the reforms, all national-level informatization units and communications main stations reported directly to the ISB. It is unclear how many will still remain subordinate to the ISB. An overly cautious Central Military Commission, reluctant to give up too much control of information, may choose to keep a number of these informatized units under its direct purview.

The structure and shape of this CMC informatization corps is currently unknown. Speculatively, it is possible that the Central Military Commission may create a joint informatization force similar in structure and scope to the Joint Logistics Support Force (军委联合后勤保障部队; JLSF), a fusion of former General Logistics Department units and possibly logistics units from the other service branches (*Sina*, September 13). **[10]** Such a "Joint Information Support Force" (军委联合信息保障部队) would presumably be responsible for national-level, joint information support, command and control, information security, and intelligence dissemination.

At this point, it remains unclear whether and to what extent the SSF will incorporate an informatization or information support mission. Some informatization units are confirmed to have moved to the Strategic Support Force, but these could be the exception rather than the rule. Units responsible for elements of space information support, computer network defense, and spectrum sensing/management are expected to move over to corresponding missions in the Strategic Support Force, but there has been no confirmation in open sources thus far.

Conclusion

Thus far, the Central Military Commission has focused on making broad strokes and affecting change in larger, leading organizations first, in what the PLA is calling an "above the neck" (脖子以上) reform (81.cn; December 19). Such an approach minimizes disruptiveness of reforms and helps generate buy-in from leadership on deeper cuts that will undoubtedly take place in the future. Ultimately, this serves as a slow, incremental baseline on which future reforms can be built. For the Strategic Support Force, this has meant that the old siloed nature of space, cyber, and electronic warfare have been broken and reorganized into new verticals.

This alone, however, will not be enough. Although the organizational structure now employed by the SSF is a better representation of a domain-centric view of war fighting, some incongruences remains at lower levels. Elements of the former GSD's cyber, space, and electronic warfare capabilities remain integrated within units responsible for other missions. To fully follow-through on the conceptual framework employed for the Strategic Support Force, deeper, more painful cuts will need to happen. The PLA is now embarking on "below the neck" (脖子以下) reforms, likely to be implemented over the remaining three year period the reforms are intended to take place. This process will presumably entail undertaking deeper, more difficult changes than previous changes have presaged. For the SSF, this will be the test to see whether the PLA can fully implement the concepts and guiding paradigms that will enable better war-

fighting or institutional barriers and vested interests will win the day.

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1. In the reforms, the four general departments, the General Staff Department (总参谋部; GSD), General Political Department (总政治部; GPD), General Logistics Department (总后勤部; GLD), and General Armament Department (总装备部; GAD) have become slimmed-down, CMC functions organs called the Joint Staff Department (军委联合参谋部; JSD), Political Work Department (军委政治工作部; PWD), Logistics Support Department (军委后勤保障部; LSD), and Equipment Development Department (军委装备发展部; EDD), respectively.
2. Xiao Tianliang [肖天亮] (eds.), The Science of Military Strategy [战略学], National Defense University Press [国防大学出版社], 2015, p. 388; Though the SSF does appear to have incorporated a former General Political Department unit, the 311 Base (311 基地; 61716 部队) or the "Three Warfares Base," for now the status of this unit isn't entirely clear. Traditionally, the psychological dimension of warfare hasn't been considered a domain, per se, but rather a discipline under information operations. It is not clear whether the PLA intends to create a war-fighting force on par with those for space, cyber, and electronic warfare that would conduct psychological operations. See http://www.cqvip.com/qk/81377x/20160 6/669378161.html and http://www.cqvip.com/QK/97723X/2014 01/49213060.html for personnel linkages between the 311 Base and the SSF.
3. Both the ARB and Satellite Main Station have been split off from their former parent units, which have become new bureaus under the General Staff Department's successor, the CMC Joint Staff Department (联合参谋部; JSD). The GSD 2PLA has become the new JSD Intelligence Bureau (情报局; JSD-IB) and the GSD INFOD has become the new JSD Communications and Information Bureau (通信信息局; JSD-IB).
4. According to Mark Stokes, Russell Hsiao, and Jenny Lin, the 56th Research Institute focuses on research and development of advanced computing technologies, including supercomputers. The GSD 58th RI focuses on cryptography and information security. Both of these technologies have applicability to cyber warfare.

https://project2049.net/documents/pla_third_department_sigint_cyber_stokes_lin_hsiao.pdf

5. In this regard, it is noteworthy that so far the 3PLA's sister organizations from the General Staff Department, the 2PLA and INFOD, have remained under the GSD's successor, the CMC Joint Staff Department, along with their respective Research Institutes. In this way, the various GSD Research Institutes may be a useful bellwether for judging if a particular general department or organization has moved. Such an approach to renaming is consistent with the PLA's "bricks not clay" reform.
6. While the PLA has so far move whole organizations, it can't be ruled out that the CMC may move smaller pieces of organizations when necessary. For instance, the CMC moved the 2PLA to the CMC, reorganizing it as the Intelligence Bureau (JSD-IB), and moved the 2PLA Aerospace Reconnaissance Bureau (ARB) to the SSF Space Systems Department; effectively separating the components of the organization. Generally, however, it appears that the CMC is building with whole organizations, but lingering uncertainty as to how deeply the CMC is cutting into traditional mission sets hinders the ability to make predictions with greater confidence.
7. In the previous structure, each Service Branch, including the PLASAF, and Military Regions maintained their own Technical Reconnaissance Bureaus. The SSF does not seem to incorporate these other Service or MR-specific TRB's, and they appear to continue to be entities independent of the SSF's cyber mission as inherited from the 3PLA. Interestingly, there are preliminary indicators to suggest that the former MR TRB's are not under the control of the new Military Theater Commands as one would expect, but rather report directly to the new Army Leading Organ, indicating that the Army is utilizing the former network of MR TRB's as a *de facto* reconnaissance branch in a similar manner the former GSD used the 3PLA.
8. As previously discussed, the former 4PLA was also responsible for the PLA's computer network attack mission. In general, for information operations, the 4PLA appeared to act as the "attack" element, with the 3PLA serving as the reconnaissance element, while the Informatization Department acted as the defense element.
9. The 61st Research Institutes name would therefore be the CMC Equipment Development Department 61st Research Institute (中央军委装备发展部第 61 研究所).
10. An excellent forthcoming paper from Erin Richter and Leigh Ann Ragland-Luce examines the JLSF in greater detail. Thank you to both for giving the author a basic introduction into the JLSF.

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Modernizing Military Intelligence:Playing Catchup (Part Two)

By Peter Mattis and Elsa Kania

This two-part series is adapted from remarks delivered at The Jamestown Foundation's Sixth Annual China Defense and Security Conference and chapter in China's Evolving Military Strategy *(2016). Part One addresses the People's Liberation Army's (PLA) evolving thinking on intelligence. Part Two addresses the organizational aspects of how the PLA's intelligence evolved away from military operations and how this problem is being addressed under the current reform program.*

In the early 2000s, the Chinese People's Liberation Army (PLA) outlined an expansive set of intelligence missions that the military's intelligence organizations were ill-prepared to execute. PLA intelligence needed to be able to support operational decision-making at all levels, support deterrence operations, and guide information warfare in the network, electro-magnetic, and psychological domains (*China Brief*, December 5). The military intelligence apparatus centered in the General Staff Department, however, had been allowed to drift. After the Cultural Revolution (1966–1976) military intelligence took on new responsibilities in support of Party rather than military leadership because of its unique capabilities and the dissolution of civilian intelligence bureaucracies. Although the PLA slowly began to reassert itself over its principal intelligence departments through personnel appointments beginning in December 2005, PLA intelligence and warfighting concepts only started to align during the latest round of reforms (*China Brief*, November 5, 2012).

Reforming the PLA's intelligence apparatus to meet modern demands required two significant adjustments. The first related to personnel and ensuring that intelligence officers understood the operations they supported. Chinese military intelligence filled the vacuum created by the dissolution of civilian intelligence agencies in the early years of the Cultural Revolution. Deng Xiaoping's rise in the late 1970s cemented their role, because of his long-standing relationships in the PLA and his distrust of the party's security services. The rise of the defense attachés without operational experience, who dominated military intelligence from 1988 to 2005, was a symptom of this shift away from military operations. The second related to organization and ensuring more rational management of intelligence resources. The creation of the Strategic Support Force following the reforms announced by Xi Jinping on November 26, 2015 appears to have reorganized intelligence along the lines suggested in the CMC's opinion: "the CMC leads, the theater commands fight, and the services equip (军委管总、战区主战、军种主建)" (Xinhua, January 1). Although the full implications of the PLA's efforts to reform intelligence are not yet clear, its intelligence apparatus is finally beginning to catchup with the rest of the military.

How the PLA Lost Its Intelligence Apparatus

The PLA's intelligence apparatus slowly drifted from military control beginning in the late 1960s as it became the principal intelligence provider to the central leadership. A series of reinforcing developments limited the PLA's control over its intelligence apparatus and prevented military intelligence from evolving alongside the rest of

the PLA as the military moved toward "system-of-systems" operations beginning in the 1990s.

Intelligence services operate within a larger national context that places additional demands on their members beyond their own chain of command. Regardless of whether intelligence services are national or departmental, their capabilities to collect and analyze intelligence are national resources that can be called upon by national leadership as desired. From 1966 through at least 1976, the PLA's intelligence organizations were among the only functioning services that could support the Party leadership. The turmoil caused by the Cultural Revolution led to the dissolution of the Central Investigation Department and the Ministry of Public Security's foreign intelligence units. Those in any kind of routine contact with foreigners often faced espionage accusations, and the tight compartmentalization with which sources were handled ensured that few if any other officers could vouch for or defend those accused. As the state ministries and the Party bureaucracy shut down, the civilian intelligence organizations appear to have turned their sources and operations over to military intelligence. **[1]**

The intelligence leadership within the General Staff Department (GSD) also underwent a generational turnover that privileged the general foreign affairs expertise of defense attachés over expertise gained through operations or providing direct intelligence support to PLA commanders. These officers were exemplified by Xiong Guangkai (熊光楷), who served tours in East and West Germany as a defense attaché. Xiong served as deputy director and then director of 2PLA (1984–1988 and 1988–1992, respectively) before becoming the deputy chief of the general staff responsible for overseeing intelligence and foreign affairs from 1998–2005. **[2]** Prior to Xiong's rise to the top of 2PLA, the department's chiefs had operational intelligence experience in combat during the Chinese Revolution, War of Resistance against Japan, or the Korean War. From Xiong's directorship onward, however, only one of the seven 2PLA directors, Chen Xiaogong (陈小工), had any combat or operational experience. **[3]**

The centrality of military intelligence remained even after the Cultural Revolution and the reestablishment of party-state intelligence functions in a briefly reconstituted Central Investigation Department and, in 1983, the Ministry of State Security (MSS). Several reasons account for the PLA's overall importance to Chinese policymakers. First, the PLA possesses the only all-source intelligence capability within the Chinese system, and there is no reason to believe intelligence is shared across the divide between the civilian ministries and the PLA on a routine basis. Shared operational platforms suggest the civilian and military intelligence services share intelligence at the working level in areas such as Taiwan or anti-Falungong operations. The need to keep building new intra-governmental centers for security operations, however, suggests intelligence is not routinely integrated (*China Brief*, January 25; *China Brief*, December 5, 2014; *China Brief*, September 16, 2011). Second, the senior-most PLA intelligence officer, who up until the recent reorganization was a GSD deputy, sits on the leading small groups (LSG) that guide foreign and security policy, such as the Foreign Affairs and the Taiwan Affairs LSGs. The MSS would not join the Foreign Affairs LSG until the mid-1990s, more than twelve years after the MSS was formed. Third, in 1985, Deng Xiaoping placed draconian restrictions on the MSS that reduced its presence in China's embassies and ability to recruit sources abroad. These constraints were not lifted until at least the 2000s (The National

Interest, July 6, 2015). Despite having its own presence in the embassies and other official platforms like Xinhua, the PLA was not subject these restrictions.

Personal relationships also helped isolate the PLA intelligence apparatus from military's direct control. From Deng Xiaoping's rehabilitation as GSD chief in 1975 to Xiong's ascension to GSD deputy in 1998, the intelligence leadership were all veterans of the 8th Route Army with a direct personal connection to Deng. These close personal ties and relaxed operational restrictions suggest Deng was comfortable relying on the PLA for his intelligence needs. **[4]** The close relationship between General Secretary Jiang Zemin and Xiong also boosted the centrality of military intelligence and probably cemented the drift between the PLA's operational arms and its intelligence apparatus. Reportedly, this relationship was close enough that Jiang attempted to install Xiong at the MSS to assert control and boost the ministry's intelligence collection against Taiwan (*South China Morning Post*, March 17, 1998). Other rumors suggest Xiong turned PLA signals intelligence and other intelligence capabilities on the PLA leadership to help Jiang outmaneuver the military bureaucracy in implementing de-commercialization and oversee day-to-day management of the PLA.

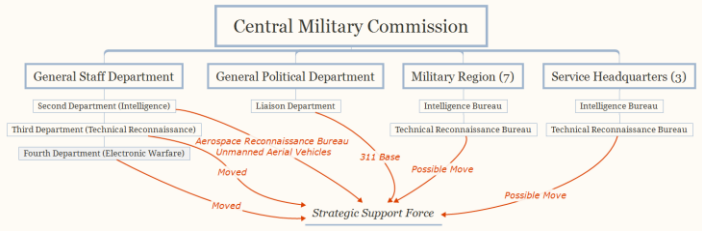
These factors held back the PLA's intelligence apparatus from adapting to the changing requirements for intelligence work within an informatizing military. After the retirement of Xiong in December 2005, however, the PLA slowly began reasserting control over military intelligence. The changes began at the leadership level, where senior intelligence leaders now had the opportunity for promotion or lateral moves into operational roles as deputy commanders. Intelligence stars like Chen, Yang Hui (杨辉), and Wu Guohua (吴国华), who might have retired early in view of their terminal career prospects, moved to the PLA Air Force, Nanjing Military Region, and Second Artillery, respectively. The GSD deputy chiefs after Xiong all came from operational backgrounds, such as former GSD Operations Department chief Zhang Qingsheng (章沁生) and former pilot and now PLA Air Force Commander Ma Xiaotian (马晓天) (*China Brief*, November 5, 2012). Anecdotal evidence also has started to emerge that such interchanges between operations and intelligence personnel are occurring at lower levels, giving some officers time abroad in military attaché billets and moving mid-career intelligence officers into deputy unit commander billets.

Reforming the Military, Reforming Intelligence

On November 26, 2015, CMC Chairman Xi Jinping announced far-reaching military reforms to reshape and reorganize the PLA. Prior structures, such as the military region system, have been erased, and the ground forces, traditionally predominant in every major but ostensibly "joint" PLA department, appear to have lost their position of power (*China Brief*, December 14, 2012). Amid the propaganda fanfare over new organizational structures, the PLA did not make any announcements that explicitly noted how the military would reorganize intelligence work under the aegis of this extensive reform agenda. A tentative analysis is still feasible, because of how systematically the PLA has organized itself and its intelligence organs.

The available Chinese sources suggest that the former General Staff Department's (GSD) intelligence functions have been divided between three new organizations, the Joint Staff Department (JSD), the Strategic Support Force (SSF),

and perhaps also the PLA Army leading organ (i.e. national-level headquarters). The structural logic and organizational dynamics associated with these changes allows for certain initial inferences about the future of PLA intelligence.



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The JSD appears to have responsibility for strategic-level intelligence and to have taken over the human intelligence mission associated with the former GSD Second Department (2PLA). The GSD deputy chief responsible for intelligence and foreign affairs, Admiral Sun Jianguo (孙建国), is now a JSD deputy chief and continues to represent the PLA to foreign audiences in Beijing and at forums like the Shangri-La Dialogue in Singapore (Xinhua, June 5). Sun also still serves as the president of the China Institute for International and Strategic Studies (CIISS), a position with some authority in the military intelligence community. The JSD includes a subordinate Intelligence Bureau (情报局), which is most likely a renamed 2PLA, which was known as the Intelligence Department (情报部) (Duowei, April 10). Unofficial sources identify the previous head of 2PLA, Major General Chen Youyi (陈友谊), as chief of the Intelligence Bureau (92to.com, October 27). None of the sources describing the JSD organizational structure identifies any bureau still within the department that could be 3PLA.

The Strategic Support Force seems taken over the technical reconnaissance capabilities formerly associated with the GSD. Based on personnel movements, the 2PLA's Aerospace Reconnaissance Bureau appears to have moved over to the SSF, where it may now be known as the Aerospace Reconnaissance Command (The Paper, April 9). It also appears that the majority of the former General Armaments Department's (GAD) space organizations, including its satellite launch centers, have been transferred to the new force under the aegis of its Aerospace Systems Department (航天系统部). **[5]** Indeed, the SSF appears to have taken control over most former GAD and GSD space-related units, such that it likely now controls the PLA's intelligence satellites. There are also initial indications that multiple components of the former 3PLA have been transferred to the SSF, perhaps under the aegis of its Network Systems Department (网络系统部). **[6]** For instance, the former 3PLA's 56th Research Institute, a major computer research institute, is now under the aegis of the SSF (China Postgraduate Admissions Information Network, Undated). However, no authoritative Chinese sources have yet clarified definitively how 3PLA's intelligence capabilities have been disposed.

Certain components of the former GSD may also have been transferred to the new Army Leading Organ (陆军领导机构) or Army Staff/Headquarters Department (陆军参谋部). Since the GSD has previously served as both the joint staff for the PLA as a whole and the headquarters for the ground forces, the establishment of an independent, national-level headquarter department for the ground forces is among the most important aspects of the reforms. Previously, the ground forces' dominance of GSD leadership positions probably skewed most of the staff work toward supporting their operational needs and political desires. The division of the JSD and the ground forces headquarters is intended to allow each to focus on their respective responsibilities. Given this underlying rationale, the split

may therefore break up elements of the GSD's intelligence departments, dividing them between the ground forces and the theater commands. The PLA Army Headquarters Department probably includes at least an intelligence bureau to provide strategic intelligence support to ground forces leadership.

Speculatively, the PLA might divide the former military regions' intelligence and technical reconnaissance bureaus between the five new theater commands and the SSF. Intelligence is a common headquarters component and a recognized staff function. One of the critical lessons the PLA drew from its experiences during the Chinese Revolution and Civil War was the need to keep intelligence close to decision-makers, and modern PLA writings, as noted in Part One, have emphasized the need for such a close connection (*China Brief*, December 5). Even if the military region's collection capabilities were given wholly to the SSF, their intelligence bureaus would probably be reconstituted among the theater commands' headquarters to process incoming information for the command's specific needs.

Looking forward, the PLA appears unlikely to resolve the underlying contradiction between the need to centralize information warfare capabilities and the different bureaucratic rice bowls in intelligence work. Intelligence always will be a military staff function, and the JSD should rightfully have a stake in both intelligence capabilities and supporting decision-makers at senior levels. The real question of bureaucratic conflict may lie between the SSF and the Political Work Department (the former General Political Department, GPD).

Although SSF has likely consolidated the majority of the PLA's information warfare capabilities and forces under a single command structure, the Political Work Department may retain primary responsibility for political/psychological warfare. The former GPD's Base 311 (Unit 61716), which engages in public opinion warfare, psychological warfare, and legal warfare (i.e., the three warfares), most likely is now part of the SSF, based on personnel transfers. **[7]** However, the primary department responsible for political warfare, as well as the intelligence-related functions outlined in the Political Work Guidelines, is the former GPD Liaison Department (联络部). This department may now be the Liaison Bureau (联络局) within the new Political Work Department (Sina Blog "Qin City Park", July 13). The changes to the guidelines in 2003 and 2010 emphasized the importance of political officers becoming part of the PLA's war-fighting capability. **[8]** Other publications about modular force groupings within evolving system of systems operations included political/psychological warfare units (*China Brief*, March 15, 2013). If the Liaison Department (or its successor) does remain within the Political Work Department, then information warfare in its entirety will operate under divided commands that only unify at the CMC level, which may undermine effective coordination.

(click here for full-size image)

At this point, the remaining unknowns remain are substantial. For example, as of late 2016, many of the technical reconnaissance bureaus (TRB) for the services and military regions appear to be in existence, but no information published online since the reorganization clearly

links them to the services, the new theater commands, or the SSF. The guiding phrase for the reform, "the CMC leads, the theater commands fight, and the services equip" (军委管总、战区主战、军种主建), suggests the TRBs could be transferred to or divided between the SSF or the theater commands. If the services are supposed to focus on equipping their forces, then it seemingly makes less sense for them to possess tactical intelligence collection capabilities.

The construction of an alternative center for intelligence work also raises the question of how the PLA will train the intelligence personnel for the SSF to better support military operations at the tactical level. The traditional intake into the military intelligence services comes from the Nanjing International Relations Institute and the Luoyang Foreign Language Institute, as well as the PLA Information Engineering University. While technical and area studies education may work well for training the personnel from the former 2PLA, 3PLA, and 4PLA, these programs do not translate well into the kind of tactical intelligence support required for targeting and bomb damage assessment. If intelligence is being integrated more broadly to support operations, then new training programs will need to be created under the SSF—a point the PLA appears to recognize (*People's Daily*, January 24).

Conclusion

PLA thinking on intelligence has evolved remarkably little over the last fifteen years, because, in many respects, it has not been necessary. The PLA's steady modernization effort to conduct joint operations on shared knowledge of the battlefield with precision-guided munitions demanded more from the PLA's intelligence apparatus than it could give without a serious overhaul. The intelligence organizations at the General Staff Department level were ill-suited to provide tactical support, so little in the way of experimentation could be done to develop tactical intelligence doctrine using GSD resources. In a sense, the PLA has not yet seen or tested its thinking about intelligence in any serious way. Though the possibility that intelligence has been tested through exercises cannot be ruled out, there are enough other potential drivers of the current reform drive and the creation of the SSF to view intelligence as an ancillary issue—or only as one part of the broader changes to information operations (*China Brief*, February 8).

The ambitious set of intelligence missions—supporting decision-making at all levels of command, calibrating deterrence operations, and guiding information warfare—suggests the challenges for PLA intelligence is not in the concepts but the organizational infrastructure to execute. The broad range of intelligence work that goes into these missions requires an equally broad set of training programs that will teach skills that cannot readily transfer from one kind of decision support to another. If the intelligence organizations are centralized, then the new organizations need to be able to reach across the PLA and also tailor its support for the different challenges facing different military units. Moreover, unless the PLA moves away entirely from supporting the Party leadership on foreign affairs, military intelligence also needs to keep officers capable of doing collecting, analyzing, and presenting intelligence to the leadership on foreign countries.

For analysts, the challenge will be identifying the PLA's evolving intelligence posture and how it resolves the challenges it faces. Chinese security authorities are allowing fewer and fewer slipups as they become accustomed to the ways in

which researchers and foreign intelligence services exploit the Internet (*China Brief*, May 7, 2014). If the PLA reorganization proceeds down some of the aforementioned lines, then many of the unit identifiers will change over. Many of the PLA's lower-level intelligence bureaus in the services and military regions barely had a public or online footprint, and the lag time in identifying the new units could be months if not years. Moreover, the tools for identifying what is included in military training and education are blunt, especially on a sensitive topic like intelligence. Top-level changes at the level of the JSD and the theater commands; however, the nuts and bolts of making intelligence successful are unlikely to be available.

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Notes

1. David Ian Chambers, "Edging in from the Cold: The Past and Present State of Chinese Intelligence Historiography," *Studies in Intelligence* 56, No. 3 (September 2012), pp. 31–46.
2. Defense Intelligence Agency, "China: Lieutenant General Xiong Guangkai," Biographic Sketch (Washington, DC, October 1996) Digital National Security Archive.
3. Chen Xiaogong served as a unit commander again Vietnam, either in 1979 or in the border skirmishes that flared up most noticeably in 1984. His unit reportedly lost more than 20 percent of its strength, suggesting Chen witnessed serious fighting. See, James Mulvenon, "Chen Xiaogong: A Political Biography," *China Leadership Monitor*, No. 22 (Fall 2007).
4. Peter Mattis, "PLA Military Intelligence at 90: Continuous Evolution," Paper presented at Annual CAPS-RAND-NDU Conference, Taipei, Taiwan, November 2015.
5. For references to the Aerospace Systems Department, see, for instance: National Defense Industry Bureau Network, October 21, 2016.
6. In addition, it is likely that most of the former GSD Fourth Department (4PLA), the Electronic Countermeasures and Radar Department, has also been transferred to the SSF.
7. According to articles available through CNKI, Mu Shan (牟珊) was formerly affiliated with Base 311 (61716 部队) but, as of mid-2016, was affiliated with the Strategic Support Force.
8. See the 2003 Political Work Regulations and 2010 Political Work Regulations.

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Quantum Leap (Part 2): The Strategic Implications of Quantum Technologies for the PLA

By Elsa Kania and John Costello

This is the second in a series of two articles that examines and evaluates the ramifications of Chinese advances in quantum information science. While part 1 reviewed China's national framework for and progress in this scientific domain, this second article evaluates the military applications and strategic implications of quantum technologies.

China's high-level focus on quantum information science reflects its recognition of the revolutionary implications of quantum technologies. China has operationalized and employed "unhackable" quantum cryptography to secure sensitive communications, while pursuing quantum computing capabilities whose enormous computing power could overcome most existing forms of encryption. Concurrently, Chinese scientists are starting to explore other quantum technologies, including supposedly "stealth-defeating" quantum radar. The Chinese People's Liberation Army (PLA) recognizes the strategic significance and operational potential of quantum technologies in their attempts to achieve a decisive advantage. Notably, these disruptive technologies—quantum communications, quantum computing, and potentially quantum radar—may have the potential to undermine cornerstones of U.S. technological dominance in information-age warfare, its sophisticated intelligence apparatus, satellites and secure communications networks, and stealth technologies.

The Military Applications of Quantum Technologies

Quantum Cryptography and Quantum Communications

The employment of quantum cryptography enables unbreakable, almost unhackable quantum communications networks that may have particular utility in a military context. Currently, China is in the process of constructing these networks at a national and even global scale for government and military purposes (see part 1). The PLA may already employ quantum communications networks in a limited capacity for the transmission of particularly sensitive information. By contrast, the U.S. military has not yet chosen to invest extensively in building a quantum communications infrastructure. For instance, the Air Force has concluded that the technique of quantum key distribution "significantly increases system complexity but is unlikely to provide an overall improvement in communication security" (USAF Scientific Advisory Board). For the PLA, however, existing communications systems are presumably relatively insecure, such that the value-added of state-of-the-art quantum communications may be higher. The construction of a national quantum communications backbone network (国家量子通信骨干网) has been characterized as a form of military-civil fusion (MCF, 军民融合), consistent with a national strategy for MCF and a tradition of building infrastructure optimized for such dual uses (*Xinhua*, November 21).

Looking forward, the PLA will likely use increasingly sophisticated quantum communications networks not only to ensure the integrity of sensitive communications during peacetime but also to seek an asymmetric information ad-

vantage in a conflict scenario. As China's concern about the security of military and civilian information systems has intensified, the employment of quantum cryptography has come to be seen as a critical "shield" for information security (信息安全之"盾") (USTC, August 16). In one early application of this technology, in 2009, a team of scientists under the leadership of Pan Jianwei constructed a quantum network to secure communication between government officials coordinating the military parade that celebrated the 60th anniversary of the founding of the People's Republic of China (*Caixin*, February 6, 2015). Although it is difficult to verify the current status of the PLA's quantum communications capabilities, Pan Jianwei claimed in an interview last year, "China is completely capable of making full use of quantum communications in a local war. The direction of development in the future calls for using relay satellites to realize quantum communications and control that covers the entire army" (*Caixin*, February 6, 2015). This is why China's quantum satellite, *Micius* (墨子), is so important, since it enables the testing of this methodology, while also advancing progress toward a future "quantum Internet." By 2030, China intends to possess a network of quantum satellites, which could potentially also be employed not only to enable secure military communications but also to enhance the PLA's command and control capabilities, including perhaps the secure transmission of the targeting data necessary to enable long-range precision strike (e.g., *PLA Daily*, September 27).

PLA academics have highlighted the multiple applications and potential advantages of quantum communications in a military context. According to National Defense University professor Li Daguang (李大光), quantum communication could contribute to ensuring information security, enhancing information confrontation capabilities, and enabling superluminal (i.e., faster than the speed of light) communication (*PLA Daily*, March 24). As a result, multiple nations are "racing to control the strategic commanding heights of quantum communication." Influential PLA information warfare theorist Ye Zheng (叶征) has also characterized quantum cryptography as one of the emerging technologies that have "infused information operations with new vitality, promoting the development of information operations." **[1]** According to An Weiping (安卫平), deputy chief of staff of the PLA's new Northern Theater Command, quantum communication is anticipated to have a dramatic impact on the future evolution of the form of warfare and the international military balance, including because it is anticipated to enhance battlefield information processing facilities, enabling the construction of a more robust combat system (*PLA Daily*, September 27).

Although the value of quantum cryptography is debatable, recent Chinese advances in quantum key distribution do constitute significant steps toward the development of even more secure quantum communications networks optimized for wartime use. **[2]** In November, a paper co-authored by Pan Jianwei described recent advances in measurement-device-independent quantum key distribution, which overcomes potential security vulnerabilities, including through detecting attempted eavesdropping (*Phys. Rev. Lett.*, November 2). Notably, their research broke records through secure transmission over 404 kilometers of optical fiber, while concurrently demonstrating a 500-fold increase in speed, sufficient to enable encrypted voice transmission via telephone (Physics, November 2). While this demonstration is only experimental at this point, continued advances in quantum communications could further increase its utility for the PLA.

Quantum Computing

The eventual achievement of quantum computing will result in computational capabilities that are vastly more powerful than classical computers. Future quantum computers could be integrated into complex weapons systems that require immense processing power. Through quantum computing, it will become possible to overcome most standard forms of encryption, rendering all networks reliant upon it, including computers and satellites, extremely vulnerable. In future warfare, quantum computing may prove to have strategic significance on par with nuclear weapons (e.g., *PLA Daily*, January 8, 2014).

For the PLA, the pursuit of quantum computing may possesses particular strategic significance since this capability could undermine the security of the extensive network of communications and surveillance satellites upon which the U.S. military remains heavily dependent. The PLA considers the U.S. to be a "no satellites, no fight" military and has focused on multiple kinetic and non-kinetic methods of targeting U.S. space assets. **[3]** PLA doctrinal writings have also emphasized the targeting of isolated battlefield networks, such as those of a carrier battle group. **[4]**

Within our lifetimes, quantum computing will enable such attacks on the availability and integrity of the satellites and communications systems upon which modern warfare relies, in ways currently inconceivable. The ability to decrypt sensitive intelligence and communications, whether conveyed via satellite networks or fiber, would provide an extreme intelligence advantage in peacetime and wartime contingencies alike. In the foreseeable future, a major, very real threat facing the U.S. is the possibility that a strategic competitor, such as China, could develop quantum computing in secret and use it against sensitive communications in order to outmaneuver or strategically outflank the U.S. In a wartime scenario, this potential infiltration of isolated networks could enable efforts to preempt operational movements or sabotage U.S. systems, without the U.S. knowing the source of this vulnerability. Although the full extent of U.S. government and military advances in quantum computing is likely not reflected by the limited information available in the public domain, the U.S. has yet to articulate a national agenda for quantum science that matches the scope or scale of that of China. Recently, a White House official articulated concerns that the U.S. lead in quantum computing is increasingly "under siege" (Defense One, December 7).

Quantum Sensing

In the perhaps more distant future, various forms of quantum sensing, including quantum radar, may take advantage of quantum entanglement to enable highly sophisticated detection of targets, regardless of stealth. **[5]** Notably, in September, a team of Chinese scientists from China Electronics Technology Group Corporation's (CETC) 14th Research Institute's (中国电子科技集团第 14 研究所) Intelligent Sensing Technology Key Laboratory (智能感知技术重点实验室) publicized their progress toward creating a single-photon quantum radar that is reportedly capable of detecting targets up to 100 kilometers away with improved accuracy (*PLA Daily*, September 13; CETC, September 18). Their research was undertaken in collaboration with a team led by Pan Jianwei from the University of Science and Technology of China, CETC's 27th Research Institute, and Nanjing University (CETC 14th Research Institute, September 7). The reported range of this quantum radar, which takes

advantage of entanglement between photon pairs, is supposedly five times that of a laboratory prototype jointly created last year by an international team of researchers (Phys.org, February 26, 2015).

The future realization of quantum radar that could potentially overcome superior U.S. stealth capabilities would enable the PLA to undermine this critical pillar of U.S. military power. At the time, commentary in PLA media highlighted quantum radar as the "nemesis" of today's stealth fighter planes, highlighting that it has "remarkable potential" to disrupt future warfare (*PLA Daily*, September 22). However, it is difficult to evaluate the actuality of China's advances in quantum radar technology. Information in official media reports of technological breakthroughs could potentially be exaggerated. On the other hand, the possibility that certain aspects of Chinese research on the military applications of quantum technologies may have advanced further than is discernable based on the available open-source information and publications also cannot be discounted.

The Chinese Defense Industry's Development of Quantum Technologies

Beyond the academic laboratories and research institutes focused on quantum information science (e.g., see part 1), several Chinese state-owned defense firms also appear to have started to engage in research and development regarding the military applications of quantum technology. These include: the China Electronics Technology Group Corporation (中国电子科技集团, CETC), one of China's top state-owned defense conglomerates, which has close ties to the PLA and China's space program, as well as the China Aerospace Science and Industry Corporation (中国航天科工集团公司, CASIC) and China Aerospace Science and Technology Corporation (中国航天科技集团公司, CASC), state-owned defense firms that act as primary contractors for China's space program and also develop related military technologies (*China Brief*, February 21, 2012). The following is an initial listing of the research institutes associated with these defense firms that are reportedly engaged in research in quantum technologies.

China Electronics Technology Group Corporation

- *14th Research Institute* (第 14 研究所): Its Intelligent Sensing Technology Key Laboratory (智能感知技术重点实验室) is involved in research on quantum radars (CETC 14th Research Institute, September 7).
- *27th Research Institute* (第 27 研究所): This institute has also been involved in the quantum radar project (CETC 14th Research Institute, September 7).
- *30th Research Institute* (第 30 研究所): This institute has apparently been working on the development of methods of quantum secure direct communications (量子保密直接通信) methods (Patent).
- *38th Research Institute* (第 38 研究所): This institute may also be involved in the development of a quantum communications network, in collaboration with Pan Jianwei and his team (CETC 38th Research Institute; China Popular Science Reader, November 3, 2009).

China Aerospace Science and Industry Corporation

- *Third Academy, 33rd Research Institute* (三院 33 所): This research institute has been involved in the development of a NMR gy-

roscope prototype based on quantum technology (基于量子技术的核磁共振陀螺原理样机) (Sina, August 31).

China Aerospace Science and Technology Corporation

- *9th Academy, 13th Research Institute* (九院 13 所): This institute has been engaged in research on quantum imaging, which involves the use of quantum correlations for a new form of remote sensing (CASC, August 20, 2015)
- *5th Academy, 508 Research Institute* (五院 508 所): This institute established a Quantum Sensing Laboratory (量子遥感实验室的) in 2012 (China Space News, July 26, 2012).

The Future of Warfare in the Quantum Age?

Looking forward, China aspires to lead the coming second quantum revolution and may possess the potential to leapfrog the U.S. in this critical technological domain (*PLA Daily*, August 18). According to An Weiping, as the information age is undergoing a "leap" toward the "quantum information age," quantum is considered the "forward position" for a great power's comprehensive national power, scientific level, and strategic contests of military power (*PLA Daily*, September 27). China's concentrated pursuit of quantum technologies could have much more far-reaching impacts than the asymmetric approach to defense that has characterized China's strategic posture thus far, with its focus on "assassin's mace" (杀手锏) programs since the 1990s.

These quantum ambitions seemingly constitute an evolution of the PLA's traditional asymmetric strategy to one that attempts to offset U.S. technological superiority. The employment of quantum communications, computing, and perhaps even radar may radically alter the rules of the game on the future battlefield. These technologies could neutralize the technological advantages associated with today's information-centric ways of war, epitomized by the U.S. model, which has relied upon a sophisticated global intelligence apparatus, military satellite networks, and stealth capabilities. For China, the successful development of even one or two of these quantum technologies might ultimately enable an "offset" of its own, which could decisively change the future strategic balance.

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Notes:

1. Ye Zheng [叶征], *Lectures on the Science of Information Operations* [信息作战学习教程], Military Science Press [军事科学出版社], 2013, p. 79.

2. The substitution of conventional encryption by quantum key distribution does not eliminate other vulnerabilities and weak links in the security of a system (e.g., Schneier on Security, October 16, 2008). In some cases, the complexity introduced by this quantum cryptographic technique may also limit the efficacy of this technology (e.g., USAF Scientific Advisory Board).
3. See, for instance: Kevin Pollpeter, "The Chinese Vision of Space Military Operations," in *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People's Liberation Army*, 2005, p. 329–370.
4. Ye Zheng [叶征], *Lectures on the Science of Information Operations* [信息作战学习教程], Military Science Press [军事科学出版社], 2013, p. 91.
5. In general, there are three primary forms of quantum radar, single-photon quantum radar (单光子量子雷达), interferometric quantum radar (干涉式量子雷达), and quantum entanglement radar (以及纠缠态量子雷达). Although there is limited information available about which forms of quantum radar may be currently in research and development in China, there have been patents filed for a "laser radar based on the principle of strongly correlated quantum imaging" (Zhejiang University, May 7, 2010), quantum radar and target detection methods (Tan Hong, October 22, 2014), and a "quantum entanglement radar" (Ge Wangshan, June 15, 2012).
6. Sources for chart is as follows: CETC 14th Research Institute, September 7; Patent; CETC 38th Research Institute; China Popular Science Reader, November 3, 2009; Sina, August 31; CASC, August 20, 2015; China Space News, July 26, 2012.

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