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Vietnam's Master Plan for the South China Sea

The country's plan for intelligence, surveillance and reconnaissance is taking shape.

By Koh Swee Lean Collin
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For many years, Vietnam has been steadily accumulating new military capabilities to reinvigorate its antiquated Cold War arsenal, sourcing from mostly Russia but increasingly from other suppliers too. However, military effectiveness clearly does not depend on only kinetic capabilities; the means of detecting, tracking and guiding weapons against the intended targets constitute another essential element. Cognizant of this, besides continuing to acquire new kinetic capabilities Hanoi has undertaken nascent but nonetheless crucial steps in establishing a comprehensive intelligence, surveillance and reconnaissance (ISR) suite.

It is through this context that one may interpret recent revelation about the potential military significance of an Indo-Vietnamese deal to establish a satellite tracking station in Ho Chi Minh City, and an earlier report last year about Vietnam's new unmanned aerial vehicle (UAV) that will soon patrol the South China Sea (SCS).

An ISR Master Plan in the Offing?

Vietnam's UAV and remote-sensing earth observation satellite programmes have often been emphasized for their utility in agriculture, disaster management and fishery management. At first glance, these initiatives correspond with general patterns observed in Southeast Asia – Indonesia (see here and here) and Singapore for example have active UAV programmes. As for earth

observation satellites, Singapore launched TeLEOS-1, jointly designed by ST Electronics, Nanyang Technological University and Defence Science Organisation Laboratories in December 2015. The Philippines is also poised to launch the Diwata-1 earth observation microsatellite.

But such capabilities clearly have military applications, since they generate data that could be utilized for various purposes. Even though civilian satellites for instance may not possess the sort of capabilities possessed by their military counterparts, they may still fulfill less demanding military peacetime and wartime requirements. And some of such ostensibly civilian-purpose satellites demonstrate performance close to military specifications. TeLEOS-1 for example has a panchromatic resolution of 1 m (at nadir), which may generate militarily useful data. Indeed, the lines between civilian and military applications are often blurred in such dual-use technologies. This is especially true in the maritime domain.

In the recent years, there are signs of Vietnam implementing a strategy of establishing what can be deemed "maritime domain awareness" in the SCS. Notably, in February 2013, the Ministry of Natural Resources and Environment (MONRE) said that it would gradually modernize existing "marine environment and hydrometeorology observation stations" as well as build new ones in key maritime zones as part of a master plan to establish a marine resources and environment observation network of 35 such stations in total by 2020. This integrated network, a crucial part of a three-phase project developed by Vietnam Administration of Seas and Islands (VASI), will help improve national management of the seas and islands under Vietnam's sovereignty and jurisdiction. Among various purposes, this network is designed with national defense in mind, thus giving an obvious strategic context to Vietnam's ISR drive.

Therefore, it seems very likely that Vietnam's ISR advances are at least partly in response to developments to date in the SCS, which has seen recurring tensions. Hanoi appears to also be matching Beijing's moves, including the latter's vision of creating a new HY-3 "constellation" of maritime surveillance satellites in 2019 which has, according to Lin Mingsen, deputy director of the National Satellite Ocean Application Service, "an important role in reinforcing China's marine rights protection, marine law enforcement and supervision, management of its offshore waters and marine disaster relief and reduction." This is not to overlook China's steady development of military UAVs such as the Wing Loong I medium-altitude, long-endurance (MALE) drone, said to have entered mass production in 2015, the same year its enhanced successor Wing Loong II was unveiled.

With a long 3,444-kilometers coastline (not counting islands) and vast maritime zone including claims in the disputed SCS waters, Vietnam clearly needs a comprehensive ISR strategy to bolster maritime domain awareness and targeting in times of peace and war. Unlike its acquisition of "big ticket" military kinetic capabilities, such as Su-30MK2 fighter jets and *Kilo*-class submarines, Vietnam's discrete ISR-related projects have until now managed to evade much public attention while progressing steadily in the shadows.

Earth Observation Satellites for Civilian Purposes?

Space-based ISR capabilities, often couched within the ambit of civilian-sounding "earth observation satellite" development, constitute a key facet of Vietnam's ISR quest. It started with

the "Strategy for Research and Application of Space Technology of Vietnam until 2020" approved in June 2006 with a $2 billion investment. Less than year later, the Space Technology Institute (STI) was created to undertake space science and technology research, which appeared to focus on innocuously civilian applications. Vice-chairman of the Vietnam Academy of Science and Technology (VAST), Nguyen Dinh Cong, said that Strategy called for the indigenous development of small earth observation satellites.

But there is clearly a military intent; back in December 2008, Chairman of the National Research Programme on Space Science and Technology Nguyen Khoa Son said that "If we have our own satellite, we can respond more promptly to natural disasters and be more active in defence and security activities." Also, the Vietnam Space Committee, established in 2010 and tasked to advise the prime minister on implementing the space strategy, was enhanced in January 2013 to comprise representatives from various national agencies, notably the Defense Ministry.

Towards this aim, typical of many emerging satellite aspirants, Vietnam first started out with communications satellites. After some delay, it launched VINASAT-1 in April 2008, followed by VINASAT-2 in May 2012. The Vietnamese proved to be quick learners. Lockheed Martin, contractor for both VINASATs, praised Vietnamese engineers for their ability to master the skills of controlling the satellites. Indeed, Lockheed Martin handed over control of VINASAT-2 to Vietnamese authorities in July 2012, two months after satellite was launched. This was half the time taken for VINASAT-1, the control of which has relinquished to Hanoi in August 2008 – thereby demonstrating a certain level of Vietnamese technical mastery.

But Vietnam faces a much steeper learning curve as it progresses into the remote-sensing arena. In July 2012, Vietnam launched its first indigenous earth observation satellite, the F-1, designed by the Space Research Division (FSpace) of FPT Technology University. It measures 10 x 10 x 10 cm, weighs just 1 kg and is capable of taking low resolution (640×480) pictures. Vu Trong Thu, Head of FSpace, said that Vietnam aims to master space technology for various purposes, including SCS surveillance – thus hinting at the F-1's ISR role. But this microsatellite failed to transmit signals back to Earth, possibly because of battery problems.

Nonetheless, this setback did not stymie Vietnam's ambitions to wean itself of reliance on foreign-sourced remote-sensing data which has to be acquired "at a huge cost," according to Pham Anh Tuan, Director of the Vietnam National Satellite Center (VNSC). During an interview in March 2015, Pham explained: "Currently, to produce a satellite photo, Vietnam has to order it in advance, and will only receive the image two days later. In fact, on several occasions Vietnam has not been able to receive the photos it needed on time. However, if we have our own satellites and a space center, everything can be done within 6-12 hours, including taking photos and processing data."

So Vietnam's second attempt, VNREDSat-1, which measures 600 x 570 x 500 mm and weighs 120 kg, was put into orbit in May 2013 and successfully transmitted the first images back to Earth two days after launch. VNREDSat-1 was designed by Astrium SAS, a European Aeronautic Defence and Space (EADS) affiliate, and its $70-million project cost bankrolled jointly by the French and Vietnamese governments. Whffen Astrium SAS handed over VNREDSat-1's control to VAST four months later, Deputy Prime Minister Nguyen Thien Nhan

called that a milestone in Vietnam's space technology development, claiming full mastery of "small satellite technology" and the ability to independently process images. Most importantly, according to the National Space Science and Technology Research Programme chairman Nguyen Khoa Son, VNREDSat-1 helps reduce Vietnam's reliance on foreign-sourced images.

To be sure, the military significance of VNREDSat-1 cannot be overlooked. In February 2014, Nguyen Xuan Lam, Head of MONRE's National Remote Sensing Department, said that VNREDSat-1 will used for monitoring Vietnam's waters and islands for the purpose of socioeconomic development as well as defense and security purposes, under the project "Monitoring Offshore Key Waters and Islands with Remote Sensing Technology." At a conference in May the same year, Deputy Minister of MONRE Nguyen Thai Lai said that VNREDSat-1 serves as an effective tool in managing Vietnam's environmental resources and defending national sovereignty over its land, sea, islands and airspace.

Vietnam is evidently buoyed by the success of VNREDSat-1 – and of Pico Dragon, which has roughly the same dimensions as the ill-fated F-1 and was launched shortly after, managing to transmit its first signals to Earth. By 2016, according to Pham, Vietnam plans to launch the 10 kg NanoDragon, which will be entirely developed locally, to be followed by the 50 kg MicroDragon in 2018, and then LOTUSat-2, a 500-600 kg satellite capable of capturing X-band synthetic aperture radar images with 1-16 m resolution, by 2020. Clearly, Hanoi has adopted an incremental approach, moving from small to bigger and more capable satellites.

As it stands, VNREDSat-1 carries a camera that can capture images with a 2.5 m resolution – certainly falling short of the high resolution of one meter or less afforded by military satellites. This hampers Vietnam's ability to identify and observe with high precision the types of activities taking place in the SCS. VNREDSat-1's limitation and the growing urgency of the SCS situation thus catalyze follow-on initiatives. In October 2014, Hanoi inked a deal with Belgium to develop VNREDSAT-1B, planned for launch in 2017. Unfortunately, however, it later backed out of the deal, following the breakdown of prolonged negotiations over its terms.

Hence the deal with India to build a satellite tracking station in Vietnam, allowing Hanoi access to data from India's constellation of civilian and military remote-sensing satellites. Facing a remote-sensing capability gap until the more capable LOTUSat-2 comes on line, Vietnam possibly views this as a short-term stopgap measure to acquire more precise, militarily useful data generated from sophisticated Indian military satellites such as the radar imaging satellite RISAT-2 which, despite Indian officials' insistence that it is used solely for disaster management, is capable of monitoring objects with dimensions as small as 10 cm. In the longer term, Hanoi may have assessed that collaboration with New Delhi may facilitate its ultimate goal of attaining self-sufficiency in its satellite remote-sensing capabilities.

Drones Seeing Steadier Progress

Compared to satellites, UAVs constitute a field where Vietnam has arguably achieved more success, in no small part attributable to the relative ease of accessing dual-use technologies commonly found in such platforms. Indeed, UAVs have been a critical facet of Hanoi's quest to develop ISR capabilities, and rightfully so since drones have become a perennial asset in modern

warfare. In fact, Vietnam had begun developing UAVs as far back as 1978 when its air force's Institute of Technology launched the TL-1 program. The first dedicated military UAV, HL-1, was based on a French model but financial constraints meant it was only partially completed.

In recent years, Hanoi has taken steps to revitalize its UAV program. Since 2010, it has cooperated with the Russian aerospace corporation Irkut to develop UAVs. Russo-Vietnamese UAV cooperation was enhanced in March 2012 with a new agreement signed between Vietnam Aerospace Association (VASA) and Irkut to develop a UAV weighing less than 100 kg with endurance of 16 hours. The deal was reportedly worth $10 million and covers technology transfers to Vietnam. But it is also evident that Hanoi seeks to diversify its sources of UAV technology. Notably, in November 2012, VASA inked a UAV deal with a Swedish firm, with its first phase covering Swedish support to initially build two Magic Eye-1 UAVs, each weighing 40 kg and capable of staying up for six hours. The subsequent two phases cover technical collaboration in associated UAV electronics, such as automatic drive mechanisms and cameras, and joint exports.

Hanoi appears to have adopted a double-pronged strategy of acquiring foreign systems while developing them through technology transfers. At least five UAV models had been tested so far, equipped with various specialized payloads. However, not all such effort yielded success. For example, also in February 2014 Vietnam's navy reportedly discussed with Austrian firm Schiebel to purchase the Camcopter S-100 rotary-winged UAV, ostensibly for deployment from the Dutch SIGMA corvettes Hanoi was earlier said to be acquiring. But the corvette deal has since fallen through, though it is not implausible for the same UAV to be flown from other types of warships if Vietnam remains keen on it. Undeterred, Hanoi persists with this double-pronged UAV development strategy, starting with tactical systems optimized for short-range battlefield ISR.

Following the successful test flight of a prototype AV.UAV.S2 over the Central Highlands province of Lam Dong in May 2013, touted by Vietnam's state media as paving the way for follow-on development of UAVs to perform "other necessary tasks", in February the following year military-owned Viettel Group unveiled its indigenous Patrol VT tactical UAV, reportedly equipped with a high-definition infra-red sensor capable of taking high-quality images within 600 meters. About seven months later, Vietnam acquired the Orbiter-2 mini-UAV from Israel. It debuted on Vietnamese television in December, supporting a navy coastal defense artillery live-firing exercise featuring an Israeli-made EXTRA rocket system. Hanoi is possibly satisfied with the Orbiter-2 and therefore decided to acquire more of the system, as well as the larger Orbiter-3 that is capable of 7-hour endurance.

But such tactical UAVs are typically handicapped by limited endurance and payload. Vietnam clearly seeks more capable UAVs. A senior official responsible for UAV development at Viettel's Flight Instrument Center stated in June 2013 that the firm's longer-term goal is to develop a UAV capable of 15-24 hours' endurance. In this respect, Vietnam seems to have reaped the most out of its military-technical links with Belarus, following a UAV purchase and joint development pact signed in May 2013. It is very plausible that HS-6L, a high-altitude, long-endurance (HALE) drone reported in December 2015, is developed with Belarussian assistance.

Capable of a 4000km-range and 35-hour endurance, this UAV is poised to conduct SCS flight tests during the second quarter of 2016.

Clearly, while its scope is dwarfed by China's, Vietnam is keen to develop a holistic range of UAVs optimized for various tactical and strategic-operational missions. Within barely a decade, it has made notable progress in no small part due to its access to foreign technologies. In the near future, Hanoi would attain a degree of self-sufficiency in UAVs to complete such an important facet of its envisaged suite of ISR capabilities.

Persistent ISR Capability Gaps

While the pathway undertaken by Hanoi in building its ISR capabilities has so far been sound and pragmatic, clearly there is still some way to go before a comprehensive, multi-layered suite of ISR capabilities can be established for maritime domain awareness and targeting purposes in the SCS. There is a persistent capability shortfall in manned aerial ISR platforms, and particularly in airborne early warning and control (AEW&C) and maritime patrol aircraft.

An AEW&C plane is primarily optimized for aerial surveillance while possessing a secondary maritime surveillance function but such platforms are expensive. Maritime patrol aircraft are the next alternative, being optimized for maritime surveillance roles. At present, Vietnam's stable of such planes – the Canadian DHC-6 Guardian-400 and Spanish CASA-212 – are handicapped by limited endurance, payload and range. Time-sensitive, close-in ISR can be accomplished with only larger MPAs in view of the vast maritime area of responsibility Vietnam has.

Ever since Hanoi reportedly expressed "a lot of interest" in acquiring the P-3C Orion from the United States back in April 2013, thus far no follow-on moves had been made even though Washington partially relaxed its arms export ban on Vietnam in September the following year. A less costly strategy could be to modify Vietnam's new C-295 medium airlifters to perform ISR roles. But these planes are intended in the first place to replace the antiquated fleet of Soviet fixed-wing air transports, leaving little or no surplus assets for such conversions.

In any case, Vietnam's current ISR focus constitutes a logical progression from the previous emphasis on reinvigorating its kinetic military capabilities. Having already invested so much in new fighter jets, missiles, warships and submarines, Hanoi clearly recognizes the need for more attention to ISR. Its ongoing programs are geared towards building space-based remote-sensing and unmanned aerial ISR assets that would augment "traditional" ISR capabilities found in Vietnam's existing aerial, surface, sub-surface and shore-based platforms.

Ultimately, the eventual realization of a comprehensive ISR capability suite would allow Vietnam to maximize the potential of its arsenal for the purpose of conducting sea denial and defensive sea control missions, in effect realizing its own version of anti-access and area denial (A2/AD) strategy in the SCS. Considering the relatively small arsenal mustered by Hanoi vis-à-vis China's, a comprehensive suite of ISR capabilities would serve as a valuable force multiplier.