East Asia's Military Transformation: The Revolution in Military Affairs and its Problems

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All of the United States' key allies in East Asia have felt compelled to respond to the Revolution in Military Affairs (RMA) due to the need to maintain interoperability with US forces. South Korea, Australia and Singapore have been the most enthusiastic in pursuing military transformation, although Japan and Taiwan have faced political constraints. However, the RMA in East Asia has been problematic as it has been divorced from the political and strategic contexts. There is a real need for the countries involved to carefully understand its potential and limitations, and to relate what are essentially military means to overall political objectives and strategic frameworks.

All of the United States' key allies in East Asia have felt compelled to respond to the Revolution in Military Affairs (RMA). East Asia is commonly understood to comprise the countries of Northeast Asia and Southeast Asia, but Australia has to be included in this discussion due to its geo-strategic proximity to East Asia, its role as a key US ally in the Western Pacific, and its participation in the Trilateral Security Dialogue (with Japan and the United States) which coordinates US strategy in East Asia.[1] South Korea, Australia and Singapore have been the most enthusiastic in pursuing military transformation, while Japan and Taiwan have faced significant political constraints. However, the RMA in East Asia has been problematic as it has been divorced from the political and strategic contexts. There is a real need for the countries involved to carefully understand its potential and limitations, and to relate what are essentially military means to overall political objectives and strategic frameworks.

The process of military transformation in East Asia has been linked to the debate over the so-called Revolution in Military Affairs (RMA) in the United States. The RMA has touted the efficacy of the integration of intelligence, reconnaissance, surveillance, communications, command and control, stealth, precision strike, and new information and systems technology to fundamentally change the way conventional war is fought.

The RMA is supposed to provide those states embarked along its trajectory the promise of conventional warfare superiority and, more dangerously, greater ease in using military force to resolve disputes since the RMA promises quick, relatively painless victory. The quick and decisive military

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[1] See Andrew T. H. Tan, 'Singapore's Cooperation with the Trilateral Security Dialogue Partners in the War Against Global Terrorism', *Defence Studies,* vol. 7, no. 2 (June 2007).

outcomes achieved by the United States in both Gulf Wars against Iraq reinforced the claims of RMA proponents. East Asian states have thus been forced to consider its claims, and to respond to it. Some have adopted parts of the RMA to improve specific capabilities, such as in maritime surveillance and patrol, but others, such as China and North Korea, have explored ways to counter the conventional superiority that militaries transformed by the RMA are supposed to possess.

This article focuses on the response of key US allies in East Asia to the RMA, and argues that the RMA in East Asia has been problematic as it has been divorced from the political and strategic contexts. There is therefore a real need for the countries involved to carefully understand its potential and limitations, and to relate what are essentially military means to overall political objectives and strategic frameworks.

Military Transformation and the RMA

What is interesting about East Asia is the region's evident military transformation arising from increased military expenditure and the acquisition of new and improved capabilities.[2] This process has been driven by a complex set of political, strategic, economic and social factors, though Barry Buzan has noted that even in the absence of other drivers, states will push to continuously modernise their armed forces. This is due to the inherent uncertainties of an anarchic international system and the concern that rivals might gain a military technological advantage.[3]

It is in the context of the regional arms build up and the technological imperative underlying arms modernisation that the region has been forced to respond to the US debate on the RMA, where various aspects of the RMA have officially been adopted under the Pentagon's Joint Vision 2010.[4] The generally accepted definition of the RMA, attributed to Andrew Marshall of the US Office of Net Assessment, is:

> a major change in the nature of warfare brought about by the innovative application of new technologies which combined with dramatic changes in military doctrine and operational and organisational concepts, fundamentally alters the nature and the conduct of war.[5]

The RMA is also linked to the emerging concept of network-centric warfare (NCW), which:

> generates increased combat power by networking sensors, decision-makers, and shooters to achieve shared awareness, increased speed of

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[2] See Desmond Ball, 'Arms Modernization in Asia: An Emerging Complex Arms Race', in Andrew T. H. Tan (ed.), *The Global Arms Trade* (London: Routledge, 2010).
[3] Barry Buzan, *An Introduction to Strategic Studies: Military Technology and International Relations* (London: Macmillan / International Institute of Strategic Studies, 1987), p. 109.
[4] See Chairman of the Joint Chiefs of Staff, *Joint Vision 2010*, <http://www.dtic.mil/jv2010/j v2010.pdf> [Accessed 14 May 2011].
[5] As cited in Michael Mazaar, Jeffrey Shaffer and Benjamin Ederington, *The Military Technical Revolution: A Structural Framework* (Carlisle: US Army War College, 1993), p. 21.

command, high tempo of operations, greater lethality, increased survivability, and a degree of self-synchronisation.[6]

This paper is not meant to revisit the RMA debate, suffice to note that proponents of the present RMA argue that the dramatic improvement in the ability to collect, analyse and act on information has resulted in the ability to apply precise and timely military force in a decisive manner.[7] According to one of its proponents, Admiral William Owens, the development of new technologies in precision-strike and information gathering would ultimately lead to a "system of systems". By integrating long-range, precision-strike weapons with extensive intelligence, surveillance and reconnaissance, and vastly improved capabilities for processing information and distributing it, he asserts that the United States could detect and destroy enemy targets over large swathes of the earth's surface.[8]

Indeed, the key to the present RMA is the vast improvement in information and information systems technology which, it is held, has led to the achievement of real-time battlefield awareness, thereby lifting the so-called "fog of war", that is, the confusion and unpredictability, which has hitherto characterised warfare.[9] In turn, this has enabled complex, high-tempo precision operations to be conducted continuously under all-weather conditions and over a much wider battle-space.

Critics of the RMA however, have highlighted the growing threats posed by cruise, anti-ship and ballistic missiles, anti-satellite technologies, the vulnerabilities of information and communication systems, and the development of weapons of mass destruction, such as nuclear, chemical and biological weapons.[10] Indeed, long-range anti-ship cruise missiles, ballistic missiles, nuclear weapons, anti-satellite capabilities, and sea-mines and submarines to deny littoral access, are some of the key components of the evolving asymmetric strategies being developed by non-participants of the US-led RMA, such as China and North Korea.

Despite these critics, proponents hold that the current RMA underpinning the US process of military transformation amounts to a real revolution in the way wars are fought, conferring conventional military superiority to those states that successfully adopt and master it, tilting the regional balance of power. Indeed, the quick and relatively painless achievement of military objectives (until confronted by the insurgencies in Iraq and Afghanistan after 2003) by

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[6] Director, Force Transformation, Office of the Secretary of Defense, *Network-Centric Warfare: Creating a Decisive Warfighting Advantage* (Washington: US Department of Defense, 2003), p. 2.

[7] Lawrence Freedman, *The Revolution in Strategic Affairs*, Adelphi Paper no. 318 (London: International Institute of Strategic Studies, 1998), p. 11.

[8] As cited in Eliot Cohen, 'Technology and Warfare', in John Baylis et al,, *Strategy in the Contemporary World: An Introduction to Strategic Studies* (Oxford: Oxford University Press, 2002), p. 243.

[9] Michael O'Hanlon, *Technological Change and the Future of Warfare* (Washington: Brookings, 2000), p. 8.

[10] Ibid., p. 16.

the United States in the two Gulf Wars appeared to validate the efficacy of military transformation along the lines of the RMA.

The RMA in East Asia has led to two distinct responses. Non-US allies, such as China and North Korea, have responded by developing strategies designed to counter the US-led RMA. However, the apparently swift manner in which the United States dispatched of its conventional foes has led America's allies in the region to adopt variations of the US-led RMA as part of their military transformation. These allies believe that military transformation along the lines of the RMA would also confer a military advantage to them. As close US allies, they believe that they could also ultimately count on US protection should weapons of mass destruction, for instance, be used by their adversaries. Moreover, a primary driver has been their own peculiar geostrategic circumstances, since the RMA promises to deliver conventional military superiority over potential adversaries which have much larger military forces.

However, military transformation along the lines of the US-inspired RMA is a complex affair, given the fact that not only are modern weapons systems tremendously expensive, much more is required for a true RMA to take place. As Joseph Nye and William Owens noted, the RMA also includes the development of doctrine, strategies and military organisations that can take advantage of the technological potential. This includes the need for integrated logistical capabilities, joint force doctrines, a very high-level of technical support and training, as well as integrated command, control and communications capabilities.[11]

Military transformation in response to the RMA has important implications for regional order and stability, as it is tied to the larger issues of how to respond to the emerging strategic rivalry between the United States and China, and the shape of the future regional order. For US regional allies, the acquisition of US-developed RMA technologies and similar defence doctrines implies a commitment to a long-term strategic relationship with the United States. Military transformation also potentially confers new capabilities to regional states, thus upsetting the regional balance of power, and heightening tensions between regional states due to the security dilemma. This, in turn, could lead to mistrust, conflict spirals and the possible outbreak of conflict over, for instance, disputed maritime territory.[12]

Japan's Military Transformation

In his study on the RMA in Asia in 1997, Paul Dibb identified Japan as a "Tier 1 country" with a high capacity to carry out the RMA.[13] This should not

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[11] See Joseph S. Nye and William A. Owens, 'America's Information Edge', *Foreign Affairs*, vol. 75, no. 2 (March-April 1996).

[12] For a discussion of the role of misperceptions and the security dilemma, see Robert Jervis, *Perception and Misperception in International Politics* (Princeton: Princeton University Press, 1976).

[13] See Paul Dibb, 'The Revolution in Military Affairs and Asian Security', *Survival*, vol. 39, no. 4 (Winter 1997-98).

be surprising on account of Japan's economic power as the world's third largest economy and the significantly high level of technology that the country possesses. However, Japan's defence forces have been subjected to various constitutional, political and normative constraints that have placed severe limits on defence planning, procurement and operational capabilities. Following the end of the Second World War, Japan adopted a peace constitution, epitomised by Article 9, promising never to go to war. This was underpinned by a pacifist post-war generation that did not want to revisit the horrors of what happened before 1945, given that Japan not only lost the war but suffered atomic attacks. Under its "Exclusively-Defence Oriented Policy", Japan's defence forces cannot be employed except in response to an external attack on Japan, and the defence capabilities that Japan would retain, and the use of these capabilities, would be kept to the minimum necessary for self-defence.[14] The Diet (Parliament) thus expressly forbade the acquisition of any offensive capability, such as aircraft carriers, amphibious warfare vessels, ballistic missiles and long-range bombers. In this political climate, it was not surprising that the Japan Defence Agency (JDA), established in 1954, was given cabinet status only in 2007, becoming the Ministry of Defence.[15]

The various constitutional and political constraints have meant that Japan's priority has been territorial defence, not forward offensive deployments or the projection of power in support of diplomatic or political objectives. Japan also has had to depend on the security alliance with the United States to protect it against external attack, and to rely on the United States to bolster regional and global security in a manner that would also benefit Japan.

Nonetheless, Japan has been forced to consider the emerging RMA in the United States, given the need to ensure continued interoperability with US forces. The increased requirement for Japan to participate in peacekeeping operations and to contribute to US-led operations, such as in Iraq, also provided impetus towards military transformation. The JDA thus carried out studies into the emerging RMA in the late 1990s and concluded that instead of seeking its full realisation, it would adopt a version that would be relevant to Japan's specific circumstances.

According to the JDA publication, *Info-RMA: Study on Info-RMA and the Future of the Self-Defense Forces,* published in 2000, there are seven principles which will guide Japan's RMA:

- information sharing through the establishment of a network;

- joint defence operations involving all arms of the military;

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[14] *East Asian Strategic Review 2001* (Tokyo: National Institute of Defense Studies, 2001), p. 114.
[15] Elaine Lies, 'Japan's Defense Agency Upgraded to Ministry', *Reuters*, 9 January 2007, <http://www.reuters.com/article/idUST20364020070109> [Accessed 14 May 2011].

- increasing the speed of decision-making and manoeuvre through the development of an advanced information system;

- the increase in combat efficiency through improved battle management capability and the ability to operate precision-guided munitions; organisational flexibility;

- protection against cruise and ballistic missiles as well as better protection and redundant capabilities in information networks and sensors; and

- interoperability with US forces, involving real-time information sharing through information networks in order to ensure that the two countries can coordinate their joint responses.[16]

According to the report, the ultimate objective of Japan's RMA would be:

> Sharing real-time information among each unit of the Ground, Maritime, and Air Self-Defense Forces based on redundant and invulnerable information networks comprised of various sensors; securing interoperability between SDF and US forces; and establishing a defense posture that could perform most efficiently with a minimum of reaction time, and could respond flexibly in accordance with rapidly changing situations.[17]

This demonstrates that Japan's RMA is framed within the parameters of the various existing constitutional and political constraints on the use of force as a policy instrument. One aim of the limited RMA is the strengthening of interoperability with US forces, primarily in defence of the Japan homeland. Another key priority in this transformation is the improvement of ballistic missile defence, particularly against any attack by an increasingly erratic North Korea. In addition, the RMA's promise of precision attack capabilities and battle-space awareness also fits Japan's focus on homeland defence, since it promises to minimise collateral civilian casualties.[18] Moreover, Japan possesses a range of Information Technology (IT) and other advanced technologies that confer upon it a huge advantage in the pursuit of the RMA.

As Sugio Takahashi succinctly concluded, copying the US roadmap is not the answer. The defence forces have to keep pace with the ongoing transformation in warfare in order to avoid becoming an outdated, legacy force, but "a partial RMA based on interoperability with the United States in logistics and BMD (ballistic missile defence) is Japan's best solution."[19] In

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[16] *Info-RMA: Study on Info-RMA and the Future of the Self-Defense Forces*, Office of Strategic Studies, Defence Policy Division, Defence Policy Bureau, Japan Defence Agency, December 2000, <http://www.mod.go.jp/e/publ/w_paper/pdf/2006/rma_e.pdf> [Accessed 14 May 2011], pp. 7-9.

[17] Ibid., p. 9.

[18] *East Asian Strategic Review 2001*, p.114.

[19] Sugio Takahashi, 'The Japanese Perception of the IT-RMA', in Emily O. Goldman and Thomas G. Mahnken (eds.), *The Information Revolution in Military Affairs in Asia* (New York: Palgrave Macmillan, 2004), p. 93.

this respect, Japan has focused on improved C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance), and the selective acquisition of force-multipliers, such as navy destroyers equipped with the Aegis combat system and advanced AWAC (Airborne Warning and Control) aircraft.[20]

The *Mid-Term Defense Policy Program*, covering Fiscal Years 2005-2009, stated that Japan would establish:

> multi-functional, flexible and effective defence forces that are highly ready, mobile, adaptable and multi-purpose, and are equipped with state-of-the-art technologies and intelligence capabilities, while maintaining the most basic capabilities to cope with large-scale invasion.[21]

Further, it reiterated that "the Japan-US Security Arrangements are indispensible in ensuring Japan's security", and that "the US military presence is critically important to peace and security in the Asia-Pacific region."[22]

The *National Defense Program Guidelines for Fiscal Year 2011 and Beyond* reflected Japan's changed strategic environment. This included China's increasing assertiveness over the disputed Senkaku islands and in the South China Sea, as well as the erratic and aggressive behaviour of a nuclear-armed North Korea, which in 2010 sank a South Korean navy corvette and shelled an island belonging to South Korea. The Guidelines thus spoke of the increase in "grey-zone" disputes over territory and economic interests, and stated that "North Korea's military activities constitute an immediate and grave destabilizing factor to regional security."[23] It also noted China's rapid military modernisation, and observed that:

> China has been expanding and intensifying its maritime activities in the surrounding waters … these trends, together with insufficient transparency over China's military forces and its security policy, are of concern for the regional and global community.[24]

Thus, the emphasis in Japan's military transformation would be on "enhancing (the) basis for joint operations, improving capabilities to respond to attacks on offshore islands, (and) strengthening capabilities for international peace cooperation activities."[25] Similarly, the *Report of the Council on the Future of Security and Defence Capabilities in the New Era* also concluded that Japan's future capabilities should fulfil three roles: respond to diverse contingencies (including ballistic and cruise missile

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[20] Masahiro Matsumura, 'Quiet Changes in Japan's Defense', *Japan Times*, 22 July 2008.
[21] *Mid-Term Defense Program (FY2005-2009)*, Defense of Japan 2008, <http://www.mod.go.jp/e/d_act/d_policy/pdf/mid-term_defense_program.pdf> [Accessed 14 May 2011], p. 1.
[22] Ibid.
[23] 'National Defense Program Guidelines for Fiscal Year 2011 and Beyond', Ministry of Defense, Japan, 17 December 2010, <http://www.mod.go.jp/e/d_act/d_policy/pdf/guidelinesFY2011.pdf> [Accessed 14 May 2011], pp. 2-4.
[24] Ibid., p. 4.
[25] Ibid., p. 5.

attacks, and special operations forces, terrorist and cyber attacks), maintaining stability in the region surrounding Japan, and improving the global security environment.[26]

Japan currently deploys a comparatively small military force relative to the size of its population and economy, consisting of 248,000 personnel.[27] The imperative towards military transformation in order to deliver greater firepower relative to the comparatively small size of its armed forces is therefore clear. Japan has decided to adopt niche RMA capabilities that would contribute to its own limited military transformation. Thus, Japan plans to upgrade its substantial fleet of 202 F15J Eagle air superiority combat aircraft to counter China's expanded air defence and cruise-missile capabilities.[28] The air force also operates seventeen Airborne Early Warning (AEW) aircraft, consisting of a mix of Boeing E-767 and E2C Hawkeye, aimed at detecting and countering any infringement of Japan's air and sea-space.[29]

As a maritime state, Japan has also maintained significant and capable naval forces. Its navy currently deploys eighteen conventional attack submarines (Harushio, Oyushio and the new Soryu class), thirty-two destroyers and sixteen frigates. Six of the destroyers are equipped with the Aegis combat systems, which are used for air and cruise missile defense.[30] Japan has also begun procuring Hyuga-class helicopter carriers, the first of which was commissioned in 2009, with the second to arrive in 2011. At 13,500 tons, they can deploy eleven heavy-lift CH-47 Chinook helicopters and are the largest surface warships procured by Japan since the end of the Second World War. They can be converted into light aircraft carriers, in the future operating V/STOL (Vertical/Short Take-off and Landing) aircraft such as the US-developed Joint Strike Fighter.[31] These ships, in tandem with its sizeable navy and in the context of joint operations with its key ally, the United States, provide Japan with a long-range deployment capability. The navy has also enhanced its anti-submarine warfare capabilities, an important priority in view of China's expansion of its submarine fleet.

Despite these impressive capabilities, the fixation with technological solutions to improve tactical capabilities, and the legalistic nature of the domestic debate over Japan's defence suggests a lack of strategic clarity and thinking. In contrast, much smaller states such as Sweden and Singapore have been able to formulate well-articulated RMA doctrines, albeit modified to fit the small-state context, to guide their aspirations for revolutionary military transformation so as to be better prepared for future

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[26] As cited in *Defence of Japan 2010*, Ministry of Defense, pp. 166-7,
<http://www.mod.go.jp/e/publ/w_paper/2010.html> [Accessed 14 May 2011].
[27] *The Military Balance 2011* (London: International Institute of Strategic Studies, 2011), p. 245.
[28] *The Military Balance 2010* (London: International Institute of Strategic Studies, 2010), p. 382;
The Military Balance 2011, p. 247.
[29] *The Military Balance 2011,* p. 247.
[30] Ibid., p. 246.
[31] Hyuga Class Helicopter Carrier, *Military-Today*, <http://www.military-today.com/navy/hyuga_class.htm> [Accessed 28 January 2011].

warfare. In Japan, the absence of a vigorous debate over the RMA and the political uses for which it could be employed, and the undue constraints imposed by the post-1945 political context have led to the lack of long-term vision and strategic clarity regarding the future development of its armed forces. Moreover, the catastrophic impacts of the earthquake and tsunami in Japan in 2011 are also likely to set back Japan's military transformation, as the country focuses on the massive task of reconstruction.

South Korea's Response to the RMA

In contrast to Japan, the Republic of Korea (ROK, or South Korea) has enthusiastically embraced the RMA and the whole notion of military transformation with clearly articulated goals and strategies. This process of military transformation has been primarily driven by the existential threat from North Korea, which has consistently maintained larger armed forces than the ROK, engaged in numerous armed confrontations with it, and has also threatened on a number of occasions to attack the ROK. In this respect, the rapid industrialisation of South Korea in recent decades, accompanied by an IT revolution, has underpinned defence digitisation and the unfolding RMA in its armed forces. In turn, this has led to changes in weapons systems, C4ISR, organisational structures and military doctrine. Indeed, from the early 1990s, the ROK's armed forces has pursued the objective of building a network-centric warfare capability through the establishment of a Common Operating Picture, which would enable integrated operations.[32]

To implement military transformation along the lines of the RMA, the government established a National Defense Reform Committee (NDRC) in 1998. The NDRC decided that the long-term objective should be the building of a technologically advanced "elite" armed forces, which would come about through the reduction of the armed forces from its current size of around 690,000 to between 200,000 and 300,000 personnel at some future stage.[33] An NDRC RMA Group was formed in 1999, and the Defense White Paper 2000 championed the objective of network-centric warfare through defence digitisation, which it defined as:

> the process of transforming the overall defense structure into the information and knowledge-based network, using the latest technology consisting of computers and high-tech communications equipment.[34]

The goal of which is to support command and control, and bring about swift victory by providing real-time battlefield intelligence.

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[32] Conference Report, Bytes and Bullets: Impact of IT Revolution on War and Peace in Korea, Asia-Pacific Center for Security Studies, Hawaii, 8-10 October 2002, pp. 2, 6.
[33] 'Overview—South Korean Military Doctrine', *Globalsecurity.org*, <http://www.globalsecurity.org/military/world/rok/doctrine.htm> [Accessed 14 May 2011].
[34] As cited in Jin Ki Hong, 'Directions for Defense Digitization of the ROK Armed Forces in the 21st Century', in *Bytes and Bullets in Korea* (Hawaii: Asia-Pacific Center for Security Studies, 2002), p. 143.

This was followed by the release in 2005 of the Defense Reform Plan 2020, under which the ROK aimed to have a self-reliant and technologically-advanced military capability, as well as an advanced defence management system. The size of the armed forces would also be gradually reduced to around 500,000 by 2020, with reserve forces reduced from 3 million to 1.5 million. This plan was revised in 2008 following the Global Financial Crisis (GFC), with the troop reduction to be delayed until weapons systems modernisations and military restructuring had taken place.[35] The ultimate objective of the Defense Reform Plan 2020 was to meet the demands of future warfare as well as to ensure the ability to adjust to any change in the geo-political environments, which could occur, for instance, if the United States withdrew its forces from South Korea. Indeed, the US military presence and role in South Korea has been in the process of change, with greater roles assumed by South Korea in its defence.[36] In 2004, an agreement was reached on the return of a number of US bases to the ROK and the eventual relocation of all US forces to the south of the Han River by 2016. In addition, the number of US troops has been capped at 28,500, and wartime operational control will be transferred from the United States to the ROK in 2015, although US troops will remain in the country.[37] In addition, the armed forces might need to be called upon to defend sea-lines of communications, to pacify a reunified Korea, or to contribute to international peacekeeping operations.

The seriousness with which South Korea has embarked upon this process is demonstrated by the release of the ROK Army Vision 2010, the ROK Navy Vision 2020 and the ROK Air Force Vision 2025, which is to guide the military transformation of all three services.[38] Priority has been placed on the digitisation of the armed forces, aimed at gaining real-time battle-space awareness, as well as digital command and control, which would enable precision, high-tempo strikes.

A 2006 RAND study projected that the acquisition of air superiority combat aircraft, Airborne Warning and Control (AWAC) aircraft and air tankers under South Korea's defence reform would help the ROK's air force transition from a fighter force meant to support the United States to a more balanced force that would have a greater range of independent capabilities. Through the acquisition of major surface warfare vessels, including ships equipped with the Aegis combat systems that could counter theatre ballistic missiles and aircraft, the navy would transition from a coastal defence force to a blue-water navy. The army would suffer the greatest cut in manpower, reduced from 47 to 24 divisions. But it would be equipped with far more capable

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[35] 'Overview—South Korean Military Doctrine', *Globalsecurity.org*.
[36] *Participatory Government Defense Policy 2003* (Ministry of National Defense, Republic of Korea, 2003), p. 84.
[37] Background Note: South Korea, US Department of State,
<http://www.state.gov/r/pa/ei/bgn/2800.htm> [Accessed 14 April 2011].
[38] Conference Report, Bytes and Bullets: Impact of IT Revolution on War and Peace in Korea, p. 8.

weapons systems such as the K1A1 Main Battle Tank, multiple-rocket launchers and UAVs (Unmanned Aerial Vehicles).[39]

Crucial to the transformation of the ROK forces is the massive investment in C4ISR and other battle-management assets essential for network-centric warfare. Significantly, the Defense Reform Plan 2020 also mandated the procurement of theatre operational command facilities, military communication satellites, tactical information communication networks, the Joint Tactical Data Link System, and the Korea Joint Command and Control System. As a 2008 study of the RMA's impact on defence industry in South Korea concluded, the "RMA in South Korea is a relatively recent phenomenon, deeply influenced by the diffusion of the American RMA concept and practice", although this process has been limited compared to the United States.[40]

The process of military transformation suffered a setback in 2010 with budget cuts affecting the acquisition of mine-sweeping helicopters, the XK-2 Next-Generation Main Battle Tank, and a scaling back of efforts to indigenously develop the next-generation KF-X combat fighter, the KAH attack helicopter and a military satellite communications system. Despite the promise of military transformation substituting quality for quantity, the ROK continues to deploy substantial legacy forces in 2010, with 655,000 military personnel as well as large numbers of major weapons systems, such as 2514 Main Battle Tanks (including 1534 of its locally-built K1 Main Battle Tank), 2880 armoured personnel carriers (including 1700 of its locally-built Korean Infantry Fighting Vehicles) and over 11,000 pieces of artillery (including multiple-rocket launchers).[41] Maintaining such a large legacy force requires substantial manpower and other resources, jeopardising the objective of eventually reducing the size of the armed forces to less than half of what it is today, which would make possible the abolition of universal male conscription.

In order to counter North Korea's ballistic missile capabilities, the ROK has also procured 48 Patriot Surface-to-Air Missile (SAM) batteries which are capable of destroying enemy aircraft and ballistic missiles.[42] To make up for its smaller ground forces compared to North Korea's, the ROK has made efforts to ensure air superiority and the ability to conduct airborne surveillance and reconnaissance, deploying 59 new US-made F-15 Eagle air superiority combat aircraft and UAVs, with 4 Boeing 737-700 AWAC aircraft on order.[43]

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[39] Bruce W. Bennett, *A Brief Analysis of the Republic of Korea's Defense Reform Plan* (Santa Monica: RAND, 2006), pp. 4-7.
[40] Chung-in Moon and Jin-Young Lee, 'The Revolution in Military Affairs and the Defence Industry in South Korea', *Security Challenges*, vol. 4, no. 4 (Summer 2008), p. 123,
[41] *The Military Balance 2011*, pp. 252-3.
[42] Ibid., p. 252.
[43] Ibid., p. 253; Gary Parsons, 'Boeing Delivers AWACs to South Korea', *key.Aero*, 9 February 2010, <http://www.key.aero/view_news.asp?ID=1551&thisSection=military> [Accessed 14 May 2011].

The ROK has also paid attention to securing the country's maritime access, deploying 23 submarines, including new submarines fitted with long-endurance Air-Independent Propulsion (AIP) systems, as well as 47 destroyers, frigates and corvettes, including a new class of destroyers equipped with the Aegis combat system capable of air and cruise missile defence. Significantly, the navy has also acquired an amphibious warfare vessel, the Dokdo, which can transport some 700 troops.[44] The Dokdo, however, is also capable of being adapted into a light aircraft carrier to deploy V/STOL aircraft such as the newly developed Joint Strike Fighter (JSF) combat aircraft at some future stage. The navy will acquire three of these very capable vessels.[45]

South Korea's RMA has been driven by the existential threat from North Korea and the uncertain regional security environment. However, despite its enthusiastic embrace of the RMA, there has been an absence of thinking on countering weapons of mass destruction, or dealing with asymmetric warfare. In 2010, the sinking of a South Korean corvette, allegedly as a result of a midget submarine attack from North Korea, and the North's open provocation in shelling an island in the South, led to South Korean casualties.[46] More alarming, the incidents demonstrated not just the failure of deterrence but impotence on the part of the South despite its much-vaunted pursuit of the RMA. All-out conflict with the North would expose the South to weapons of mass destruction, including the possible use of nuclear weapons by the North, the probable destruction of the capital, Seoul, from massive artillery attack from the North, and extensive attacks by the North's huge special forces. The only response the South could muster to North Korea's provocations was to conduct joint exercises with the United States to bolster deterrence, which only served to demonstrate the centrality of the US security alliance to South Korea's security.[47]

Australia and the RMA

Australia has embraced military transformation based on the RMA as its vision for the future. The government's enthusiasm was demonstrated by the publication of Australia's Strategic Policy 1997, which explicitly embraced the RMA. According to the document:

> not only will new technology provide military personnel with an expansive
> breadth and depth of information about the battlefield, but sophisticated

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[44] *The Military Balance 2011*, pp. 252-3.
[45] 'Dokdo Class Amphibious Assault Ship', *Military-Today.com*, <http://www.military-today.com/navy/dokdo_class.htm> [Accessed 14 May 2011].
[46] Barbara Starr, 'US Official: N. Korea Torpedo Likely Sunk S. Korean Warship', *CNN.com*, 26 April 2010, <http://news.blogs.cnn.com/2010/04/26/u-s-official-n-korea-torpedo-likely-sunk-s-korean-warship/> [Accessed 15 May 2011]. See also Jack Kim and Lee Jae-Won, 'North Korea Shells South in Fiercest Attack in Decades', *Reuters*, 23 November 2010, <http://www.reuters.com/article/2010/11/23/us-korea-north-artillery-idUSTRE6AM0YS20101123> [Accessed 15 May 2011].
[47] 'US Sends Aircraft Carrier for Joint Exercises with South Korea After Deadly Attack', *Foxnews.com*, 24 November 2010, <http://www.foxnews.com/politics/2010/11/23/obama-s-korea-stage-military-exercises/#

> strike weapons will give advanced forces the capability to destroy targets with an unparalleled degree of precision and effectiveness ... our ability to use and manage information technology will be one of the areas where we can maintain and aspire to continuing excellence.[48]

The document also spoke of the need for a 'Knowledge Edge', which had three advantages. Firstly, making transparent the huge territory and maritime approaches to Australia would confer great strategic depth. Secondly, the small size of Australia's defence forces relative to the size of the area they must defend means that information technology would be vital in command, positioning and targeting so that these forces could be used to maximum effect. Finally, Australia possesses a strong national base in information technology, including access to the most advanced applications of IT to warfare through its alliance relationship with the United States.[49] The document also envisioned the enhancement to surveillance of Australia's maritime approaches through an integrated system that could provide real-time coverage of air and sea approaches. This would entail the networking of space-based surveillance, long-range UAVs, over-the-horizon radar (OTHR) and AWACs to provide real-time battle-space awareness.[50]

This ambitious vision was then followed by the establishment of an Office of the Revolution in Military Affairs in 1999.[51] This laid the basis for the defence review in 2000, which noted that the information technology-based RMA would be vital to Australia given the dramatic arms modernisation throughout the Asia-Pacific, which meant that Australia's military edge was being eroded.[52] In addition, the bloc obsolescence of major weapons systems in the Australian armed forces meant that information capabilities would be potentially cost-effective as well as crucial in maintaining Australia's military edge.[53]

In 2004, the Office of the Revolution in Military Affairs was replaced by the Network Centric Warfare Program Office. This was followed by the publication of the *NCW Roadmap, 2007*, which asserted that:

> success in an NCW context is achieved by effectively linking Command and Control, Sensor and Engagement systems via a network, to facilitate situational awareness, collaboration and offensive potential.[54]

This document was no illusionary wish-list, as it built upon indigenous Australian efforts dating from the early 1990s, such as the Jindalee

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[48] *Australia's Strategic Policy* (Canberra: Department of Defence, 1997), <http://www.minister.defence.gov.au/sr97/SR97.pdf> [Accessed 14 May 2011], p. 55.
[49] Ibid., pp. 56-7.
[50] Ibid., p. 60.
[51] Minister for Defence, *Achievements Under the Howard Government*, Department of Defence, 9 May 2000, <http://www.minister.defence.gov.au/Mooretpl.cfm?CurrentId=237> [Accessed 15 May 2011].
[52] Department of Defence, *Defence 2000: Our Future Defence Force* (Canberra: Commonwealth of Australia, 2000), pp. 24-6.
[53] Ibid., pp. 89-97.
[54] Department of Defence, *NCW Roadmap, 2007* (Canberra: Commonwealth of Australia, 2007), p. 5.

Operational Radar Network (JORN), the High Frequency Modernisation Project (HFMOD), the Military Satellite Communications project, the Australian Tactical Automated Command and Control System, and the Battlefield Command and Support System.[55] In addition, Australia plans to network the entire naval fleet and to carry out networked enabled operations in the aerospace domain by 2014. This would be achieved by acquiring air warfare destroyers, AWACs and UAVs, and upgrading P3C Orion maritime patrol aircraft, and upgrading the Jindalee radar system.[56]

In 2009, the Rudd government published a Defence White Paper which advocated significant improvements in defence capabilities over the next two decades on grounds that the strategic outlook is uncertain, and that tensions between major powers could lead to confrontation. Significantly, the document cited China and stated that:

> the pace, scope and structure of China's military modernisation have the potential to give its neighbours cause for concern if not carefully explained ... if it does not, there is likely to be a question in the minds of regional states about the long-term strategic purpose of its force development plans, particularly as the modernisation appears potentially to be beyond the scope of what would be required for a conflict over Taiwan.[57]

The document also spoke of the need to develop information capabilities. Noting the need to integrate information from its various information and surveillance assets, it pointed out the need, as a matter of priority, to develop a defence-wide information architecture, as well as to develop intelligence, surveillance and reconnaissance linkages with its principal ally, the United States.[58] More significantly, it asserted that Australia needed to not just defend itself any direct attack, but must also play a role in securing its immediate neighbourhood, as well as the wider Asia-Pacific region, particularly Southeast Asia.[59] To enable it to do this properly, Australia would acquire twelve new submarines, land-attack cruise missiles, eight new frigates, a new class of twenty offshore combat vessels, a large strategic amphibious vessel, new long-range maritime patrol aircraft, up to 100 Joint Strike Fighter combat aircraft, new armoured fighting vehicles, tactical UAVs, HALE (high altitude, long-endurance) UAVs, CH47 heavy-lift helicopters, improvements in ISR (intelligence, surveillance and reconnaissance) capabilities, and the establishment of a cyber security operations centre.[60]

For Australia, the imperative of military transformation is clear, in view of the small size of the armed forces. In 2010, Australia's defence forces consisted of just under 57,000 personnel.[61] However, a major problem with pursuing

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[55] Peter Hall and Robert Wylie, 'The Revolution in Military Affairs and Australia's Defence Industry Base, 1996-2006', *Security Challenges*, vol. 4, no. 4 (Summer 2008), p. 65.
[56] Ibid., pp. 66-7.
[57] Department of Defence, *Defending Australia in the Asia-Pacific Century: Force 2030* (Canberra, Commonwealth of Australia, 2009), p. 34.
[58] Ibid., pp. 81-2.
[59] Ibid., pp. 41-3.
[60] Ibid., pp. 70-86.
[61] *The Military Balance 2011*, p. 223.

the RMA is the huge cost involved, which is exacerbated by the bloc obsolescence of many weapons systems in all three services. For instance, while the army has acquired fifty-nine new M1A1 Abrams MBTs, it continues to deploy around 600 of the venerable M-113A1 armoured personnel carriers.[62] In 2010, the air force deployed seventy-one F-18A/B Hornet combat aircraft and twenty-four F-18F Super Hornet combat aircraft, with the F-111 bomber finally retired after thirty-seven years of service.[63] The bloc obsolescence of the F-111 and F-18A/B combat aircraft, however, requires the very expensive acquisition of a replacement fleet of combat aircraft. The acquisition of six B-737 Wedgetail AWAC aircraft is an integral component of military transformation, but this has been at a substantial cost of A$3.45 billion.[64] Given the costs involved, it is therefore unclear whether the ambitious procurement plan contained in the Defence White Paper of 2009 could be funded.

Finally, another problem is the political implication of the RMA—by improving interoperability with the United States through the acquisition of US-made weapons systems, Australia is in effect affirming its strategic relationship with the United States. This exposes Australia to some difficult choices should strategic rivalry between China and the United States result in open conflict. After all, Australia's national interests are not always congruent with the United States. In fact, China is vital to Australia's economic future due to its voracious demand for Australian commodities and energy. In addition, both Australia and China have not been rivals and are not competing for influence in East Asia, and Australia does not fear an external attack from China on account of its huge maritime buffer.[65]

Taiwan and the RMA

Taiwan is a natural candidate for the RMA, given its strong IT industry and an advanced IT infrastructure. Although the armed forces have embraced the RMA concept as the basis for its own military transformation, significant political constraints to implementation remain. Taiwan's international political isolation, difficulty in accessing the latest military technology in the global arms market due to pressure from China, and the lack of a domestic political consensus on defence have been major barriers to an RMA in Taiwan.

Taiwan's RMA is largely predicated on Chinese threat scenarios given that China is its main security referent on account of its desire to reunify Taiwan with the mainland.[66] China's military modernisation in recent years has focused on building capabilities to coerce Taiwan into submission if

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[62] Ibid., p. 224.
[63] Ibid., p. 225.
[64] 'RAAF's Wedgetail Future on the Line', *The Age*, 16 April 2009.
[65] Jonathan Holslag, *Trapped Giant: China's Military Rise* (London: International Institute for Strategic Studies, 2010), p.96.
[66] Richard A. Bitzinger, 'Come the Revolution: Transforming the Asia-Pacific's Militaries', *Naval War College Review*, vol. 58, no. 4 (Autumn 2005), p. 48.

necessary.[67] This could happen if, for instance, Taiwan pushed for open independence. China's response could take the form of using its considerable cruise and ballistic missile forces to render inoperable Taiwan's air bases and runways, then establishing air superiority over the Taiwan Straits, enabling it to continue military operations against Taiwan with relative impunity.[68] In addition, China's military is also building the capacity to prevent US and allied forces from intervening effectively in any Taiwan Strait crisis. China's anti-access strategy is focused on sea-denial capabilities to prevent the effective deployment of US naval and other forces in the maritime approaches to China in the Yellow, East China and South China Seas.

According to one study:

> China is on the verge of achieving several paradigm-shifting breakthroughs: anti-ship ballistic missiles, or ASBMs; streaming cruise missile attacks; precise and reliable indigenous satellite navigation, high quality real time satellite imagery, and target-locating data; and anti-satellite (ASAT) and other space-related weapons, which might be used to disrupt U.S. access to information, command and control, and ability to remotely control weapons.[69]

In particular, China is building an anti-ship ballistic missile specifically designed to target US aircraft carriers. These would dramatically improve China's anti-access capabilities by enabling it to threaten surface and air assets that enter China's contested maritime periphery in the event of conflict.[70]

Taiwan's hitherto defensive, land-centric strategy of defending the island against an attack or invasion by China began to change with the interest of the Democratic Progressive Party (DPP) in future warfare. The DPP's Defence White Paper of 1999 advocated that Taiwan should develop C4ISR capabilities to achieve information superiority over the Taiwan Straits, and asserted that the navy and air force should receive priority in this transformation.[71]

Thus, when President Chen Shui-bian of the DPP came to power in 2000 Taiwan's military strategy was adjusted significantly. The Defence White Paper of the same year declared that Taiwan would adopt the RMA. The document also recommended to build a defence information infrastructure, a

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[67] Dan Blumenthal, 'Sino-US Competition and US Security: How Do We Assess the Military Balance?', *NBR Analysis*, December 2010, National Bureau of Asian Research, p. 17.
[68] See David A. Shlapak et al., *A Question of Balance: Political Context and Military Aspects of the China-Taiwan Dispute* (Washington: RAND, 2009).
[69] Andrew S. Erickson, 'China's Evolving Anti-Access Approach: Where's the Nearest (US) Carrier?', *China Brief*, vol. 10, issue 18, 10 September 2010, <http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=36810> [Accessed 15 May 2011].
[70] 'China Developing Anti-Ship Ballistic Missiles', *Defense News*, 14 January 2008, <http://www.defensenews.com/story.php?i=3307277> [Accessed 14 May 2011].
[71] James Mulvenon, 'Taiwan and the RMA', in Emily O. Goldman and Thomas G. Mahnken (eds.), *The Information Revolution in Military Affairs in Asia* (New York: Palgrave Macmillan, 2004), p. 147.

C4ISR infrastructure, and to develop offensive Information Warfare (IW) capabilities. The priorities for Taiwan's military research and development would be on electronic battle, air and sea superiority, and anti-landing capabilities.[72]

The DPP promoted a strategy based on "active countermeasures", in effect, a strategy of offensive and pre-emptive offshore military operations. Proponents of this strategy argued that territorial defence would not be suitable as it would destroy Taiwan's urban infrastructure and cities, and would cause enormous civilian casualties. Taiwan should therefore conduct offensive operations to disrupt the enemy's amphibious forces, instead of waiting for them to land and then fighting them on Taiwanese soil. Taiwan should also attack the adversary's airfields, radar sites and missile sites.[73] The key characteristics of Taiwan's RMA would be the improvement in C4ISR and the restructuring of the armed forces into a compact, hi-tech force. The latter would entail the reduction in the size of the armed forces, eventually to become an all-volunteer force, and the acquisition of new weapons systems.

Chen Shui-bian's electoral victory in Taiwan coincided with the election of George W. Bush as President of the United States. Although Bush continued to adhere to the 'One China' policy, his administration authorised a series of arms sales that would help improve Taiwan's ability to defend itself. US arms sales have included four reconditioned Kidd-class destroyers and numerous types of tactical missiles, such as Harpoon anti-ship missiles; AIM120, AMRAAM and Sidewinder air-to-air missiles; Maverick air-to-ground missiles; and Patriot anti-aircraft/ anti-ballistic missiles. The United States also sold six E2C AEW aircraft to Taiwan to improve its early warning capabilities.[74]

Taiwan also launched a US$2.3 billion program in 2003 to improve its C4ISR capabilities.[75] Taiwan's drive under the DPP to build an offensive RMA capability was supported by its world-class IT industry and an impressive indigenous defence industry which has produced a number of weapons systems which have made Taiwan more self-reliant. These include Hsuing-feng cruise missiles, Tien-kung (Skybow) anti-aircraft missiles, Tien-chen (Skysword) air-to-air missiles, the Ching Kuo combat aircraft, the Tzu-Chung jet trainer, multiple rocket launchers and other weapons systems.[76]

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[72] Ibid., pp. 148, 151.
[73] York W. Chen, 'The Shifting Balance of Air Superiority at the Taiwan Strait and its Implications on Taiwan's Defense Planning', in Martin Edmonds and Michael Tsai, *Taiwan's Security and Air Power: Taiwan's Defense Against the Air Threat from Mainland China* (London: Routledge, 2004).
[74] *The Military Balance 2010*, pp. 427-9.
[75] Christopher Griffin, 'Boom or Bust: The Strengths and Weaknesses of Taiwan's Defense Strategy Emerge', *Armed Forces Journal*, January 2008, <http://www.armedforcesjournal.com/2008/01/3106365> [Accessed 15 May 2011].
[76] *The Military Balance 2010*, pp. 427-9.

However, Taiwan faces serious obstacles to its military transformation. Taiwan's defence industry cannot produce the full suite of weapons and electronic systems required. Taiwan therefore needs access to military technologies. Yet, because of its international political isolation it heavily depends on the United States both in terms of its indigenous production and its off-the-shelve acquisition. Arms purchases from the United States however, are hostage to political factors such as China's vociferous opposition, the reluctance of the United States to sell weapons and technology that could be used for offensive purposes and thus raise tensions in the Taiwan Straits, and the opposition of the other major political party in Taiwan, the Kuomintang (KMT). Indeed, it was the KMT's control of the Legislative Yuan or parliament during the presidency of Chen Shui-bian from 2000 to 2008 that stymied the attempt to purchase weapons systems such as F16C/D combat aircraft, conventional submarines and P3C anti-submarine warfare aircraft which would have supported the offensive RMA strategy pursued by the DPP. The KMT politicised the issue and prevented crucial purchases of key weapons systems under the special budget proposed by the DPP, except for the obviously defensive PAC3 Patriot missile systems needed to counter China's ballistic and cruise missile capabilities.[77]

Another major problem has been the desire to reduce and eventually phase out the unpopular universal male conscription of 2-3 years, a promise made by Ma Ying-jeou of the KMT who won the presidential elections in 2008. However, Taiwan's defence capabilities can only be maintained if this is offset by technological improvements. An analysis of Taiwan's capabilities in 2010 does not provide confidence as to Taiwan's ability to thwart an offensive by China. Its armed forces consist of 290,000 active troops (including conscripts), with its land forces deploying just over 1800 ageing tanks (such as the M60A3) and around 1200 ageing armoured personnel carriers (mostly M-113). The navy has four ageing Kidd-class destroyers, and twenty-two frigates, four outdated submarines, and outdated Grumman S-2 Tracker anti-submarine warfare aircraft. The air force has 477 combat aircraft consisting of outdated Mirage 2000, F5E Tiger and its indigenously-developed F16A/B variant, the Ching Kuo.[78]

This compares unfavourably with China's increasingly modern armed forces, including considerable cruise and ballistic missile capabilities, some seventy-eight destroyers and frigates in its navy, seventy-one submarines (including twelve Russian Kilo-class), eighty-seven landing ships (including a Landing Platform Dock), and 1687 combat aircraft, including modern J10 (a Chinese copy of the aborted Israeli Lavi fighter), the J11 (a Chinese copy of the Su-27 air superiority combat aircraft) and the modern Russian Su30MKK combat aircraft.[79] In 2011, China also started test flights of its J20 stealth

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[77] Griffin, 'Boom or Bust'.
[78] *The Military Balance 2011*, pp. 272-4.
[79] Ibid., pp. 230-4.

fighter.[80]   In tandem with its emergence as a global power, China has also declared its intention to build aircraft carriers.[81]

There is thus growing concern in the United States that the balance of military power in the Taiwan Straits is changing. This is due to the stalled defence reform process in Taiwan as a result of the political infighting, as well as the startling complacency regarding China's growing threat to Taiwan which appears to exist amongst many in the elite. This development would have the effect of upsetting the status quo and potentially encouraging a rising and increasingly assertive China to pursue more robust and coercive policies towards Taiwan in the future. This would raise regional tensions and posing serious strategic choices for the United States and its allies and partners in East Asia, namely, Japan, South Korea, Australia and Singapore, should conflict break out.

Singapore and the RMA

Singapore is well-placed to exploit the RMA and to undertake military transformation given its sustained economic growth, well-educated workforce, excellent education system, robust IT industry, relatively sophisticated defence industry, and access to Western military technology through its web of security relationships with the United States, Great Britain, Australia, Israel and Sweden. Key factors which have provided the impetus towards military transformation are the city-state's small geographic and population size, lack of strategic depth, heavy dependence on seaborne trade, and external reliance on everything from markets to food, water and energy. They have led to a strong sense of vulnerability, which has been exacerbated by the sometimes tense relationship with its much larger Muslim neighbours, namely, Malaysia and Indonesia.

Singapore thus closely followed the process of military transformation centred on the RMA in the United States. The government embraced the RMA as it promised to help it overcome its strategic weaknesses. In 2000, the Ministry of Defence publication *Defending Singapore in the Twenty-First Century* lauded the RMA and announced the intention to exploit the IT-led RMA to achieve battlefield superiority.[82]   In 2003, the armed forces established a Future Systems Directorate and a Center for Military Experimentation to guide the organisational and doctrinal developments required for the RMA.

Singapore also developed the doctrine of Integrated Knowledge-based Command and Control (IKC2).   The objective of IKC2 is the superior collection and organisation of knowledge that can provide dominant situation

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[80] Bradley Perrett, 'Chinese J-20 Logs First Flight', *Aviation Week*, 11 January 2011, <http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/awx/2011/01/11/awx_01_11_2011_p0-281508.xml> [Accessed 15 May 2011].

[81] 'China Reveals Aircraft Carrier Plans', *FT.com*, 17 December 2010, <http://www.ft.com/cms/s/0/fa7f5e6a-09cc-11e0-8b29-00144feabdc0.html#axzz1ClE8GcZb> [Accessed 15 May 2011].

[82] *Defending Singapore in the 21st Century* (Singapore: Ministry of Defence, 2000), p.10.

awareness and achieve more effective command and control of forces as well as the precise application of force.[83] The Singapore Armed Forces (SAF) thus understands that the RMA requires new weapons and information systems, together with doctrinal and organisational developments, to achieve the desired force multiplier effect.

However, it was recognised that Singapore needed an armed forces that could do more than just defend the country against external attack. In addition, the emergence of non-traditional threats such as terrorism, natural disasters and complex emergencies required a greater range of capabilities. Thus, Singapore aims to develop a 'Third Generation SAF' which "will possess the capabilities to fight decisively in war and respond flexibly in peacetime for counter-terrorism, peacekeeping and humanitarian aid."[84] The new armed forces would also be technologically-advanced and based on state-of-the-art technology in the areas of precision strike, advanced networks and unmanned systems.[85] The key to the 'Third Generation SAF' is the networking of sensors and firepower across all military branches.[86]

Even as Singapore embraced the RMA, however, potential pitfalls have been recognised. As a senior civil servant warned that:

> the SAF must refrain from jumping blindly on the RMA bandwagon … the SAF must be conscious of its security environment, keeping an eye on trends and regularly reviewing its position.[87]

Further, the SAF must be flexible and able to provide the political leadership with various options in times of crisis.[88]

Singapore possesses a number of advantages which improves the probability of successfully carrying out its military transformation. The continuous tenure of the ruling People's Action Party since 1959 has ensured both continuity and consistency in Singapore's defence development. This development has been underpinned by Singapore's dramatic economic growth over the past five decades, as well as the government's policy of attracting the best and brightest talent in the country to join the SAF. Established in the late 1960s with the assistance of Israel, the SAF has consistently received defence allocations equivalent to 5-6

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[83] Jacqueline Lee et al., *Realising Integrated Knowledge-Based Command and Control: Transforming the SAF*, Pointer Monograph no. 2 (Singapore: Pointer/ Joint Communications and Information Systems Department, Ministry of Defence, 2003), <http://www.mindef.gov.sg/safti/pointer/back/monograp/mono_ikc2/ikc2_all.pdf> [Accessed 15 May 2011].
[84] 'About the Third Generation SAF', Ministry of Defence, Singapore, 24 April 2010, <http://www.mindef.gov.sg/imindef/mindef_websites/topics/3g/what.html> [Accessed 12 November 2010].
[85] Ibid.
[86] *The Military Balance 2010,* p. 382.
[87] Andrew Tan, 'Military Transformation in a Changing Security Landscape', *Pointer* (Journal of the Singapore Armed Forces), vol. 29, no. 3 (July-September 2003), p. 31. *Author's Note: The author of the Pointer article, whilst sharing the same name, is not related to the author of this article.*
[88] Ibid., p. 33.

percent of Singapore's GNP. Singapore has also been able to maintain universal male conscription and sustain large reservist military forces, something democratically-elected governments in Taiwan and South Korea are finding politically difficult to maintain, and in Japan and Australia, politically impossible. Singapore has also invested heavily in defence industry as well as pursuing the necessary weapons systems to enable the SAF to keep its military edge in a region that has in the past been unstable.

More significantly, Singapore's close strategic, political, military and economic relationship with the United States has deepened after the end of the Cold War as the country searches for a great power protector in an international system that has been in a state of flux. Indeed, Singapore has been a leading advocate of a greater security role for the United States in the region and has backed this strategic policy by building a naval base at Changi that could accommodate US aircraft carriers. Its close relationship with the United States has provided access the latest military technology which is necessary for its military transformation and for building closer interoperability with US forces in the Pacific.

Singapore's defence industries have benefitted from the state's support, the technological sophistication of its economy, and the many collaborative linkages it has developed with other countries over the years. Its defence industries have produced a range of weapons and other systems to support the development of the Third Generation SAF. A range of C4ISR technologies are being developed, as well as computerised war gaming and simulation, information security systems and offensive information warfare capabilities. The SAF has also focused on developing a range of UAVs, from small tactical ones to a reported battle management LALEE (Low-Altitude Long Enduring Endurance) drone the size of a Boeing 737.[89] In addition, it has developed its own Battlefield Management System which helps network the SAF's land forces, as well as a range of artillery, including 155mm 52-calibre self-propelled howitzers, and a range of armoured vehicles.[90]

Singapore is developing its own space-based satellite capabilities, reportedly funding the advanced development of Israel's Ofeq satellites which it would eventually operate.[91] In 2010, the Israeli press speculated that Singapore had funded the development of the new Iron Dome anti-rocket system developed by Israel which it would soon deploy to defend its military installations against rocket and artillery attack.[92] Desmond Ball, in evaluating Singapore's SIGINT (signals intelligence) capabilities, concluded

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[89] Tim Huxley, 'Singapore and the Revolution in Military Affairs', in Emily O. Goldman and Thomas G. Mahnken (eds.), *The Information Revolution in Military Affairs in Asia* (New York: Palgrave Macmillan, 2004), p. 193.
[90] *The Military Balance 2010*, pp. 424-7.
[91] Huxley, 'Singapore and the Revolution in Military Affairs', p. 197.
[92] Yossi Melman, 'Was Iron Dome Defense System Actually Built for Singapore?', *Haaretz.com*, 25 March 2010, <http://www.haaretz.com/print-edition/features/was-iron-dome-defense-system-actually-built-for-singapore-1.266629> [Accessed 15 May 2011].

that Singapore had some of the most advanced communications intelligence (COMINT) capabilities in the world and the most advanced electronic warfare (EW) capability in Southeast Asia.[93]

Singapore commitment to military transformation has meant that it is able to deploy highly capable conventional armed forces. In 2010, the army possessed substantial assets such as ninety-six Leopard 2A4 MBTs and about 1600 armoured personnel carriers (including locally-developed Bionix, Terrex and Bronco), and a very modern artillery capability, including the US-made HIMARS precision-rocket launching system.[94]

Integral to military transformation has also been the acquisition of advanced surveillance platforms, such as four Gulfstream 550 jets equipped with the Elta conformal AEW system which went into service in Israel in 2008.[95] In addition, Singapore currently operates a comparatively large UAV fleet, consisting of about forty Israeli-made Hermes 450 and Searcher UAVs, and is actively developing its own UAVs. Indeed, the air force has been the cutting edge in Singapore's military transformation with twenty-four F15SG Eagle combat aircraft being procured and plans to acquire up to 100 Joint Strike Fighters in the coming decade to replace its current fleet of F16C/D Falcon combat aircraft.[96] The navy is also seeing its own military transformation with the acquisition of six Lafayette stealth frigates equipped with Herakles phased array radar and four modern amphibious warfare vessels.[97] Singapore has made the development of submarine forces a key priority with its acquisition of a submarine rescue capability and speculation that Singapore is planning to procure the new A26 next-generation Swedish submarine in the coming decade to replace its current fleet of refurbished Challenger and Archer-class submarines.[98]

Singapore's approach to the RMA has been highly supportive and its implementation competent and well-resourced. However, the same concerns which for instance affect South Korea, should be also relevant for the SAF. This includes the question how well an RMA-capable armed forces can cope with asymmetric warfare strategies. More significantly, the pursuit of an RMA is drawing Singapore into a long-term strategic alliance relationship with the United States. This has political implications in that it will constrain the room for flexibility in the face of changes in the geostrategic

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[93] Unpublished paper, as cited in Huxley, 'Singapore and the Revolution in Military Affairs', p. 198.
[94] *The Military Balance 2011*, p. 269.
[95] Siva Govindasamy, 'Singapore 2010: RSAF Displays G550 AEW Platform for the First Time', *Flight International,* 31 January 2010, <http://www.flightglobal.com/articles/2010/01/31/337833/singapore-2010-rsaf-displays-g550-aew-platform-for-first-time.html> [Accessed 15 May 2011].
[96] *The Military Balance 2011*, p. 270; Wendell Minnick, 'Singapore Interested in F-35?', *Defense News*, 11 July 2010, <http://www.defensenews.com/story.php?i=3620542> [Accessed 15 May 2011].
[97] *The Military Balance 2011*, p. 269.
[98] Stuart Slade, 'Swedish A26 Submarine Moves Ahead', *Forecast International*, 24 November 2009, <http://www.forecastinternational.com/abstract.cfm?recno=166833> [Accessed 15 May 2011].

environment. For instance, Singapore will find itself with little room to manoeuvre should China-US strategic rivalry result in greater tension and even conflict.

Problems in Military Transformation in East Asia

The analysis suggests that America's key allies in East Asia have felt compelled to respond to the RMA. The results have however, varied. Japan, with the world's third biggest economy, would have been expected to embrace military transformation as a means of maintaining its military edge, in the face of the erratic behaviour of a nuclear-armed North Korea and an increasingly assertive China aroused by anti-Japanese nationalism. However, constitutional and political constraints, lack of strategic clarity and thinking, as well as a startling degree of complacency, have meant that Japan's response to the RMA has been rather slow and incomplete, leading to a failure to exploit greater options and flexibility in defending Japan's strategic interests. The situation in Taiwan is also similar, due to domestic political reasons and its international isolation. The most enthusiastic adoption of the RMA, accompanied by its clear exposition, has been in South Korea, Australia and Singapore.

A key problem of the RMA in East Asia is that it is divorced from the political and strategic context, focusing only on the military transformation of the armed forces so that they could prevail in conventional war. For instance, Japan has not displayed any clear understanding of the political objectives for which its armed forces could be employed, which has led to its increasingly disadvantageous strategic position vis-à-vis China, which has a much better understanding of what military power can or should achieve in terms of political goals. Hence, China's decision to soon deploy aircraft carriers is meant not so much for warfighting as for projecting China's power and increasing its influence in the region. By reducing the RMA debate into whether Japan can or cannot legally employ "offensive" weapons, Japan has signalled to the rest of Asia that it will not be able to play the role of a great power balancer against China. In the case of South Korea, the ultimate objectives of the RMA have not been thought through, given the surprises that the North sprung on the South in 2010 and the South's obvious impotence in the face of the North's provocations.

More seriously, the RMA in South Korea has not considered the more obvious problem of the North's tremendous anti-RMA capabilities, which lie in the North's massive special forces, its huge artillery capabilities, and its ability to employ weapons of mass destruction including nuclear weapons. In Australia, the RMA moves it closer to the United States without consideration for the proper long-term political and economic interests of the country, which are not the same as the United States'. The impending acquisition of Joint Strike Fighters by Australia and Singapore will have important strategic ramifications given the United States' refusal to share software source codes for the combat aircraft, with the result that a decision to procure them will lock these countries into a long-term strategic

relationship with the United States, thus constraining their room for political flexibility in the future.

Another problem with the RMA in East Asia is that it may not have been accompanied by a clear appreciation of its limitations, for instance, in dealing with weapons of mass destruction, or low-intensity conflict such as insurgencies, as Iraq and Afghanistan are presently demonstrating. Amidst all the hype regarding an RMA-type transformation, there is real danger that the enthusiasm over technological fixes could lead to complacency regarding its limitations, as well as erode the traditional military values centred around the human will, initiative and military judgement. If anything, the insurgencies in Iraq and Afghanistan have reinforced these traditional military values, reminding of the basic continuities underlying warfare despite technological innovations.

In addition, the RMA has spurred counter-RMA strategies, such as those displayed by North Korea. China has also been developing anti-access capabilities to counter US forces in the West Pacific, in tandem with efforts at developing conventional force projection capabilities in support of foreign and strategic objectives, demonstrating the primacy of welding proper strategy, as opposed to developing the means without proper consideration as to what they are to be used to achieve.

Finally, the very visible arms build up that has been part of the RMA (and counter-RMA strategies) in East Asia has been a key factor in the regional arms race, as new and better military capabilities are being introduced. In the absence of an overall regional framework centred on multilateral institutions, regimes, norms, confidence building measures and transparency, there is today the real danger of a regional arms race, as Desmond Ball has warned. This could lead to heightened tensions, misperceptions, security dilemmas, conflict spirals and eventually lead to open war between states in the region. In short, adopting the RMA is not a panacea. There is real need for the countries involved to carefully understand its potential and limitations, and to relate what are essentially military means to overall political objectives and strategic frameworks.

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