



USS Kitty Hawk (Lee McCaskill)

Australia and the Quest for the Knowledge Edge

By MICHAEL EVANS

Australian defense planners confront the painful reality that while strategic environments may change quickly, military force structures cannot. They face what former Defence Minister John Moore described as a “sea of instability,” stemming from an unanticipated upsurge of insecurity in the Asia-Pacific region, including a fragile post-Suharto Indonesia, a mercenary outbreak in Papua New Guinea, deployment of Australian

forces to help pacify East Timor, and the “Africanization” of local politics in South Pacific islands such as Bougainville, Fiji, and the Solomons. To complicate matters, Australia inherited an added strategic burden in 2001 arising from New Zealand’s decision to abandon even a niche high-technology warfighting capability. Moreover, the demands of global modernization and a long decline in defense spending have presented Canberra with the complex task of crafting a more flexible and multidimensional strategy.

Planners thus see benefits from acquiring selected information technologies arising from the American-led revolution in military affairs (RMA). For many strategists, such technology offers an

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U.S. Navy (Andrew Meyers)

HMAS Brisbane plying Australian waters.

important means of redesigning defense planning. Issues of capability, force structure, and joint doctrine are seen as having at least partial solutions through RMA research and development.

RMA suggests a dramatic phenomenon when in fact it is more a continuum of advances. It is about the accelerated integration of three general kinds of computer-age technologies into weapon systems and command and control networks: command, control, communications, computers, intelligence, surveillance, and reconnaissance (C⁴ISR); long-range precision strike; and stealth or

low-observable platforms. Furthermore, like most previous military revolutions, RMA is emblematic of Western concern about the likely contours for using armed force in a new age. If Napoleonic warfare heralded the age of revolutionary nationalism, if the rise of mechanized warfare is associated with the age of European fascism, and if the ascendancy of nuclear deterrence theory is identified with the Cold War, then RMA reflects ideas about the shape of warfare—present and future—in the global information age.

One historian of military revolution has noted that RMA incorporates both a political preference for minimum risk warfare and a technological quest for continued military potency by advanced Western liberal societies,¹ which can apparently no longer countenance the mass mobilization and ideological and social militarism of World War II and the first two decades of the Cold War. They now tend to field what have been termed *volunteer-technical* rather than *mass-reserve* forces. From a historical perspective, the contemporary revolution is best seen as a blend of political preference as well as a technological process in which Western democracies attempt to adapt to uneven but continuous military transformation under rapidly changing post-industrial and post-Cold War political conditions.

This article examines the official quest of an advanced Western-style liberal democracy to exploit RMA as both a preference and a process. Three areas are analyzed: first, Australia's general approach to RMA thinking between 1994 and 2000 and the evolution of an indigenous concept of an information-based military revolution—known as the *knowledge edge*; second, the specific development of the knowledge edge concept between 1999 and 2000 and the significance of the December 2000 Defence White Paper on RMA; and third, institutional challenges confronting the quest to redesign the armed forces around RMA ideas and technologies by the second decade of the 21st century.

From Dominance to Edge

RMA thinking in Australia was informal and concentrated on sifting through American ideas prior to 1997. There was considerable evaluation of experiments with information technologies, including command, control, communications, computers, and intelligence (C⁴I), real-time data dissemination, and precision munitions—many prompted by the lessons of the Persian Gulf War.

Official analysis particularly speculated on the benefits of gaining knowledge dominance from new information technologies, which was encouraged by strategic guidance between 1994

Royal Australian
Regiment on patrol.



Australian Army (Bob O'Donahoe)

**the attraction of technology that
compensates for the weak force-
to-space ratio is obvious**

and 1997 emphasizing the Defence of Australia policy, first outlined in 1987 and based on the enduring value of strategic geography. Since Australia covers 12 percent of the earth's land surface but contains 1 percent of its population, the attraction of technology that compensates for the weak force-to-space ratio is obvious. The continent's northern frontier equals the distance between London and Beirut.

A decisive event in the development of an official RMA initiative was the March 1996 election of a Liberal-National coalition government led by John Howard. Minister for Defence Ian McLachlan argued subsequently that the long-term changes in information technology would be as profound for military organizations as the internal-combustion engine proved in the early 20th century. He identified the key proven components of such a revolution as the lethality of weapons, projection of force over increased distances, speed of information processing, and growing capacities for intelligence gathering. He also pointed to the potential of unmanned aerial vehicles (UAVs) and increased interoperability with the United States.

He warned, however, that Australians had to be "careful to pick only those parts of RMA technology that address our needs."²

Bilateral cooperation on RMA issues increased significantly by the end of 1996. Australian strategists became immersed in the full range of American ideas, including exploiting information technology to achieve superior battlespace awareness and dominant maneuver; facilitation of precision strike and simultaneous close, deep, and rear attack; the potential of joint direct-attack munitions; and the value of global positioning systems. Future warfare specialists from the Office of Net Assessment, Center for Strategic and Budgetary Assessments, and war colleges became regular visitors.

Some analysts pointed out in early 1997 that Australia stood to benefit from automated combat systems, long-range precision-strike, stealth, and sensor technology as techniques that would permit greater control of the huge northern maritime approaches. Significantly, these views became influential in molding the Pentagon's institutional approach to the RMA debate.³

In December 1997, *Australia's Strategic Policy 1997 (ASP 97)* adopted a maritime concept of strategy and attempted to align strategy with post-Cold War realities. This review became the first official document to acknowledge the potential of

RMA in helping shape Australia's future strategic environment, stating:

For Australia [the revolution in military affairs] has particular significance. Not only will new technology provide military personnel with an expansive breadth and depth of information about the battlefield, but sophisticated strike weapons will give advanced forces the capability to destroy targets with an unparalleled degree of precision and effectiveness.

Mastery of information technology was considered an area where the 50,000-strong Australian Defence Force (ADF) could continue to excel. The review identified the highest priority as the *knowledge edge*—a refinement of earlier ideas based on using information technology to extract knowledge dominance in military operations. The concept was defined in *ASP 97* as “the effective exploitation of information technologies to allow us to use our relatively small force to maximum effectiveness.”⁴

A knowledge edge was seen as offering three advantages. First, it would allow greatly improved surveillance of the maritime approaches. Second, when applied to the command, positioning, and targeting of forces, it would enable military deployment to maximum effect. Third, *ASP 97* foresaw Australia developing a networked defense force in the early 21st century through its strong domestic information technology and

alliance with the United States. Such a force would be based on meshing sensors, platforms, space-based surveillance, long-range UAVs, over-the-horizon-radar, and airborne early warning and control (AEWC) aircraft.

Dedicated Office

The Howard government introduced further measures to support an RMA effort during 1998 and 1999. Spending on related research and development was increased by Australian \$10 million and military technology links with the United States were extended. However, the most important measure was the April 1999 decision to create the Office of the Revolution in Military Affairs (ORMA) in the Military Strategy Branch of Australian Defence Headquarters. A dedicated organization in the heart of the defense establishment ensured that theorizing on information-age warfare would become institutionalized.

The office became responsible for coordinating two tasks. First, in close cooperation with the United States, it was charged with developing a transformation strategy for adapting selected

aspects of RMA technology to Australian circumstances. To this end, the office defined a revolution in military affairs as comprising “fundamental changes in the conduct of military operations resulting from innovative use of technologies, concepts, and organizations in response to political, economic, security, and social uncertainty.”⁵ This broad definition reflected a consensus among defense analysts that only a multidimensional approach to warfare would yield superior capability. The second task was to identify and analyze future warfare concepts that might incorporate necessary organizational, doctrinal, and technological changes into the current ADF.

ORMA developed a methodological strategy for an Australian approach to information-age warfare called Project Sphinx between 1999 and 2000. It provided a mechanism to develop strategic concepts for ADF that would unite policy with military operations and technical processes. Sphinx was to identify the most plausible future warfare concepts and assess their long-term investment implications through 2025.

Central to the methodology were three strategic propositions: the Asia-Pacific region is fundamental to national security; the information age has ushered in a new era in warfare; and the post-Cold War security environment is peculiarly volatile and unpredictable. With these propositions in mind, Project Sphinx sought to relate future warfare concepts to capability development in key areas such as precision firepower, information operations, and force projection. Methods have embraced special study teams, strategic wargaming, simulation, and creation of an RMA working group drawn from the Department of Defence, academe, and industry.

Sphinx has helped to make RMA thinking in Australia the most advanced in the Asia-Pacific region in just three years, as seen at an international conference initiated by ORMA in Canberra in May 2000. There was clear evidence of a knowledge gap between national defense analysts and most of their regional counterparts. Australian speakers talked about a future battlespace in which network-enabled operations, precision munitions, and joint warfighting concepts would predominate. In contrast, most Asian speakers stressed the marginal position RMA held in their strategic thinking. One Malaysian scholar spoke for many analysts, saying that with the exception of Singapore:

The RMA is of minimal utility today to Southeast Asia . . . there are no conscious attempts in the region to work towards a revolution in military affairs. This

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Commander in Chief,
Pacific Command,
with Australian
forces, Brisbane.



U.S. Air Force (Paul Hokomb)

is because the RMA is still a little irrelevant to the needs of the subregion. Regime security remains the primary paradigm for Southeast Asia.⁶

By the beginning of 2000, response to the revolution had three main characteristics. First, planners favored a 2025 timeframe for assessing the value of RMA technologies. Second, most official strategists viewed information networking—the essence of the knowledge edge philosophy—as involving the rapid dissemination of real-time surveillance and targeting data as the most realistic outcome to emerge from the new technologies. Third, while accepting the necessity for American assistance, analysts consciously opted for a national approach to future warfare. This technique took the form of a *middle way* response to RMA trends that relied heavily on defense scientists for verification. The middle way strategy was essentially an indigenous transformation based on adapting information-age technologies to specific national needs such as surveillance, precision strike, and intelligence. The aim was to achieve a satisfactory level of interoperability with the United States while maintaining ability to undertake independent operations in the region.

Culmination Thinking

The knowledge edge, the centerpiece of Australian RMA transformation strategy from 1999, was reflected in two major official documents

published by the Department of Defence, *Defence Review 2000* and a white paper entitled *Defence 2000: Our Future Defence Force*.

Defence Review 2000 was released as a public discussion paper in June. Its objective was to educate the electorate about future security needs. A basic premise was that the military would rely increasingly on information technology and trained personnel. The paper noted that the importance of information technology would grow since the trend toward military modernization in the Asia-Pacific showed no sign of abating. The numbers of advanced combat aircraft, anti-ship and surface-to-air missile systems, and electronic warfare capacities had risen dramatically during the 1990s. As a result, Australia's traditional advantage in maritime and air platforms was gradually being eroded by block obsolescence. Upgrades in avionics, electronic warfare, and missiles for fighters and strike bombers, along with the acquisition of AEW/C, were seen as critical to regaining equality with the best regional air forces.

Platforms which will reach the end of their service cycle by 2015 will include air force F/A-18s, P-3C maritime patrol aircraft, and C-130H transports, a navy guided-missile frigate, and many army wheeled vehicles. In addition, F-111 bombers, "the muscle of our strike force," will reach the end of their operational effectiveness by

Guarding transport,
Tandem Thrust '01.



3rd Marine Division (John Giles)

Australian-American cooperation was reaffirmed as the anchor of national security

2020. The cost for new equipment between 2000 and 2020, including aerospace combat power, was estimated at \$80–\$100 billion, exceeding current investment levels by half. In light of the challenges of growing regional military capabilities and an ADF heading toward obsolescence, a knowledge edge, RMA-style approach to modernization was described as vital. “[RMA] information capabilities,” *Defence Review 2000* stated, “are about applying the ideas of the knowledge economy to the business of fighting wars.” The most critical ADF assets would lie not simply in platforms and weapons, but increasingly in the integration of systems and skills to produce combat effects. The document continued:

Information warfare . . . the “revolution in military affairs” . . . is where our comparative advantage over potential adversaries is likely to last longest. In coming years, it will be harder for Australia to match regional numbers of platforms such as ships and aircraft, but we are well-placed to keep a lead in our ability to use what we have to the best effect.

Finally, Australian-American cooperation was reaffirmed as the anchor of national security. The review noted, “our alliance with the [United States], which leads the world in [information-age

capabilities], is vital to giving us affordable access to this technology.”

The white paper published in December 2000 provided the most detailed rationale yet by strategic planners for embracing the knowledge edge. The new blueprint represented the culmination of RMA thinking that had begun in *ASP 97* and reflected three years of close analysis of both technological innovation and the potential for revolutionary changes in warfare. It contained a general assessment of RMA as well as a specific analysis of Australian requirements.

The paper reaffirmed that RMA was based on a global information-technology revolution. It stated, “the most important development changing the conduct of warfare is the ability to increase vastly the speed and capacity to collect, organize, store, process, tailor, and distribute information.” Indeed, *Defence 2000* is peppered with statements such as “effective use of information is at the heart of Australia’s defence capability” and “exploitation of information capabilities will be critical to maintaining our edge.”

The main RMA characteristics were identified as a trend towards networking forces, systems, and capabilities to achieve multiplied combat power,



U.S. Air Force (Paul Holcomb)

Australian and foreign students at Defence College, Canberra.

along with appropriate reforms in organization and doctrine:

RMA technologies impart the ability to know more than one's adversary in relevant areas. This can result in a decisive military advantage when linked with appropriate weapons and concepts of operation. Indeed, this will probably be one of the decisive factors in warfare over the coming decades.

As foreshadowed in *ASP 97* and *Defence Review 2000*, the white paper committed Australia to develop an advanced information-technology infrastructure based on major investment and cooperation with the United States. By the early 21st century, ADF will be based on a mixture of

upgraded and new air-sea platforms and appropriate information- and space-based surveillance capabilities—including emergent UAVs and uninhabited combat aerial vehicles.

However, the most significant indication that the knowledge edge had moved toward center stage in strategic thinking was the decision contained in the white paper which designated information capabilities as an integral part of a \$16 billion, ten-year Defence Capability Plan (DCP). Under this plan, information capabilities—comprising intelligence and surveillance, communications, information warfare, command and headquarters systems, logistics, and stealth—became a separate grouping to ensure their strategic priority. Between 2001 and 2011, \$2.5 billion will be spent on development. Indeed, in terms of expenditure, information technologies now rank third behind air combat (\$5.3 billion) and land forces (\$3.9 billion) but well ahead of maritime forces (\$1.8 billion) and strike (\$0.8 billion).

The priority afforded to the information capabilities grouping is justified in *Defence 2000* on two main grounds: RMA developments offer unique advantages in acquiring American-style information technology, and embracing information technology works to a national strength since Australia enjoys extensive computer literacy. The combination of RMA information technologies and computer skills ensures that the knowledge edge will long remain the foundation of national military capability.

The Budget Crisis

Although planners expect much long-term benefit from the knowledge edge, success depends not simply on ideas but on implementation and resources. Australia must overcome an institutional challenge to its national security—the need to adequately fund both operational commitments and future capabilities. In early 2000, Secretary of Defence Alan Hawke identified “a convergence crisis” stemming from the combined impact of financial, management, planning, and strategic pressures. At its heart lay a frozen defense budget and organizational methods that remained rooted in Cold War practice.

In 1999, at the same time ORMA and the knowledge edge concept were being established, Canberra fell into a defense budget crisis. Australia was spending 2.9 percent of GDP on defense in 1984. The figure fell to 1.8 percent (\$11.2 billion) by 1999—the lowest since the Munich crisis in 1938 and a 35 percent drop over fifteen years. By early 2000 there appeared to be an unresolved tension between a desire for advanced technology and a need for credible forces for operations in the

immediate region. It became clear that unless the budget was increased, the nation could not undertake even a modest middle way RMA and simultaneously retain high preparedness for current contingencies such as the peace enforcement mission in East Timor.

Defense spending became an acute political issue during 2000, with Hawke stating bluntly, “the bottom line is that Australia can no longer afford a balanced, self-reliant, capable, and ready defense force of 50,000 with its current capabilities on 1.8 percent of GDP.” Concerning the convergence crisis he remarked:

The irony of our professional military performance in East Timor is that it masks the reality we face. Australia’s national security is challenged by a convergence of financial, management, planning, and strategic pressures. . . . [The department’s] ability to present a range of capability and military response options to government will be severely constrained if these combined pressures are left unchecked. This crisis, which has been building over the last decade, has now come to a head due to increased personnel costs and the costs of expanding and reequipping the capabilities of the ADF.⁷

The Department of Defence developed the unhealthy practice of holding down operations and personnel budgets to fund capability and modernization in the relatively predictable strategic environment of the later Cold War, when short-notice ADF operational deployments were rare. In the post-Cold War era, when ADF opera-

tional deployments increased markedly in areas as diverse as Somalia and Timor, this approach to managing capital equipment and projects proved untenable. By the late

1990s the needs of capability development and short-notice military deployments could not be met simply by scaling back spending on operational needs and personnel.

There was not enough money by 2000 to meet the triple demands of upgrades to existing platforms, purchase of new platforms, and acquisition of RMA/knowledge edge systems. A defense resource assessment report warned that Australia could not maintain even its present capabilities at levels of regional comparability without a spending increase. With 1.8 percent of GDP, the possibility of developing advanced capabilities while maintaining a credible force for current contingencies seemed bleak. As Hawke warned in April 2000, “at present and anticipated levels of funding, the ADF as we know it today will cease to exist.”

The budget crisis was not easily resolved. Defense spending and unreformed managerial practice became the focus of a sharp debate in the National Security Committee during 2000. Division developed over whether Australia required a warfighting “high-end” (shorthand for expensive high-technology) or a peacekeeping-style “low-end” military. According to press reports, those supporting a high-end force included John Moore, the Minister for Defence, and Alexander Downer, the Foreign Minister. Skeptics included Peter Costello, the Treasurer, John Fahey, the Finance Minister, and Max Moore-Wilton, the influential Secretary of the Department of the Prime Minister and Cabinet.

In August 2000, those favoring a low-end force and restricted spending appeared victorious when the government reduced the number of AEWCs from the seven which the air force wanted to four. It was noted that the East Timor deployment was expected to cost over \$4 billion from 1999 to 2003. One low-end advocate in the cabinet asked, “What use would AEWCs have been in Timor?”⁸

Optimists and Pessimists

The high-end advocates prevailed in the defense spending debate in the National Security Committee despite tactical reversals over AEW by the end of 2000. The Howard government sought to provide a long-term resolution to the convergence crisis in its December 2000 white paper. The political aim was to balance strategic demands, defense capabilities, and defense funding by introducing the ten-year DCP. This plan, with emphasis on the RMA-knowledge edge, was unveiled as the cornerstone of *Defence 2000*.

The aim of DCP was to establish parameters against which spending could be increased by an average of 3 percent per annum in real terms between 2001 and 2011. Prime Minister Howard declared *Defence 2000* to be the “most comprehensive reappraisal of Australian defense capability for decades.” This victory of the government’s high-enders was captured by the national newspaper, *The Australian*, banner headline of December 7, 2000: “Enter the Cyber Warriors.”

Under the 10-year capability plan of *Defence 2000*, the budget was scheduled to increase by \$500 million between 2000 and 2001, by \$1 billion between 2002 and 2003, and thereafter by 3 percent real growth yearly until 2010. Defense spending will in theory stand at \$16 billion by 2010, as opposed to \$11.2 billion in 2000. There are both optimists and pessimists. Optimists include strategic analysts such as Paul Dibb and

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Australian Army (Bob O'Donahoo)

Leopard advancing on Freshwater Beach.

Hugh White, the principal architect of the 2000 white paper. Dobb has suggested that the financial commitment under DCP has made the new strategic blueprint “a benchmark.” Similarly, White believes that implementation of *Defence 2000* is unlikely to be disturbed over the next decade.⁹

Since DCP remains an unbinding commitment on future governments, some observers are pessimistic about the promise of a high-technology ADF with a knowledge edge capability. As *The Australian* has observed, a real concern with DCP is that no government has ever sustained a real increase of 3 percent in defense spending for 10 years. This view of the white paper echoes the dark days of the 1930s:

*Australia is now a substantially less secure country than it was five years ago. Our defence capacity is declining. Our security environment is more complex and less stable. The nations of our region are spending money on military acquisitions at an unprecedented rate—indeed, the Asia-Pacific is the fastest growing military market in the world.*¹⁰

As one observer outlined “the Government’s White Paper is all about Australia’s strategic decline. It’s about managing, slowing, but above all accommodating, our national strategic

decline.”¹¹ Only time will tell whether the optimists or pessimists are right.

As one observer outlined in a 1961 essay, for official technological research to succeed in Western democracies three important conditions must be met. First, the objective of research must be both clear and “not too grandiloquently vast.” Second, there must be a research organization strategically placed within the bureaucracy to interact with key policymakers throughout the “great underground domain of science and government.” Third, the committee must be armed with powers of action, inspection, and follow-up.¹²

So far, the RMA-knowledge edge initiative has fulfilled two of the three conditions above. As Ian Chessell, Chief Defence Scientist, noted in May 2001, the purpose of the knowledge edge must be to keep abreast of appropriate and relevant RMA technologies and integrate them into ADF combat systems. Such an ambition is both clear and not too sweeping. Second, ORMA is located inside the Military Strategy Branch—the very heart of ADF headquarters—and is thus positioned to coordinate warfare research. The third

Australians on hangar deck of *USS Essex*.



U.S. Air Force (Wayne A. Clark)

condition—action, inspection, and follow-up—exists only in the world of information-age theory so far. However, as evidentiary methods emerge, the knowledge edge organization will probably gain increasing influence over capability decisionmaking.

Intellectual Investment

Canberra must avoid two other pitfalls if it is to develop a credible knowledge edge. First, it is vital for the Department of Defence to nurture itself as a learning organization. Based on historical precedents, the demands of the knowledge edge will require a strong intellectual investment in strategic analysts. Despite Australian advances in RMA theorizing—arguably second only to those of the United States—there remains

despite advances in RMA theorizing there remains a growing shortage of younger strategic thinkers

a growing shortage of younger strategic thinkers. Fewer and fewer of the cream of university graduates are choosing to study strategy and international relations.

A defining characteristic of coherent strategic analysis lies in exploring the relationship between the empirical and the hypothetical—particularly when research is focused on integrating policy with operations, systems, and

technology. Such work requires sophisticated minds that can distinguish between information and knowledge. As Henry Kissinger has warned:

*It is commonplace to describe the information age as one of the great intellectual revolutions of history. . . . But what shapes the conduct of international relations and therefore the course of history is not only the number of people with access to information; it is more importantly how they analyze it. Since the mass of information tends to exceed the capacity to evaluate it, a gap has opened up between information and knowledge and, even beyond that, between knowledge and wisdom.*¹³

The shortage of educated strategists will hinder assessment of RMA over the long term. Australia must devote more resources to defense analysis and professional military education to achieve a healthy balance among policy issues, military theory, and operational practice. In generating a practical transition strategy from RMA theory to practice, it will need a strong civil-military cadre of policy and planning experts to sustain Project Sphinx and the knowledge edge.

Second, strategic planners must avoid the belief that dominant battlespace knowledge and stand-off air strike will abolish the age-old concepts of uncertainty and friction in war. Such views reflect the Jominian, mechanistic vision reminiscent of the so-called “whiz kids” whom Robert McNamara brought into Pentagon in the

early 1960s—which failed spectacularly against guerrillas in Vietnam. RMA advocates should remember that use of military force remains more art than science. Accordingly, the famous Clausewitzian dictum that in “the whole range of human activities warfare most closely resembles a game of cards” is still fundamental to realistic strategic thinking.¹⁴ Australian RMA specialists should temper their ideas concerning battlespace precision with the timeless warning by Thucydides about the fog of war:

*Think, too, of the great part that is played by the unpredictable in war: think of it now before you are committed to war. The longer a war lasts, the more things tend to depend on accidents. Neither you nor we can see into them: we have to abide by their outcome in the dark. And when people are entering upon a war they do things the wrong way round. Action comes first, and it is only when they have already suffered that they begin to think.*¹⁵

Canberra’s institutional embrace of an RMA initiative is just five years old. Much has been achieved despite financial stringency. Indeed, the creation of an RMA organization to analyze the implications of information-age warfare has been one of the least understood but most significant developments in the Howard government’s attempt to modernize the defense establishment. Despite the adage that it is easier to design the future than predict it, the development of the knowledge edge program is an important step toward transforming the national defense strategy to meet 21st century conditions. The RMA initiative has moved from an informal debate about knowledge dominance in the mid-1990s, to the official formulation of the knowledge edge between 1997 and 1999, to the emergence of a Knowledge Edge Information Capabilities Group in the 2000 white paper. The designation of information capabilities as a separate capability grouping—with more funding than improving current strategic strike—is evidence that the knowledge edge is viewed as the foundation of future military capability.

Finally, military technology is a crucial agent of change in any culture of modernity, but it never operates in a pristine setting. The Australian approach to RMA demonstrates how technological factors are conditioned by a nation’s institutional values and its political and strategic context. The search for a knowledge edge may yield broad lessons for other middle powers pursuing modernization with limited budgets. This process may illuminate a key intellectual problem of the information age—how new strategic theory is articulated by a professional community and how

questions of technology are nearly always mediated by a combination of policy, resources, and operational expertise. **JFQ**

NOTES

¹ Jeremy Black, *War: Past, Present and Future* (Phoenix Hill, Gloucestershire: Sutton Publishing, 2000), chapters 9 and 10.

² Ian M. McLachlan, “Defence Challenges in New Era Security,” in Alan Stephens, ed., *New Era Security: The RAAF in the Next Twenty-five Years* (Canberra: Air Power Studies Centre, 1996), pp. 3–8.

³ For further details see Michael Evans, “The Middle Way: Australia’s Response to the Revolution in Military Affairs,” *National Security Studies Quarterly*, vol. 6, no. 1 (Winter 2000), pp. 8–12; Michael Evans, *Australia and the Revolution in Military Affairs*, working paper, Pentagon Study Group on Japan and Northeast Asia, Japan Information Access Project, Washington, July 24, 2000, pp. 6–10; Keith Thomas, ed., *The Revolution in Military Affairs: Warfare in the Information Age* (Canberra: Australian Defence Studies, 1997).

⁴ Department of Defence, *Australia’s Strategic Policy 1997* (Canberra: Directorate of Publishing and Visual Communications, 1997), p. 56.

⁵ Office of the Revolution in Military Affairs, “The Implications of the Revolution in Military Affairs,” Canberra, November 8, 1999.

⁶ J. N. Mak, “The RMA in South-East Asia: Security and External Defence,” *Australian Defence Force Journal*, no. 144 (September/October 2000), p. 31.

⁷ Address by Allan Hawke to the Royal United Services Institute for Defence Studies of Victoria, April 27, 2000.

⁸ Robert Garran, “Defence’s Strategy for Survival,” *The Australian*, October 10, 2000, p. 4.

⁹ Evans, *Australia and the Revolution in Military Affairs*, p. 47.

¹⁰ Greg Sheridan, “They’re Beautiful Weapons, But We Need More of Them,” *The Australian*, December 8, 2000, p. 13.

¹¹ Greg Sheridan, “Chronicle of Strategic Decline,” *The Australian*, December 7, 2000, p. 5.

¹² Charles P. Snow, *Science and Government: The Godkin Lectures at Harvard University, 1960* (London: Oxford University Press, 1961), pp. 74–75.

¹³ Henry Kissinger, *Does America Need a Foreign Policy? Towards a Diplomacy for the 21st Century* (New York: Simon and Schuster, 2001), p. 284.

¹⁴ Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), p. 86.

¹⁵ Thucydides, *The Peloponnesian War*, translated by Rex Warner (Harmondsworth, Middlesex: Penguin Books, 1972), pp. 81–82.