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Summer 2001-2002

AUSTRALIAN NAVAL INSTITUTE Inc.

The Australian Naval Institute was formed and incorporated in the ACT in 1975. The main objectives of the Institute are:

- to encourage and promote the advancement of knowledge related to the Navy and the maritime profession; and
- to provide a forum for the exchange of ideas concerning subjects related to the Navy and the maritime profession.

The Institute is self-supporting and non-profit-making. Views and opinions expressed in the Institute's publications are those of the authors and not necessarily those of the Institute or the Royal Australian Navy. The aim is to encourage discussion, dissemination of information, comment and opinion and the advancement of professional knowledge concerning naval and maritime matters.

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Front Cover: HMAS *Newcastle* undertaking a vertical replenishment with HMAS *Success's* Seaking Mk.50. (RAN Photo).

Back Cover: HMAS *Tarakan* in East Timor (RAN Photo).

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FROM THE PRESIDENT

Dear Members,

2001 was a year of considerable achievement for the Australian Naval Institute. As most of you will appreciate, the financial state of the ANI had been the subject of considerable concern and the very existence of our Institute hung in the balance. I am pleased to report that through the considerable effort of the Council, the prospects for the ANI are much brighter. In particular I would like to thank Commander John Shevlin, (our outgoing Secretary), and Lieutenant Commander Drew Forster, (our Treasurer) for providing a clear financial picture upon which the Council could make its decisions. These efforts were greatly assisted by Mrs Jean Davitt (our Office Administrator), who has brought a much needed business-like efficiency to our administration. At the same time the newly formed Journal Editorial Board has significantly streamlined the production costs.

The efforts of the Council would have been in vain however, if there was not the continued and growing support from the Institute membership. This is heartening. I hope now that the ANI's future is more secure, greater effort can be directed at boosting and broadening the Institute's membership.

Of equal importance has been the reinvigoration of the ANI Friends and Supporters Program. LOPAC and ADI have been long-standing and most valued supporters. I am pleased to announce that SAAB Systems Pty Ltd has come onboard for 2002. We look forward to, with their support, to fulling our charter encouraging and promoting the advancement of knowledge related to the Navy and the maritime profession.

With the ANI's charter in mind this edition has been published to coincide with the Navy's Pacific 2002 Conference. The Conference will deal with the most important factors relating to the development of naval capabilities in the 21st Century. This is a timely conference for the development of sustainable capability is a considerable challenge, especially when the tempo of operations is high. I would encourage this aspect of the development of seapower to be discussed in the Journal during the course of 2002.

With the demands and achievements of 2001 behind us, the ANI has the opportunity to build not only on its membership strength but also to further develop the quality of the Journal. The Editorial Board has made some very good progress in this regard. The Journal however, has yet to realise its potential as a vibrant forum. All readers are encouraged to participate in discussion of naval matters.

I hope you enjoy this issue.

FROM THE EDITORIAL BOARD

In this edition of the Journal the subject of Network-Centric Warfare is featured in two articles. It is hoped that these will generate some discussion about this important subject both in the pages of future journals but also in Wardrooms, Bridges and Operations Rooms in the Fleet.

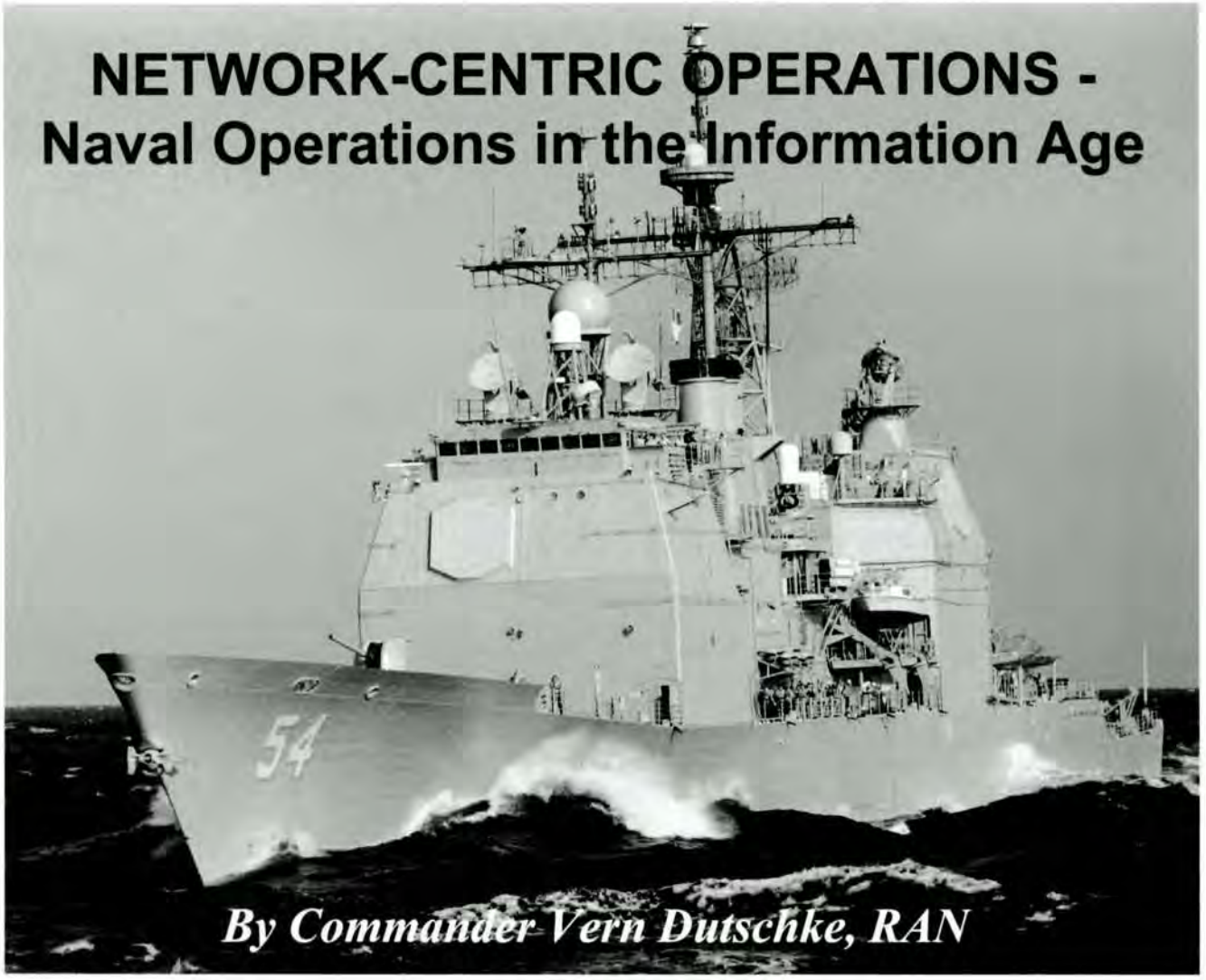
Another feature of this edition is its international flavour with articles from or about the US, Japan and Sweden. They are focused on how naval developments in these countries have relevance to the RAN.

The historical article features diary entries from Engineer W.G. Robertson of the Victorian Navy. While some of the observations show how different social attitudes have moved on, the resonance with current operations in support of the war on terrorism is striking.

Lieutenant Commander Mary Ganter has written a more contemporary article on the challenges the Navy must deal with in maximising the contribution of its women. Another issue today's Navy has to grapple with is the rising cost of capability ownership. *Sutekh* has written an article on this subject with particular reference to the surface combatant force.

Finally, both the Book Review section and Shiphandling Corner are gathering steam and there are interesting contributions to readers.

The Editorial Board is keen to receive letters and articles on any subject the readers think would be of interest to Institute members. Equally feedback on the Journal is much appreciated. With the delights of email submissions we are able to be forwarded through this address: **a_n_i@bigpond.com.au**



Admiral Jay Johnson, the former US Chief of Naval Operations said,

"The information revolution has fundamentally changed the nature of naval warfare. The battlefield of the 21st century will be one in which the force with mastery of the information spectrum will prevail, making information superiority critical to our warfighting success."

An integral part of this information revolution will be Network-Centric Warfare. The understanding of the concepts and the attendant debate is still in its infancy. In the first of two articles the way in which the USN view networked operations is explored by Commander Vern Dutschke, the RAN's Liaison Officer at the US Naval Warfare Development Command.

The USN is committed to adopting Network-Centric Operations (NCO) as the concept for US naval operations in the future. What are NCO, and why has NCO and its supporting concepts attracted the USN to use it as a means to achieve the vision of enabling it to decisively influence future events at sea and ashore – *Anytime, Anywhere?* This article summarises the Navy Warfare Development Command's - NCO concept,[1] which articulates the USN's shift from platform-centric operations to NCO.

Advances in Information Technology are changing the way we live, the way we do business and the way we fight. In this "Information Age", information is increasingly becoming a source of power. In order to succeed or survive, all organisations, civilian and military alike, must successfully exploit the power of information, from rapidly gathering data through to making informed and effective decisions. Successful organisations are exploiting the new power of the information age to gain a competitive advantage. "'*Dominant competitors have demonstrated the ability to generate high levels of awareness of what is going on in their respective enterprises and extended business ecosystems. This high level of awareness has been key to both developing strategy and improving effectiveness at the operational level*".[2] NCO is the way naval forces will exploit the information age to achieve a warfighting advantage.

"Network-Centric Warfare can be defined as military operations that exploit state of the art information and networking technology to integrate widely dispersed human decision makers, situational and targeting sensors, and forces and weapons into a highly adaptive, comprehensive system to achieve unprecedented mission effectiveness."[3]

The NCO concept is the organising principle for future Navy forces in the information age and is a new way of operating these forces. As such, they require a culture of innovation characterized by the co-evolution of dynamically developed doctrine, organisation, and educational underpinnings along with technology. The transition to NCO will not change the validity of enduring doctrine or the principles of warfare, but it will require the development of new doctrine and stronger educational underpinnings that leverage information, knowledge, and advanced technologies in the conduct of decisive, effects-based operations (EBO). New network-centric forces and capabilities will complement the forces of today and may ultimately replace many of them. Although these emerging forces will be more dispersed, they will use strong networking among more numerous platforms and sensors to create a new synergy that will greatly increase the Navy's ability to project power and decisively influence events at sea and ashore. At its centre, NCO are about warfighters leveraging the power of technology and new doctrine. The insert on page 8 summarises the fundamental elements of NCO as viewed by the warfighter.

NCO pair networking and information technology with effects based operations to achieve the full potential of Network-Centric Warfare. EBO, executed by a sensor rich, networked force gives the Navy the ability to lock out enemy options and lock in success.

NCO Supporting Concepts

The USN will execute NCO using four major supporting concepts:

- Information and Knowledge Advantage.
- Assured Access.
- Effects-Based Operations.
- Forward Sea-Based Forces.

These concepts are heavily interrelated in combat and will be applied concurrently in many situations. Information and Knowledge Advantage is the central element that enables and connects the other concepts.

Information and Knowledge Advantage

NCO depend on gaining and retaining an Information and Knowledge Advantage. They focus on what is required to accomplish the commander's objectives based on a total picture of the adversary and not merely a listing of his order of battle. EBO demands that warfighters understand the enemy's culture, values, and modes of operation. Commanders can then direct actions against them that provide maximum impact for the given level of effort.

Deployed warfighters must know how the enemy operates and what he values to best know how the enemy's will can be attacked. Building and sustaining this knowledge base will require a renewed emphasis on a historical-regional expertise that includes doctrine, language, and culture. This

knowledge must then be coupled with a Real Time Battlespace Awareness to enable successful effects based planning and execution. Thousands of sensors will be seeded into the battlefield to provide this awareness. Sensors of all types, unmanned, unattended, and platform based, covering all environments will be networked to form a grid to provide battlespace awareness to the warfighter. This sensor grid will expand the existing knowledge base and build an information advantage over the adversary.

The command philosophy of NCO seeks to empower commanders at every level to focus resources on the mission and encourage the inventiveness and initiative of subordinates. To more directly connect the warfighter to the commander, the command organisation will need to be flatter. Information that traditionally has flowed linearly along command lines will flow horizontally throughout the force to provide the basis for common awareness. Operational and tactical planning will be performed collaboratively with real-time coordination, assessment, and reach-back. This flatter command structure and shared awareness will enable *self-synchronisation*. Self-synchronisation emerges when units within a force use common information, the commander's intent, and a common rule set – or doctrine – to self-organise and accomplish the commander's objectives. Tactical units will be able to self-synchronise their actions, thus minimising the delays inherent in centralised control. Self-synchronisation enables the force,

Network-Centric Operations for the Warfighter

NCO derives power from rapid and robust networking of well-informed, geographically dispersed warfighters. They create overpowering tempo and a precise, agile style of manoeuvre warfare. Using EBO, the aim is to sustain access and to decisively impact events ashore. NCO focus on operational and tactical warfare, but they impact all levels of military activity from the tactical to the strategic.

- ***Require networking warfighters - not just nets*** - they link forces through a global grid of multiple overlapping sensor, engagement, and command nets. Their power is drawn from a common understanding of the battlespace, the adversary, and the commander's intent. The resulting synergy creates high-order effects from tactical actions and leads to the coalescence of the levels of war.
- ***Depend on enhanced warfighter knowledge***, including historical knowledge of the region and its players. They balance sensor employment with the execution of fires. As recognized in *Joint Vision 2010* and other documents, future forces must fight a battle to achieve knowledge superiority. Information Operations capability will be used to enhance and protect our information and to attack adversary information.
- ***Use dispersed forces*** to support manoeuvre, Information Operations, deception, and survivability, while concentrating effects to achieve operational objectives.
- ***Will empower on-scene warfighters and enable tactical units – guided by commander's intent – to self-synchronise their actions*** – generating dominating rates of change, rapidly focusing effects, and anticipating and limiting adversary actions.
- ***Exploit effects-based operations*** to foreclose enemy options, directly attack his sources of strength, and achieve maximum impact for the level of effort.
- ***Support the warfighter across the continuum of naval operations*** – they are more than information technology; they are about how we think, communicate, operate, and fight.
- ***Demand adaptability rooted in a culture of innovation*** to cope with the unexpected and exploit dynamic situations.

organised into combined arms tactical teams, to work as a synergistic whole, enhancing speed of manoeuvre and responsiveness.

The quality of knowledge available to the warfighter depends on timely fusion and correlation of information from a diverse range of sensors as well as accurate, responsive target identification. Because the information-knowledge network is such an important tool and weapon, it must be robust, well protected, and designed to degrade gracefully. While actively protecting this network, warfighters will simultaneously use offensive information operations to degrade the opponent's information systems and networks. Even with an Information and Knowledge Advantage and much better battlespace awareness, the fog, friction, and uncertainty of war will remain. Warfighters on both sides will continue to be surprised and challenged by unexpected outcomes. Using the inherent adaptability of networked forces, warfighters will be able to cope with the unexpected and will be able to exploit its effect on adversary confidence and willpower.

Assured Access

Military access has two dimensions: access to overseas infrastructure (basing, airfields, and logistics support) and access to the battlespace. Current joint operations are dependent on in-theater shore-based infrastructure to bring significant forces or combat power to bear. Losing this infrastructure access is driving the US to greater self-reliance on sea-based forces that either do not require such access or can seize it when needed. The latter - moving into "harm's way" to seize infrastructure or to project power – is the focus of *Assured Access*.

The scope of battlespace access in combat is tied to the mission. Control over an area of sufficient size must be sustained or secured long enough to successfully project combat power. An adversary will strive to make the projection of power as costly as possible. Adversary area-denial strategies are becoming more robust because of the rapid proliferation of increasingly sophisticated and affordable "spoiling" technologies, including information operations. Potential threats include ballistic and cruise missiles, weapons of mass effects, mines, submarines and swarming small boats. Exploitation of, and threats to, the space and information arenas expand the traditional battlespace, and demand assured access in these critical new dimensions.

In order to gain access, semi- to fully-submersible vessels and survivable aircraft, manned or unmanned, will sow the battlespace with sensors, decoys, and countermeasures to prepare the way for an overwhelming effects-based attack. Sensors and unmanned vehicles (some expendable) will assess combat effects, provide target-quality tracks on new targets, and monitor adversary actions. Long-range standoff weapons will engage fixed targets as needed throughout the operation. Early conventional and information operations strikes will target enemy surveillance, information, and defense systems, creating an area to which the *adversary is denied* access and from which campaign objectives can be achieved.

To be effective in the close-in littoral, forces will need to be made tactically stable by dispersing combat power to enhance force survivability and increase utility. Forces that can operate effectively in the littoral will be characterised by signature control, speed, agility, blue-water endurance, and improved force and platform survivability. Deployment of a mix of forces that includes numbers of geographically dispersed smaller platforms networked to more capable multi-mission units will enable concentration of force by coordinated attacks (concentrating combat power while remaining dispersed).

Effects-Based Operations

EBO emphasise rapid manoeuvre that creates *unacceptable change from the adversary's perspective* using effects directed as much against an enemy's will and belief structure as physical targets. Overwhelming tempo is created in the eyes of the enemy; it need not require rapid manoeuvre or decisions by the warfighters. Manoeuvring network-centric forces will employ EBO to rapidly shape or constrain enemy behavior, interdict the flow and fracture the cohesiveness of his forces, and disrupt his plans. At the tactical level, warfighters will use EBO to gain battlespace depth, reduce the close or extremis battle, and create new options for achieving mission objectives.

EBO focus on actions and reactions and are not limited to the wholesale attrition of physical targets. By creating a common understanding of the battlespace, the adversary and the commander's intent, NCO enable forces to attack in all three domains of war – physical, reason, and belief – in order to alter enemy behavior directly. The reason

domain is the realm of human understanding and decision-making. The belief domain is the realm of morale, leadership, cohesion, and the willingness to risk life and limb. Historical-regional knowledge is the primary source for understanding an adversary's belief and reason domains and is a prerequisite for successful EBO.

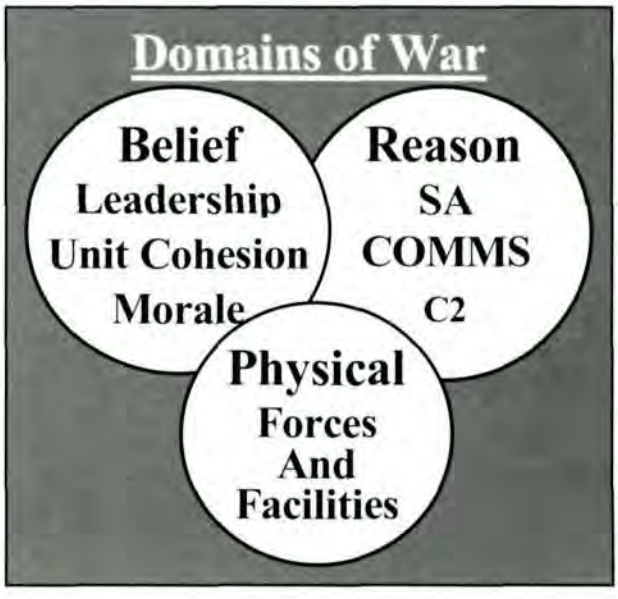
Smart targeting will focus on critical nodes and links at the heart of an enemy's force. Such selective attacks have the potential to break enemy resistance by striking at the root *sources* of his combat power. In some cases, decisive rates of attrition may be required to render enemy objectives unachievable. More often, a combination of fires, manoeuvre, information operations, and other techniques will be needed. Information and Knowledge Advantage with its correlated sensors, sensor-target links, and local deconfliction will enable warfighters to identify and interdict targets sooner, often before they become time critical. Aircraft and weapons, loitering or on-call in proximity to expected target areas, will perform armed reconnaissance against mobile or pop-up targets. In dealing with time-critical targets, these highly responsive assets may use onboard sensors to designate, attack, or dynamically re-designate, targets for other air-, surface-, or submarine-delivered fires. Stand-off weapons will continue to be used against fixed, area, and moveable targets. They may also be used for suppression of enemy air defenses in order to free additional responsive airborne assets for operations against mobile targets.

NCO are focused more on crushing the adversary's will and undermining his essential warfighting capabilities rather than attrition warfare. Therefore, traditional battle damage assessment will be augmented by other measures of effects. Accurate assessment of EBO will demand new measures and will create new challenges within this evolving concept for warfare. Determining the effectiveness of attacks on an adversary's systems, pursuant to follow-up actions, will impose new analytical requirements and unique demands on sensors.

Forward Sea-Based Forces

The Forward Sea-Based Forces concept recognises the inherent agility of naval forces and the advantages of operating from the sea. Forward sea-based forces are relatively unconstrained, operationally mobile, and capable of sustaining selectable levels of influence and combat power indefinitely. Sea based logistics, fires (including missile defense), sensing, and command, reduce the vulnerability of assets to area-denial threats. Naval sensing, fires, defence, and command capabilities are, as never before, being controlled and projected from the sea farther and farther ashore to shape the land battle. The forward posture of naval forces, supported by historical-regional knowledge, enables early sensor operations and surveillance during presence and crisis.

Applying military power from the mobile sea-based force frees the ground commander from the constraints of defending and maintaining infrastructure in the face of conventional and asymmetric threats, particularly ballistic missile



threats. Sea-based forces provide a more secure area from which the joint force commander can conduct reconnaissance, surveillance, and engagement. This does not, however, imply a single large floating support base. Instead, sea-based forces are part of the mobile naval combat force and can shift as needed to support land operations including manoeuvre across the extended battlespace.

Naval logistics in a network-centric environment will be more fully integrated into operational planning and execution. The network will be used to anticipate demand and reduce unneeded logistics flow. For sustained power projection operations of any considerable scale, pre-positioning and strategic sealift, coupled with strategic airlift, remain essential. At the leading edge of combat, however, particularly in the face of an adversary's area-denial strategy, sea-based military forces will provide the leverage to establish combat power ashore and prepare for the arrival of traditional prepositioned, sealift, and airlift assets.

A critical aspect of sea basing forces and capabilities is the network or hardware backplane of information handling tools – the vehicle through which information is exploited. A global information grid will complement a variety of information-handling tools in multiple integrated local networks. The seams between these networks will be transparent, and transitioning from one to the next should not require significant action by the warfighter. This hardware backplane will enable shared awareness, synchronized action, and dissemination of orders.

NCO – Advantages and Challenges

NCO will allow coherent operations by forces that were previously not possible. These operations will be characterised by an increased knowledge of the adversary, both historical and real time, to facilitate successful effects based planning and focused execution. This will be achieved through pervasive sensor operations commencing on early indications of conflict and continuing throughout the operation, including new methods of sensing that can measure accomplishment of effects. The information and knowledge advantage coupled with a widely promulgated and comprehensive commanders intent, will enable decentralised execution by situation aware tactical forces that can use their shared awareness to self synchronise. These tactical forces will come from all services, they will be widely dispersed, and exchange mission essential data to increase reaction speed. This will create an environment in which the enemy's behaviour can be shaped and constrained for the successful accomplishment of desired effects.

Implementing NCO will have an impact on every area of the Navy. It will demand significant changes in naval forces and the way they are employed. Doctrine will need to become more dynamic as the effect of the information age continues to evolve. Organisational changes to enable flatter command structures, execution of effects directives and self-synchronisation will require cultural changes and innovation. Producing a new type of warrior with the optimum skill sets will generate training and education challenges. Perhaps the most difficult of all, will be implementing the necessary changes to equipment and force structure needed to exploit the full potential of NCO. Understanding and acquiring the capabilities required, the platforms, sensors and weapons and their linkages that enable these capabilities, and moving from current legacy platforms to these new capabilities, is perhaps the biggest challenge facing the USN.

About the Author

Commander Vern Dutschke, RAN, is serving on exchange at the US Navy Warfare Development Command, Newport, Rhode Island, in the Concept Development Department. He is a Direction Officer with sea experience in frigates and destroyers. He has also served as a joint warfare instructor at the Australian Defence Force Warfare Centre.

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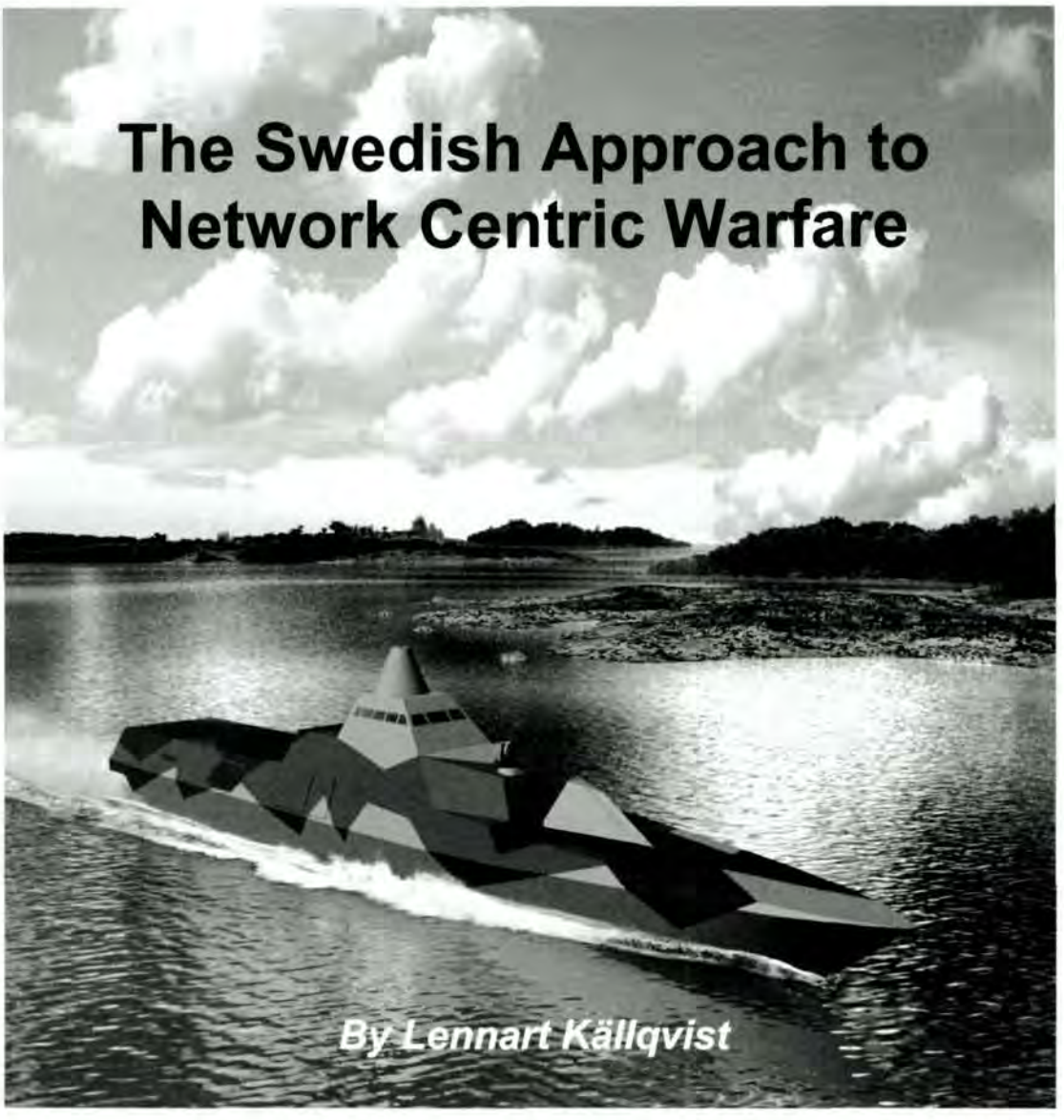
[1] Navy Warfare Development Command, *Network-centric Operations - A Concept for Naval Operations in the Information Age*, 2000, Newport RI.

[2] Alberts, D.S., Garstka, J.J., Stein, F.P., *Network-centric Warfare - Developing and Leveraging Information Superiority 2nd Edition*, DoD C4ISR Cooperative Research Program, Washington DC, 1999, pp. 36-37.

[3] Naval Studies Board - National Research Council, *Network-Centric Naval Forces - A Transition Strategy for Enhancing Operational Capabilities*, National Academy Press, Washington DC, 2000, p. 1.



The Swedish Approach to Network Centric Warfare

By Lennart Källqvist

In the second article devoted to Network-Centric Warfare, Lennart Källqvist describes how Sweden is embracing this concept.

Through the years, the structure and design of military capabilities have changed drastically several times. The changes might have been based upon new tactics but in most cases the initial enabler is a new technology. Now, we have an obvious situation where a new technology has emerged and is waiting to be exploited by the military world. This new technology is based on open networks being the backbones of the information infrastructure. This technology already exists in our society and it has seen unprecedented growth. There are several potential benefits in applying this technology in the military structure. The solutions that can be developed can also be adapted further to the new types of threats that we recognise today.

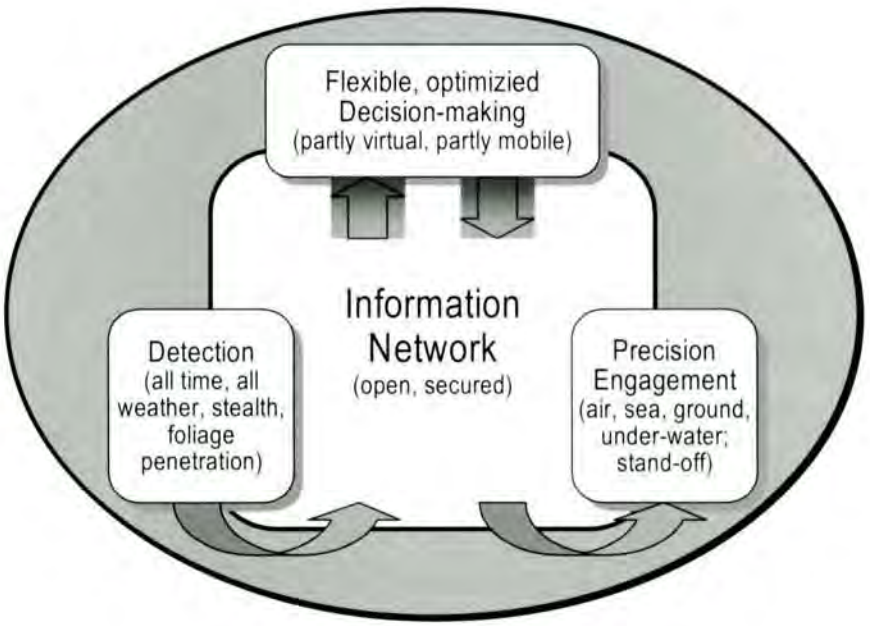
Are the defence services of the world's nations rapidly introducing this new technology? On one hand the military community is traditional and conservative. The actors are skilled in developing and modifying materiel and tactics within a given structure. This might be the reason that a decision to radically change the existing structure is difficult to obtain. On the other hand, I don't know any sector in our society with a better long-term evaluation and planning process than that

of the military headquarters. Military capabilities are measured in relative terms and are compared with the foreseeable threats. In simulators and in operation analyses it can be proven that a new solution will have a better and more cost effective war fighting capability. Thus, it is more the political acceptance of the possible solution and the management ability of the defence forces that will cause the changes to be implemented.

These two highly opposing views within the defence organisation can result in great friction in the decision process. It is understandable that a change of paradigm that might come out of the process can be referred to as a revolution in military affairs, RMA. However, few nations are yet focusing on the opportunities that can be found in a network-centric warfare (NCW) fighting capability.

A major system change to a network-centric solution can be described from two different points of origin. The natural starting point is a description of military capabilities based upon network-centric solutions. Thereafter, requirements are placed upon the systems and technical design to meet these new goals — a *technology pull*. The problem with this approach is that it is difficult to formulate the new network enabled military capabilities because it would require drastically new ways of thinking. Therefore, the *technology push* way will probably be the most effective one. It might be somewhat harder to accept for a traditional military decision-maker but it will not be the first time in history an enhanced military capability is created based on a technology break through.

What then is a network-centric military capability? These ideas emerged in the United States in the 1990's and are now being evaluated and modified in some countries. In the existing structures, referred to as the platform-centric structure, platforms and their sub-systems (sensors, weapons, EW systems, control systems, communication systems, etc.) are tightly integrated. This has made the platform more powerful, but the interaction between different types of platforms is not inherent in the design. The fusion of the output of sub-systems between platforms is inefficient. The new concept is to unbind each sub-system of the platforms from a logical point of view and connect them to a network. This can be done even if the sub-systems are physically still integrated to a certain platform.



Now we can start a thrilling experiment in our minds. By making each sub-system addressable and accessible they will become nodes in a network. We can combine any such node with any other node and thereby create a logical function. Here are some examples. Sensor information from a ground platform can be fused with sensor information from an air platform resulting in a better situation picture. The operator in the back seat of a fighter can be linked to the operations room of a warship to enable real-time interaction in a joint mission. This also means that a maritime action could be controlled by the commander in an aircraft or an air strike action by the commander on board a warship if this would be of value for the operation.

A tactical HQ with a work overload wouldn't have to get more resources. Instead, it could expand virtually by making use of other staff functions in the force through the network. On the engagement side, the firing of a weapon from a ground platform can be supported by a simultaneous jamming from an air platform focused on the same target. The logical separation of the sensor and the shooter means that we can release a weapon from one platform and let the target data be collected by sensors of another platform maybe even belonging to another Service. This is a way for the weapon platform to keep a stealthy profile.

You can continue creating these types of logical combinations. They can be provided in a static structure but, more favourably, in a dynamic structure where the layout can be changed rapidly whenever needed. In many areas it won't be the technical infrastructure that will limit the solutions but the ability of the military user to think and create the smart logical functions and forming and controlling the logical network.

Is the idea to base military capabilities on logical networks another wild cyber type of fiction? There is a development we all experience that support and verifies the network approach. I want to address this. In our society we are now leaving the industrial age for the information age. In the previous era we didn't lack information. On the contrary we had a huge amount of information. The main problem was that we had to more or less physically move to the places where the information was to be found. We had to go to the library to look for a book, or to a document archive to find a report. It was reasonable if we knew the title of the book or the report and if the book or the document hadn't been borrowed by anyone else. It became much more difficult if we couldn't define what we were looking for in a precise way. Sometimes, you would have to look through many documents and not seldom in vain. We can say that the information wasn't easy to access even if it existed.

Now, the network has been implemented as a prime enabler of information transfer. More and more information owners are providing access to their information through networks like the Internet or local intranets. We can sit in our office or in our home or at any place in the world with a computer and access to the network and retrieve a fast increasing amount of information. The first step into the information age means that the information availability has become much better.

The next step in becoming citizens of the information age is to make use of the increased information availability. We can easily combine information from different sources that gives us an opportunity to have a second opinion or verification of a piece of information. By fusing information of different sources and domains we can create new information and information of better quality. One might say that this gives us knowledge. An increasing number of information retrieving instruments are being developed that can support the user in getting the information on which they can base their decision-making. This process will lead to a much better value of information and we have just seen the beginning of it.

The challenge for the defence sector is to enter the information age and to establish the same type of information availability and value as we see happening in the civilian society in which we all are taking part. This is a huge challenge since

it means a new way of structuring and using military capabilities and since it has to start with a large number of incompatible legacy systems.

The feasible and less costly way to introduce network-based applications will be to gradually modify the legacy systems and to apply a network based design standard for all new systems that will be developed. Of course, there must also be investments in the robust Internet type of networks. When the number of nodes attached to the network increases the value of the logical network will increase rapidly. This will probably be the best way to convince the hesitant part of the defence organisation that the network-centric solutions are superior.

I am certain that there are many benefits to be found in this network-oriented approach. Aren't there then any drawbacks or weaknesses? As always in the evaluation of the power of a military system you will have to look for weak spots. It is apparent that the capability will depend on the network-based infrastructure. Therefore, an adversary would try to affect the functionality of the networks if this seems to be an easier way to reduce the military capabilities than to degrade the primary functions. Consequently, there must be a well-developed defence of the network. This means that we will need to protect the networks and the information against physical, electronic, and information operation types of attacks. Furthermore, the infrastructure solution must be designed and dimensioned so that it will have a good build-in redundancy and graceful degradation during operation in a hostile environment.

The basic ideas come from the ongoing developments in our society. Will it be possible to build military applications based on COTS and civilian services developed for a consumer market? My view is that this can be done in a somewhat limited and well-controlled way. We have to realise that a network-centric defence will rely on the technical and logical networks and their reliability and degradation properties. The systems must be designed to fit in a military environment. The consumer products might have properties that can withstand attacks by criminals while the military systems can meet offensive physical, electronic, and information threats from resourceful groups or nations. Consequently, the military applications must be verified and authorised from different system safety and classified information handling points of view. This means that there will be a need for making the systems more robust than in civilian applications even if the civilian content can be expected to increase. This might also be a part of the necessary dealing with the asymmetric threats we have.

The capability potential of transforming a military system to become network-centric is substantial.

The capability potential of transforming a military system to become network-centric is substantial. The effects that can be obtained imply a thorough modification of doctrines and tactics. The command functions will become more flexible and will interact with the information provided via the networks. The tactics can vary from centralised to decentralised command and this can be changed according to the operational situation. All resources will be interoperable and some of the necessary coordination doesn't have to be included in the pre-planning phase but through self-synchronisation during operations. The goal will be to have a better situation awareness and a faster and better quality decision loop than those of an adversary.

Warfighting will change. There will be a reduced need to put the sensors, the weapons, and the operators on board the same platform and expose it to hostilities. The needs for information exchanges will be handled through the networks.

The increased flexibility in the military structure and in the decision functions will make the network-centric solutions more capable of handling the new asymmetric threats and ways of warfighting. It is also reasonable to forecast that the threats will partly be directed towards non-military functions where the military type of defence solutions can be useful. At the same time, many applications will be based on networks both in the civilian and the military domains. Therefore, an increased interaction between the military and the

The Gripen fighter and the Visby surface combatant shown earlier will be key components of Sweden's networked forces (Photo: Saab)

civilian sectors can be foreseen.

We have an interesting future in the design of military capabilities. The struggle between different opinions can be summarised by these quotations from the United States Department of Defense NCW report to the Congress in July 2001:

> *"In the future, the network will be the single most important contributor to combat power……NCW offers unprecedented promise to achieve long sought-after capabilities without corresponding increases in resources in the long run……There are significant impediments to progress".*

The changes in Sweden

Sweden has a long democratic tradition. Nevertheless, in March 2000 the Swedish Parliament decided to implement a revolution — a revolution in military affairs. The Defence Resolution issued by the Swedish Parliament gives a new direction for the Swedish Armed Forces and states that the new structure shall be based on network solutions. This has been reiterated in a new resolution in 2001.

The background for the defence reform consists of several contributing factors. The existing military structure was a result of the defence needs during the Cold War era but it had become too expensive to maintain and to develop further. The threat situation had changed drastically which motivated the termination of the old anti-invasion style defence which included a large mobilisation component. Sweden has also shown a greater willingness to take part in international security policy and military activities. Finally, the new technology with network-based opportunities became more realistic.

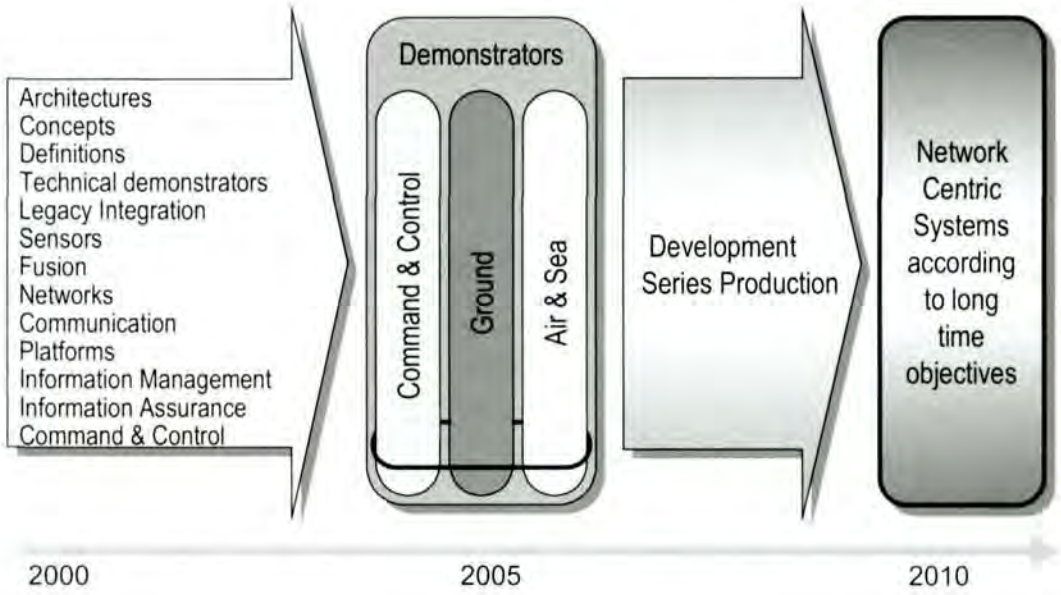
The adoption of a network-based infrastructure isn't going to be one decision followed by one implementation. On the contrary, this will be a long lasting process where the supporting technologies will be developed and proven to fulfil the requirements. Thereafter, the system solutions will be developed and gradually introduced to the Armed Forces. The Swedish approach is to put several of the new solutions into a system demonstration in 2005.

The major part of this demonstration will be carried out as a military exercise. During the next four years, some military units will develop the new NCW doctrine and tactics to be used in this exercise. The focus of the demonstration will be on new information gathering techniques for better situation awareness, and on different command and control functions that will be needed to make use of the NCW potential. Another part of the demonstration will be more industry oriented and will be based on simulations and technical solutions to prove that the networks can be given the necessary performance from a security and availability point of view. After a

successful demonstration, a full-scale program is anticipated which will be implemented in the 2005 to 2010 time period.

There are three major concerns with the Swedish NCW capability development. Will it become too American, will it mean the beginning of a giant and costly upheaval, and will it be too early and therefore become a unique Swedish non-interoperable solution? The approach to meet these concerns is as follows. The solutions will be based on ideas developed mainly in the United States during the 1990's. One advantage is that the network solutions are easily scalable and therefore can be well adjusted to the Swedish level of needs. The application of a network-based infrastructure shouldn't be considered to be one giant project but rather an introduction of a new design framework, which will govern all future new and upgrade programs without adding extra costs. Finally, the Swedish NCW development must not be too early. It is required that the program will necessarily include international cooperation and so the interoperability requirements are very firm.

In Sweden the Armed Forces, the Defence Research Agency, the Defence Materiel Administration and the Defence Industry are involved in developing the NCW solutions. These parties are working closely in different integrated project teams to make all the competences come together that are essential to cope with the huge challenge of finding the best solutions for a network-centric Swedish Defence.



About the Author

Lennart Källqvist was a pilot and engineer in the Swedish Air Force retiring as a Brigadier. He had a long career in the Defence Materiel Administration where he has been head of the Air Materiel Command Staff and head of Strategies and International Affairs within the Joint Materiel Command. Last year he left the Administration to join the Swedish defence company, Saab as part of the creation of a network between the Defence and the industry. Within Saab, Lennart Källqvist is head of the newly established NCW Management and is responsible for coordination of Saab's NCW activities.

Illumination Rounds

CAREER MANAGING PREGNANCY FOR THE SEAMAN OFFICER

By Lieutenant Commander Mary-Louise Ganter, RANR

In 1997 DNOP developed a presentation entitled "The Gender Integrated Navy – Beyond Good Working Relationships" in which the career profile of a fictitious female seaman Midshipman was followed from enlistment to the rank of Commodore. It included her posting cycle, that of her RAAF spouse and the birth of their two children. It noted that, during the course of a 32-year career and a 29-year marriage, she and her husband managed to reside in the same house twice, that one or other of the couple acted as a single parent for most of their children's lives and during two posting cycles the grandmother took responsibility for full time child rearing whilst both parents pursued their service careers.

Having only received the presentation by chance I am not sure whether the intent was to:

- offer a packaged career solution which allowed for the achievement of personal goals, such as a family, in concert with the achievement of professional ones, or
- illustrate the pressures that SMN Officer career and posting requirements place on personnel and the difficulty in achieving personal and professional aspirations given the requirements of a seagoing career.

But really it succeeded in doing the latter. The subsequent picture of the personal sacrifice needed (expected?) to achieve professionally really begged the question "At what stage in this persons career is she going to simply leave the Service?" Currently the majority of women are leaving after a period of 4 to 10 years, and for a variety of reasons.[1]

In 2002 and after actively recruiting women for seagoing service for over 15 years we still have not, as an organisation, appropriately addressed the issue of realistic career options for women at sea. One needs only go to the DNOP web site and browse the indicative career paths provided to come to the conclusion that there is no point in undertaking PWO training if one is female with any desire for a family.

If the indicative career paths are followed, and assuming ADFA entry, the first opportunity for a shore posting and a pregnancy occurs at the 11 year mark, or age 29. The window of opportunity is 12-18 months. Provided your spouse is in the same locality, you have no difficulties falling pregnant in the first 2 months, you have an uncomplicated birth 9 months later and only take 12 weeks maternity leave you will probably obtain a professional evaluation for that year and manage to take up your sea posting on time. You will probably, however, have to forgo the opportunity for a junior command as you still have to fit a second PWO job in before your next shore posting and opportunity to have your second child, which really will be your last if you want Major Fleet Unit (MFU) command. Therefore at the 14 year mark, age 32, you now have another 12

month period in which to repeat the perfect pregnancy and return to the workforce. This may be a good place to put your Staff Course, allowing you some time with your family and a little longer to recover from your pregnancy prior to going to the Charge programme at age 35.

Added to this is the fact that both spouses will have had to act as single parents for extended periods during their children's lives, that a significant proportion of service personnel have partners who are also serving, the unreality

To balance the individual's aspirations with the corporate requirement to ensure optimal manning of the Navy[2]

However the notion of balance is quite incongruent with the posting cycle of our fictitious female Midshipman, and the indicative career paths provided on the DNOP web site. Similarly the phrase 'individual aspirations' needs to incorporate more than simply an

for most women of two completely trouble-free conceptions/births, CNs indication that he expects senior management to possess a Master's qualification, the age considerations for MFU command, the large pool of Command qualified people and the total lack of any other worthwhile career path for seaman officers, it is little wonder that the number of women progressing down the PWO path is disturbingly small. In fact this is only one issue that could affect their decision not to go on to PWO training and Command and it is littered with disincentive.

The DNOP Mission Statement, contained on the DNOP website, is:

individual's *career* aspirations. Information obtained through PERSAT and the Defence Attitude Survey alone strongly indicates that personal aspirations, particularly in the form of family, greatly affect length and type of service. There is no denying that Navy is concentrating enormous effort in developing better personnel practices and providing more flexibility in employment. However the benefit from flexible work practices are not being felt in the seaman stream as they do not suit the seagoing situation and subsequently do not assist in the achievement of both Sea Command and a family. The lack of a serious alternative career path for those who decide that MFU

Command and a family are mutually incompatible also encourages separation from the Service. Does Navy really want to lose these trained, competent personnel from the organisation altogether or are there alternatives to the current structure?

The answer is not immediately apparent and requires further consideration. Front loading the seaman officer's career with sea time rather than study may help. As may recognition that not everyone will, or wants to, achieve MFU Command, and that the provision of alternative seagoing career paths with avenues from these into higher management positions is therefore necessary. Reconsideration of some of our restrictions on sea-service for pregnant women could also be useful. (I understand that the US Navy has a requirement to post pregnant females ashore from 5 months rather than immediately). Similar issues have been identified within the Supply Branch and are the subject of a study by Lieutenant Commander Jayne Craig but as yet no similar study considers the Seaman Branch. However, one way of encouraging women to stay with the Navy and embark on PWO training may be to redesign the job, its lead-in training requirements and the career points at which the job is performed to allow people (and the organisation) some flexibility[3].

Better recognition and management of the issues in the interim would also be a good start. Currently, the general response to the question of where a family fits into the indicative career path of a female seaman officer is along the lines of "that's a personal problem". I can anecdotally relate the frustration of one female officer who, in an attempt to jointly manage her career with her desk officer, informed her poster that she and her husband wanted to start a family and suggested a shore posting in the next rotation. She was posted to sea, she became pregnant, she was posted off. The resultant disruption and additional relocation costs, could have been avoided if pregnancy, and other personal aspirations, were incorporated into career management considerations. The ability to seriously discuss this issue might avoid situations where limited shore posting periods in the seaman officer career path (and opportunities to start families) are taken up with jobs where seariding is a requirement of the billet and a pregnancy would not only be inconvenient for the organisation but would generate much negative reaction for the individual.

As an organisation we need to recognise that the issue of pregnancy and career progression in the world of the seaman officer is not a 'personal problem' that we are being forced to work around. Instead it is an opportunity for the joint management of personal and professional requirements with the aim of retaining highly qualified and expensive resources.

About the Author

Lieutenant Commander Ganter is an ADFA graduate who joined the RAN in 1987. She is a seaman officer who transferred to the RANR in 1997. She is serving in the Directorate of Navy Strategic Analysis in Navy Headquarters.

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[1] *Defence Personnel Environment Scan 2020*, August 2001

[2] DNOP website 11 Jan 01

[3] This observation was also made in "Women in the Australian Defence Forces" in 1996.

THE JAPANESE MARITIME SELF DEFENCE FORCE: A Capable but Constrained Service

By
Captain George Spence, RAN

The recent deployment of ships of the Japanese Maritime Self Defence Force (JMSDF) to support the war on terrorism has thrown the spotlight on this unique maritime force. The recently returned Australian Defence Attaché, Captain George Spence provides an insight into today's JMSDF.

The JMSDF has two distinct phases in its history – pre- and post-World War II. The events of WWII interrupted the development of the Imperial Japanese Navy (IJN) but despite this, the JMSDF has become a Service of very high professional standards, sophisticated equipment, and one which takes great pride in its history and past achievements. The events of WWII and their consequences with respect to Japanese defence policy have, however, produced a navy which is significantly constrained in force structure and how it can operate. But the defence debate in Japan is gaining momentum and change might not be long in coming, which might see the JMSDF, becoming a more "normal" navy.

The IJN drew its traditions, and much of its early equipment from the Royal Navy (RN). Its ships were built in the UK, its buildings were modelled on RN buildings (the Officer Candidate School at Etajima near Hiroshima is a red brick building designed along the lines of the RN's Britannia Royal Naval College, Dartmouth), and Japanese Navy traditions are a mixture of those derived from RN traditions and those uniquely Japanese. For example, JMSDF ships have small Shinto shrines and high standards of maintenance, cleanliness, and husbandry on board is due in part to observance of Japanese religious and cultural values.

The IJN was disbanded after WWII, and the so-called Peace Constitution was put in place, which prohibited Japan from resorting to war as a means of settling disputes in the future. The Constitution also prohibited Japan from possessing military forces. In the years immediately after WWII, maritime policing duties were carried out under the auspices of the police authorities, and it was only in 1952, when the need for a separate force for maritime defence became evident, that the JMSDF was established. The JMSDF quickly re-established its historical links with the IJN and regards itself as its direct descendent. The JMSDF

proudly recalls its pre-war operational achievements such as the resounding victory over the Russian Navy at the Battle of Tsushima Straits in 1905. The pride of the JMSDF reflects a belief that the Japanese Navy was untainted by Japanese military excesses during WWII.

A range of constraints and factors have affected the development of the JMSDF since its establishment 50 years ago.[1] The Constitution has been continually interpreted in a pragmatic way by successive Japanese governments to allow the building up of what is now a navy of considerable size, capability and professionalism. However, the Japanese Self Defence Forces (JSDF) are allowed to possess only the minimum necessary capability to defend Japan; this concept of "defensive defence" means that the JSDF are not allowed to possess offensive capability, engage in such operations as pre-emptive strikes, or have capability that has power projection characteristics. It is for this very reason that the term "Maritime Self Defence Force" is used rather than *navy*. This policy obviously has force structure consequences. The Air Self Defence Force's proposal to acquire an in-flight refuelling capability for its F-15 fighters continues to be a political minefield, and the policy would have to change before the JMSDF could acquire an aircraft carrier capability.

The distance to which the JSDF can deploy to protect Japan's national interests is also a vexed issue: there was much parliamentary debate regarding how far the JMSDF could deploy to protect Japan's sea lines of communication. The end result is a Navy that, although very well developed by any standards, is very constrained in the type of operations it can undertake. The Japanese Coastguard takes on many of the longer range tasks that would normally be taken on by a navy, for example the patrolling and protection of disputed territories such as the Senkaku Islands between China and Japan.

The Japanese Government in the past also deemed that it is inconsistent with the Constitution for Japan to participate in collective defence arrangements. This is based on the principle that Japan does not wish to become embroiled in conflicts which do not pose a direct threat to Japan, a situation which would be at odds with the defensive defence posture. Japan and the United States cooperate in defence under the US-Japan Security Treaty, but this is a one-sided relationship under which the US provides considerable assistance for the security of Japan, but Japan is not similarly obliged to assist the US. Consequently, this arrangement is not seen by the Japanese to be one of collective defence.

This policy of collective defence prohibition impacts directly on the Australia – Japan defence relationship. When RAN ships visit Japan, the JMSDF are not allowed to provide logistic support to the Australian ships, Japanese policy deeming such support to be in the nature of a collective defence arrangement. Nor are bilateral combined operational exercises possible; only goodwill exercises can take place, although the latter can have some limited operational content. This is also the reason why there are very few deployments of JMSDF ships to Australia – they cannot be justified to Japanese policy makers: training squadron deployments are acceptable, but there is no reason to deploy for operational cooperation reasons since there is no collective defence policy basis for such cooperation. In RIMPAC exercises, it is notable that the JMSDF is always teamed up with the USN; this is legitimate under the US-Japan Security Treaty, but teaming up with navies of other countries is not possible under Japanese policy.

Recently, however, there appears to be a greater recognition amongst Japanese legislators and policy makers that Japanese defence policies are anachronistic and incompatible with the nature of security threats in the world today. Japan policy towards participation in UN sponsored multi-national forces is changing, and Japan can now participate in multi-national exercises if they have a humanitarian relief flavour; this indicates some softening of the constraints on collective defence. The JMSDF is now deploying overseas more often, and to further-flung destinations, although, again, such deployments are in response to humanitarian relief requirements.

The JMSDF actively seeks opportunities to cooperate with other navies because it recognises that its operational effectiveness would be enhanced by having greater interaction with navies other than the USN. The JMSDF planned to have two of its most capable ships and two P-3Cs visit Australia in October 2001 for the subsequently cancelled Centenary of Federation Fleet Review. This rare visit by operational JMSDF units was possible due to

the fact that the event was a commemorative one, and involved a combined Search and Rescue exercises. The P-3C deployment would have been the first deployment by JMSDF aircraft to a country other than the US. The JMSDF values its relationship with the RAN very highly, and the operational links between the two navies are very strong, perhaps second only to its relationship with the USN.

However, these changes to Japan's defence policy are very gradual. All JSDF activities are closely managed and monitored by Japan Defence Agency (JDA) Internal Bureau bureaucrats; those activities which go beyond the strict definition of defence of Japan are particularly closely scrutinised. This is a manifestation of Japan's "civilian control" structure: civilian control of the military was put in place after WWII to prevent a re-emergence of militarism in Japan.

Notwithstanding the constraints under which it operates, the JMSDF force structure is impressive for a navy designated a "Self Defence Force". It comprises some 42 destroyers with the KONGO Class Aegis Destroyer at the top end of capability, 12 frigates, 17 very capable conventional submarines, 32 mine warfare vessels, 29 major auxiliaries, and 16 air patrol squadrons of P-3C, SH-60J, and HSS-2B aircraft. Manpower is in the order of 45000 uniform and 3700 civilians.

The Commander-in-Chief Self Defence Fleet commands all operational JMSDF units, and is responsible directly to the Minister for Defence. (The Joint Staff Office is not particularly well developed, and is not directly involved in operational command of the JSDF).

JMSDF surface units are arranged into the Fleet Escort Force, consisting of the most capable surface units, and District Flotillas of less capable units. The Fleet Escort Force has four Escort Flotillas each of one DDH, two air defence, and five general purpose ships with a total of eight ASW helicopters embarked. This is known as the 8-8 configuration (8 ships – 8 helicopters) – a neatness which the JMSDF likes. The Escort Flotillas are based in Yokosuka, Kure, Sasebo, and Maizuru but can be deployed anywhere around Japan. On the other hand, the District Flotillas are concerned primarily with regional coastal defence; they are based in the same locations as the Escort Flotillas plus in Ominato.

A significant development in the JMSDF's force structure was the recent acquisition of LST *Osumi*, with more of the same class to come. This ship greatly enhances the JMSDF's amphibious capability having a helicopter deck and two landing craft air cushion (LCAC) embarked, notwithstanding that amphibious exercises are very infrequent. This capability was difficult for the JMSDF to acquire since the development of an amphibious capability does not sit easily with Japan's defensive defence posture. The disaster relief capability of the vessel allowed the acquisition to go ahead. *Osumi* has deployed to Turkey recently carrying prefabricated housing for earthquake relief.

Major projects in coming years will be replacement ships for the ageing DDHs of the Fleet Escort Force, and replacement aircraft for the JMSDF's P-3Cs. The DDH replacement could also be a sensitive project. There are advocates of a through-deck design for this

JDS *Murasame* is typical of the JMSDF's modern surface combatants.

ship, but the perceived similarity with aircraft carrier design will make such a design very contentious. The P-3C replacement is likely to be an indigenously developed and produced jet aircraft, with common components with the ASDF's replacement for the C-1 transport aircraft. This project could also be contentious since it may impact on interoperability with the USN maritime patrol aircraft.

But what will be even more interesting in coming years will be whether or not Japan's defence posture changes. In the last four or five years, debate on security and defence issues has become much more vigorous, partly stimulated by events such as the launch of a Taepodong missile over Japan by the Democratic People's Republic of Korea, and incursions into Japanese waters of their spy vessels. Peace-keeping

operations and international terrorism also keeps security issues on the front burner. Subjects which were once taboo are now openly debated in the public and government forums to the extent that the Japanese Government has set up study groups in both houses of parliament to look into constitutional change, including the war-renouncing Article 9. While it will likely take many years before any change to the constitution would be possible, there has already been change to Japanese peace-keeping legislation, and questioning by some legislators of the collective defence prohibitions.

If circumstances continue to emphasise the international nature of security threats and responses, and Japan has leadership, like Prime Minister Koizumi, which is prepared to challenge the conservative political forces in Japan, change to Japan's defence posture could take place earlier than expected – such as by accepting the necessity of collective defence arrangements – change which could directly affect how the RAN could interact with the JMSDF.

While the RAN has enjoyed a very cordial relationship with the JMSDF over the last 10 years or so, the benefits to Australia of the relationship are limited. The relationship certainly serves Australian strategic interests in that it fosters close consultation on regional security issues, and exchanges of views on some operational matters. But constitutional and other constraints prevent the JMSDF being a true operational partner in the way that the US, UK, Canada or New Zealand are. The inability of the JMSDF to provide logistic support to visiting ADF units, participate in combined exercises or operations, share classified information, or enter into materiel cooperation significantly limits the extent to which the relationship can be developed.

However, if the Japanese defence policy paradigm shifts in the near future, the RAN will be in an excellent position to become a close operational partner with one of the Asia-Pacific region's best navies.

About the Author

Captain Spence served as Assistant Defence Attaché in Japan in 1986, and subsequently undertook the Japanese Defence Agency National Institute of Defence Studies Course in 1997-98 prior to taking up the appointment of Defence Attaché from 1998-2001

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1 In October 2002, the JMSDF will hold its 50th Anniversary Fleet Review in Tokyo Bay – the RAN anticipates participating.

The cost of acquiring ships such as *Parramatta* shown here is substantial. But it is the rising cost of through-life capability ownership that is one of the RAN's greatest challenges. In this article *Sutekh* focuses on the funding the Navy's surface combatant force.

Since Australia's Navy was formed in 1901 it has had to manage the delivery of combat capability with constrained financial resources. This has required a balancing of capital costs for new ships, operating costs to run and maintain the fleet and personnel costs to crew the fleet. This article outlines the logistic funding issues currently facing the Navy and how it has manages them, using the surface combatant force as an example.

Defence Costs

While a defence force might be thought of as one force, there are actually three elements: the legacy force of older capability that is going out of service; the current force, which includes plans to modernise or upgrade existing capabilities; and the future force, which introduces new technologies and platforms. These elements reflect a deliberate policy of continually modernising the force - given the size of the Australian population and economy compared to the geographical area that must be either monitored or defended - Australia relies on a technological edge in both equipment and personnel training to maintain its security.

However a concentration on force modernisation, at a time when the cost of equipment effectively doubles every eight years, combined with equipment with very long lives (about 30 years for a warship), leads to problems with maintaining the current force. As equipment ages, the operating costs (essentially repairs and maintenance - R&M) begin to escalate, as more maintenance periods are required, with increasing work levels. There is also an increase in materiel support costs, as older equipment may no longer have spares being produced by the original equipment manufacturer. This means that parts have to be made at higher costs, where a

production line has to be reopened, or parts have to be reverse engineered at an even higher cost. Given the high capital cost of procuring military capability, it is not feasible for smaller defence forces to trade off old and new platforms to lower their average age and therefore decrease R&M costs.

The Navy is going through a major re-equipment process, with the introduction of new surface ships, submarines, minehunters and helicopters. Each ship class has been built in Australia and incur what has been termed *parent navy* responsibilities. Traditionally the Navy had relied on other navies to develop both technical documentation and develop capability which the Navy could then purchased. With these new ship classes, this knowledge must be developed and maintained in Australia, at a greater cost than existed for the older capabilities. Moreover, due to personnel reductions over time, relevant expertise no longer resides in either Navy or Defence, so these responsibilities are now contracted out to private industry through In-Service Support contracts. There is recognition within Navy that there is a danger that the knowledge gained by industry during the design and construction of the ships is dispersing and will be lost if appropriate support contracts are not in place.

As the future force is more technologically advanced than the one it is replacing, it is often more expensive to operate and maintain. In 1994-95, Defence realised that it was facing funding difficulties with the re-equipment of the Navy (in the first instance). A process termed Net Personnel and Operating Costs (NPOC) was introduced into the annual financial planning process of examining the annual cost estimates for operating these new capabilities, net the costs of the capabilities they were replacing. As an example, the operating costs for two of the older Destroyer Escorts and the three *Perth* class destroyers (DDGs) were used to partially offset the operating costs of the eight FFHs.

Importantly, it was Government policy to build these ships in Australia to revitalise the shipbuilding industry. However in the push to build these ships in Australia, there was little or no consideration during the procurement process of the logistics support requirements or the parent navy implications. There is now a move towards logistic support contracts being signed at the same time as the acquisition contract,[1] to ensure costs are known and as an incentive to lower overall costs from industry. It is not yet clear whether this will deliver the lower costs expected, as the logistic support requirements are not known at the time of acquisition, and options for supply from other companies becomes limited or non-existent with such a support contract.

There is also the major problem of estimating the operating cost of naval capability. Legacy and current capabilities have been underfunded and face a bow wave of remedial work and additional funding if they are to continue to operate. They also suffer from increased operating costs as they age, although the annual percentage increase in operating costs cannot be calculated with accuracy. For the future capabilities that are now being delivered and accepted into naval service, their mature operating costs cannot be estimated for about 5-8 years, as a few ships need to go through their full maintenance cycle to gain a comparison of average ship operating costs.

The Surface Combatant Force

To better understand the logistic support problems facing the Navy, and the limited options available in delivering naval capability in a constrained resource environment, the surface combatant force provides a good example to examine the issues; it has the highest level of funding and is the most visible of naval assets.

The DDGs for the purposes of this article are a legacy capability. Ahead of their planned decommissioning, ship refits were omitted and stock levels were rundown, with an increased risk that critical components would be unavailable.

The *Adelaide* class guided missile frigates (FFGs) are due to undergo a significant capability upgrade between 2002-05. Logistic support for the FFGs is

heavily underfunded and the ships are being run down prior to going into their upgrade. Remedial costs to bring them back up to the appropriate level after each upgrade will be high.

Three ships of the *Anzac* class frigates (FFH) have been delivered and the 8th should be delivered in 2007-08. The mature operating costs for these ships have not yet been determined and if their current funding levels for this class are rolled over to future years, they will be underfunded to operate.

The major components of ship R&M costs are fuel, ammunition, ship refit and maintenance, materiel support and technical support, and it is the appropriate mix of these components that determines when and how the ship gets to sea. Using the FFGs as an example, about 30% of their logistic support is for ship repair and refit, 55% for materiel support and 15% for technical and engineering support.

Ship Refits are derived from each ship's Usage Upkeep Cycle (UUC) and Planned Maintenance Schedules, which detail the periodicity at which maintenance is to be carried out, and are designed by the manufacturer to maximise the operational availability and reliability of the ship and its various systems.

Materiel Support includes the spares needed to repair defects and complete preventative maintenance. Rotatable Pool items are critical major assemblies and sub-assemblies that warrant special logistics management due to their operational criticality within the platform; lead-time to repair; cost and the total inventory holdings.

Technical and Engineering Support is provided through various in-house service providers, contracts with the USN and through the use of commercial In Service Support (ISS) contracts. The intent of these contracts is to provide 'whole of support' at the combat and platform system level in a long-term strategic partnership arrangement with industry.[2]

Funding Constraints

The Navy faces two types of funding constraint, which ultimately have the potential for the same outcome, but have a different timeframe. Current capability has inadequate funding, meaning early remedial action is required and if resolved successfully, is a short-term problem. Future capability will face inadequate funding over time as operating costs increase due to age; remedial action is required before the costs begin to escalate otherwise this will become a medium and long-term problem.

When considering logistic support trade offs to maintain naval capability delivery, there are a number of immediate constraints. Technical and Engineering Support is usually provided under contract and therefore must be regarded as a fixed cost for the term of the contract. The development of ISS contracts is a steep learning curve for the Class Logistic Offices (CLOs), as each class of ship has different support requirements and different suppliers. Combined with the move by the Defence Materiel Organisation (DMO) to the signing of long term support contracts at the time of the acquisition signature effectively locks the Navy into a contract with a monopoly supplier for the life of the capability. While the remaining R&M components can be considered as variable costs, they are also subject to contractual constraints over a period of up to about three years. As an example, varying amounts of funds in each year will have already been committed in old or new contracts. This occurs because ship refit contracts might be signed with the shipyards up to a year ahead, while materiel support contracts might be signed 2 years before delivery (to get onto production pipeline). This limits the amount of discretionary funding available and therefore the development of capability options in the short term.

There are only two effective resource management options, given the relatively fixed nature of Technical and Engineering Support: slipping ship refits or not purchasing all of the materiel support required. A short-term measure is to slip a ship refit into the next year. This will have an impact on both the short-term availability of the ship (if something goes wrong can it be repaired?) and in the longer term where there will be increased levels of

corrective maintenance and higher costs for subsequent maintenance activities when deferred work has to be completed. As the UUC is based on maintaining the optimal condition of the ship, it should be fully funded to allow maximum availability for operations, therefore any reduced funding impacts on the operational availability of the ship.

A medium term measure is to choose not to buy spares, but if there is an urgent defect (URDEF) and no available spares then the ship becomes non-effective. If decisions are made about not purchasing spares, then a priority listing is developed based on the float, move, fight concept. This means that the priority is for spares to ensure the ship can float (related to the hull and manoeuvrability), that some ships can move (propulsion) and fewer ships can fight (sensors, weapons and ammunition). Such an approach maintains the critical mass of the ship class, and the MLOC[3] requirement for sea days will probably be met, but quite clearly the specific classified preparedness requirements would not be met.

Capability Options

However, when there is a resource constraint, there are only a limited number of options to manage the continued delivery of combat capability:

- continue to run the ships as normal,
- reduce the MLOC status of some ships,
- place ships into short or long term reserve, or
- decommission the ship.

The Navy has chosen to continue running ships as normal, even though the logistic support base and maintenance have not been in accord with the UUC (which implies that the maximum operational availability of the ship will not occur). As ships begin to have their refits slipped, or have a reduced refit where only a small proportion of problems are repaired, this leads to the short-term situation of increased URDEFs which can accumulate to the situation where the ship is unable to function. Over the medium to longer-term, such an approach runs the real risk of a catastrophic failure and/or long-term maintenance problems that could shorten the expected life of the ship. This is the option that has been adopted for the FFG.

Another option is to reduce the MLOC status of some ships, which should decrease the level of logistic support they require. Such an approach can be based on the float, move, and fight concept, where all ships are funded to float, most to be able to move, but a lesser number able to fight. There was the situation where one FFG was placed into a reduced activity period for a short period in the mid-1990s. The ship was temporarily tied up with the entire crew remaining on board. However, operating costs for that ship did not decrease but actually increased; the ship's company ordered all the spares required bringing the ship back up to its proper maintenance level. While the reduced activity period did not achieve its aim of lowering operating costs, it did show that a properly maintained ship requires less future maintenance. There is a reluctance to reduce MLOC for readiness, training and morale reasons. There is a fear that a 2nd XI Navy could be created with a distinction

made between ships at normal readiness and those at a reduced activity. The impact on overall training of Navy personnel is not clear, as MLOC "targets" also reflect the minimum time that a ship's company should be at sea to meet safe operation criteria (about 120-25 days a year).

Placing ships into short or long term reserve would not be contemplated for the fear that the ship would never be reactivated. Particularly in the case of long-term reserve, personnel numbers would be reduced and it would be hard to reactivate the ship if personnel were not available. It is also not clear that the funding to maintain the ship placed in reserve could be retained to improve the overall logistic support situation. If the funding were to be removed as a saving, then there little point in placing a ship into reserve. If a ship were placed into reserve, elements within Defence might conclude that if the Navy has got by without the ship for a period, then it is not really needed and should then not be reactivated. This would mean a permanent reduction in hull numbers, so a reduction in MLOC status would therefore be preferable over placing ships into reserve.

Decommissioning a ship is a last resort and requires Government approval. This is really only an option for legacy capabilities that are very close to the end of their service life, so decommissioning a year or two early (out of a 30+-year life) should not cause too many political problems. The DDGs are an example of this situation, where all three ships decommissioned early. The major reason why the DDGs faced this situation was due to the NPOC funding process outlined earlier. Funding was programmed out of the DDGs to go to the FFH, but too little funding was actually left with the DDGs to continue their operations.

Conclusion

For the Navy, major work is still required on managing the R&M component mix to ensure the maximum delivery of naval capability. It does not appear that cost escalation can be controlled if it is a natural byproduct of equipment age, however the management and effective estimating of these costs would appear to be a priority.

If a resource constraint continues, then Navy will need to grapple with the hard capability options available to it. While this article used the surface combatant force to show the issues facing the Navy, adequate logistic funding is an issue facing all Navy capabilities. Instead of operating all capabilities at their maximum availability, there will need to be reductions, either in reduced MLOC, temporary unavailability through placing ships into reserve or a more drastic measure of reducing hulls in the water by decommissioning ships. To enable a better decisionmaking framework for this problem, work is required on how to determine the capability priority mixes across the naval capabilities, instead of concentrating on the funding of each naval capability at the exclusion of the others.

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[1] Australian National Audit Office, *Life-cycle Costing in the Department of Defence*, Canberra, 1998, p. 29.

[2] The focus is on the delivery of integrated material support, which encompasses the 'whole of support' for a particular system, platform or class. Services delivered under these contracts include but are not limited to; configuration management, systems engineering, maintenance engineering, maintenance planning, obsolescence management and training management.

[3] The two levels of military capability specified for forces within the ADF are derived from the concept of maintaining forces at an appropriate minimum level of capability (or MLOC) in peacetime and ensuring that those forces are able to work up to an appropriate higher level of task-specific capability (or operational level of capability - OLOC), within a given time, in order to conduct operations effectively. Department of Defence, *Portfolio Budget Statements 2000-2001: Defence Portfolio*, Defence Publishing Service, Canberra, 2000, p. 9.

An Australian in the Boxer Uprising

The Diary of Engineer W.G. Robertson of the Victorian Navy

Australia's current naval operations in support of the war against terrorism are but the latest chapter in a history of participating in international operations. In mid 1900 news of the massacre of Europeans in China reached Australia and several of the colonial governments offered contingents to suppress the Boxers Victoria offered two 14-pound quick firing guns from HMVS *Cerberus* fitted as field guns together with 200 officers and men. This article provides extracts are from the diary of William Robertson who gives a colourful account of the campaign.

6 July

"When volunteers were called for every man in the ship stepped out. The Captain promised that the contingent would be ready for embarking in seven days after it was accepted, and asked me to get out the drawings for the alterations of the gun mountings and to superintend the alterations at the Newport Railway Workshops.

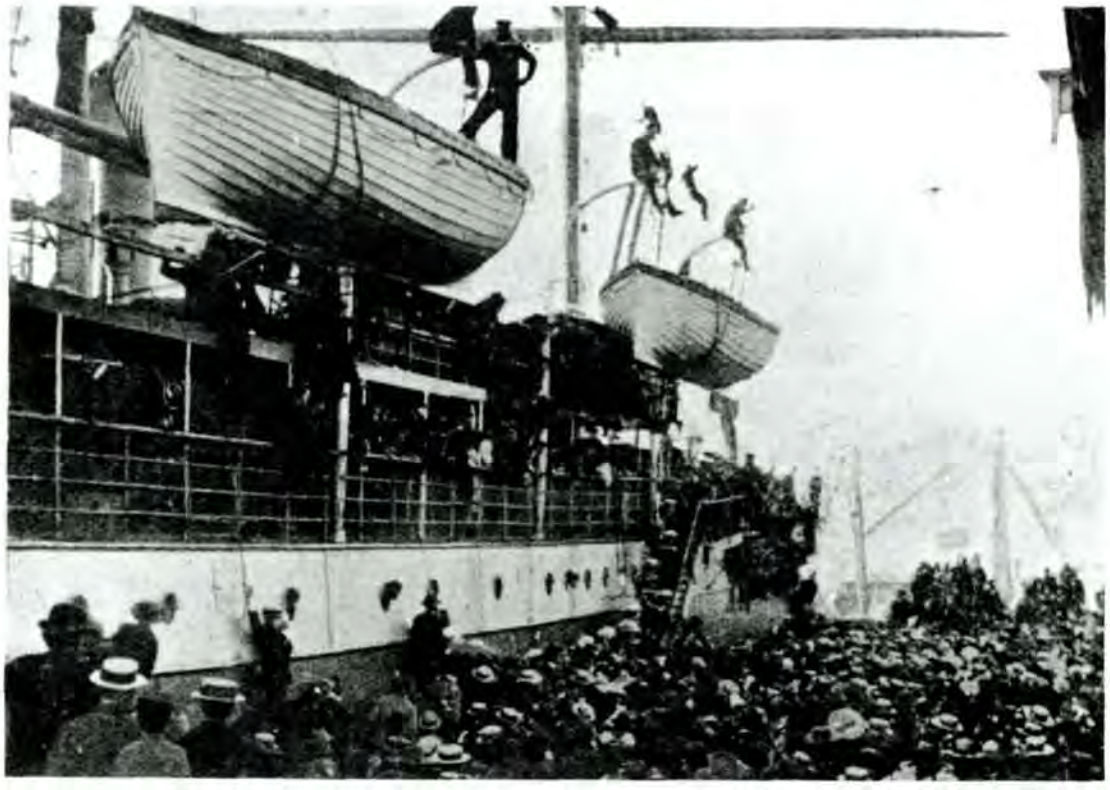
13 July

The first gun trial took place, the mounting giving entire satisfaction. The two limbers and two ammunition wagons were also tried and also came up to expectations. A second trial took place with No.2 Gun, with the most satisfactory results. The gun trials were carried out in the presence of the Secretary of Defence, the Captain and a number of Military Officers.

Before leaving for China the whole of the Naval Contingent was marched to the Williamstown rifle ranges and went to practice with rifles and revolvers, the 14 pounders also fired 16 rounds per gun under the most severe conditions, and I am now perfectly satisfied that they will give no trouble as far as my work was concerned. In addition to being at work from daylight to midnight, from the time the alterations were commenced I had to contend with some who when they saw that the guns were going to be a success, tried hard to get the credit, but failed. And all the thanks I received was to be told that the new guns could be bought for the cost of the alterations (£501, 10 shillings). My experience of the liberality of the Defence Dept. and its brain suckers may be useful to me on a future occasion.

30 July

The Victorian Naval Contingent left the Torpedo Depot Williamstown today and went by train to Spencer Street; from there marched through the streets. There was an immense and very sympathetic crowd and the reception the sailors received was very gratifying and I hope we will keep up our end of the stick in a manner which will justify the good opinion the Public seem to have of the Contingent. We then marched to Port Melbourne and I trust I'll never have another such march. The crowd was in a very sympathetic mood, and with the best intentions, but with exceedingly mistaken kindness kept supplying the men with bottles of beer, whiskey etc. At times it was difficult to see the male portion of the contingent as the lady friends of the men took charge, and each man's sister and his cousins – not to mention his wives must have been 'numbered by the dozen', and his children by the hundred. I sincerely trust I shall never again be an eyewitness of some of the scenes I was compelled to see – women & children in tears, imploring the men not to leave them, some fainting, others with a look of despair on their faces that appealed to one's sympathies more than tears; but I suppose when a country prepares to indulge in the gentle art of war, 'Such scenes as these will ever be'. We embarked in SS *Salamis* about 4 pm and had a glass of wine with the Minister of Defence who made a 'neat and suitable speech etc.'



4 August
Went on shore [in Sydney] and purchased Trautwines Civil Engineers' tables 25/-. The Govt. should pay for this, but my previous experience of the liberality of that body induces me to believe that they will see me in Hades before they do.

5 August
A military service is to be held at the Cathedral this afternoon. Am not going. Have had enough parading through the streets. Besides am not in a churchgoing mood, my thoughts will wander back to the last Sunday spent in Melbourne in company with those whom I may not see again on this side of the grave. I am glad I did not go as I believe the procession was like a circus.

7 August
The NSW Contingent came on board at 4 pm. There was a great demonstration on the wharf. The men arrived in a very creditable condition – scarcely a drunk among; they seem a splendid lot of fellows and should give a good account of themselves.

Among the officers are quite a number of juvenile 'sub-lieutenants and midshipmen', whose means of subsistence consist mainly in navigating a ledger or attending to a telephone. The other officers are by profession solicitors, bank managers and newspaper reporters and other risky occupations which go to make a seaman. Two of them have actually been to sea.

8 August
The gentle public are admitted from 10 am to 3 pm and have fully availed themselves of the opportunity of saying good bye to their friends. The ship is crowded, and I really think from a few observations I have made that the NSW men have more female relatives than ours.

26 August
Arrived at Hong Kong at 8.30 am. When we were fairly in the harbour we were amazed at the immense number of vessels at anchor; the scene was a most unique one; there were some of the most powerful warships afloat belonging to almost every civilized power, lying at anchor. There are American, British, German, French, Italian, Russian, Portuguese, Chinese, Austrian and even Dutch war ships. The sight was a most imposing one and one that may never be seen again.

As soon as we anchored we were surrounded by a flotilla of sampans, bumboats and junks all anxious to trade with the gentle colonial. One of the Chinese who boarded us was asked by an officer who had been to China before 'what pigeon you cachee John'. John replied in the most finished english that he was a commission agent, did a little in insurance and would be glad to place his services at our disposal in the way of changing sovereigns into dollars etc.

30 August
Received orders to proceed to Woosung as soon as possible. I regret to say that the 14 pounders are to be left behind in favour of 12 pounders. The weight and difficulty in obtaining ammunition for the former, threw them out in favor of the former [latter]. We also being supplied with 4–.45 Maxim guns.

2 September
Yesterday we saw a fish that caused a good deal of discussion – anything varies the monotony now and helps to make us for the time forget the heat. The general opinion (which was not worth much) is that it was a dragon fish: I would like to say that the above opinion was voiced by some juvenile Naval Officers in the NSW Contingent. The assurance with which these youthful navigators (none of them have ever been out of sight of the smoke of their mother's chimney before) give their opinions in things nautical is quite refreshing.

3 September
Anchored at 9.45 am [at Woosung] and was boarded by the medical officer. After being passed went and anchored near the *Goliath*, the Flagship of the British Admiral, Admiral Seymour. There is a large number of British and Foreign warships here, and a number of transports we saw in Hong Kong are waiting for orders. The Yang-tse-Kiang is a broad fast running river, the water is perfectly yellow, resembling the Yarra water after a flood, but the shore doctor says it is the best drinking water in the world and the only water the Chinese will drink cold.

4 September
Captain Clarke Senior Naval Officer here came on board and after inspecting the men addressed them and cautioned them against drinking water that had not been boiled or well filtered and also against the use of any vegetable that grows above ground unless it is well cooked. He spoke in an exceedingly melancholy strain and from the tone of his remarks evidently fears a very strong combination against Great Britain. We are now waiting for a Pilot and understand we are to garrison the Taku Forts.

7 September
Arrived at Wei-hai Wei at 8.30 am... There is evidence everywhere of grim war. The hospital tents with the red cross flying over them, the *Terrible*, the *Dido* the hospital ship *Marie* and the *Salamis* and a number of transports give anything but a peaceful look to things.

9 September
Arrived at the anchorage of Taku at 1.30 am. There is over one hundred ships of all nationalities here and a number of transports.

18 September
About 4.30 pm an order came from Head quarters to be ready to march at 5.30 pm to the [?] and embark on lighters etc and take part in the bombardment of the Pei-Tang forts – pretty smart work. At 5.30 pm. The Victorian Contingent in company with the NSW – marched quickly into Tien-Tsin. It appears that there was some difficulty about a train (the Russians were then in charge) so we were taken to the river bank below the town and after a delay of about 5 hours were embarked on a lighter-together with a detachment of the 1st Sikhs, 20th Punjabi infantry, 31st Madras Pioneers, 1st Bombay Cavalry, a half battery of the Royal Horse Artillery & a large number of mules and some horses. The men were ordered below and the officers and mules occupied the deck, which barely afforded standing room.

Towards midnight a tug took the lighter in tow and proceeded down the river, but there was again some trouble with the Russians about opening the bridge in their charge. Eventually we got through and the tug settled down to her work which consisted in herring boning the river and bumping the lighter on either shore alternately.

There was no room to stretch out for a sleep, and to add to the discomfort, the rain came down at intervals in torrents all through the night. The men had nothing to eat since noon but about 11.30 p.m. tinned meat and cast iron biscuit (the hardest I have ever tried to negotiate – even on a deep sea water cruiser) was served out to them. Of course sleep was impossible. A mule's chief object in life seems to be to kick something, and when one lulled himself into a sense of false security, thinking the mule in his immediate neighbourhood was asleep, and returned to sit down and soliloquise on the gentle art of war, he would be rudely awakened by a blow as if delivered by a sledge hammer and suddenly find himself in the lee scupper. Just about sunrise we were finally bumped ashore near a deserted village and the troops disembarked, tucker as before served out, and then commenced the record march in China, that is, taking into consideration the nature of the country ...the weight the men had to carry ...and the terrible heat of the sun.

Of our party only 5 or 6 had to give it up, and considering that we were fresh from the ship, where [we] had practically been passengers, our men did very well indeed, and the fact

that before one of our men fell out, 25 of the 1st Sikhs fell by the way, speaks well for the endurance of the Victorians. About 2 p.m. we saw the Sikhs throw out an advance guard who shortly after signalled 'enemy in sight' at which their comrades gave a great cheer and advanced at the double. We were all pushing along and saw some wounded Russians being carried past us, and about 3 pm came in sight of the forts. We saw a shell or two burst and then were brought to the halt with the news that the forts were taken by the Russians, French and Austrians two hours before. Everyone was terribly disappointed and disgusted, and some of the anathemas hurled at the Russians and Germans for starting before the appointed time, would have done credit to a Queensland bullock puncher.

12 October

Received orders to proceed to Pao-Ting-Fu, 70 Chinese junks have been got ready for the transport of the Commissariat Stores etc., for the land column, which starts at 10 am tomorrow. We had to pack our traps at short notice and Sub-Lieutenant Burgford and I had to sleep on board. I shall never forget that night. When we got on board things looked only middling. The junk was about 60 feet long and was divided by bulkheads into a number of compartments. We thought we might obtain a night's lodging in one of these, but on lifting the hatch made some remarks which are unfit for publication, we would have preferred the cruise boat on the river Styx in summer to that abomination. After our stock of bad language was exhausted we decided to sling our hammocks, but there was nothing to sling to. We remembered a few profane Chinese expressions we had learned in Hong Kong, and hurled them at China, the Chinese, the Chinese junks and everything Chinese in Heaven above and earth beneath and lay down on the deck and there like the Blessed Apostle wished for daylight.

At 6.30 am. We started up the Pei-Ho river but were delayed at the French bridge until 10.30 a.m. this is the time for opening it, and the French Officer in charge took care that the British Transport was not through a minute too soon. (The French do not seem to be able to veil their hatred of us) By this time the traffic had become congested, and I think I am well within the mark when I say that there were at least 500 junks above and an equal number below the bridge waiting to pass through a space 50 feet wide.

A rather amusing incident occurred while passing through the bridge of boats; a French sentry without any provocation whatever knocked one of our Chinese crew down with the butt of his rifle, one of our blue jackets ran to take a hand in the matter but the Frenchman covered him with his rifle; the dialogue that followed was entertaining if not edifying, the French son of [?] when he had finished yelling 'A, bas l'Anglais' was assaulted by a tar with 'Waterloo you son of a - Fashada you frog eating –'

15 October

At 12.30 am the sentries reported rapid firing in the rear, the assembly was sounded, and we all turned out more quickly than we had ever moved before. When we had all dressed and armed and expecting some fun, we found that an attack was being made on a Boxer stronghold that we had passed during the day without turning it. The French and Germans who were following us were informed of it and made a midnight attack killing a number of Boxers and capturing a leading Chief and a large quantity of arms and ammunition.

The French and German troops are marching on Pao-Ting-Fu in one direction, the British in another and the Column from Peking in another, so that the city will be surrounded. All the British and foreign troops sight their water transport every two days in the canal and are supplied with provisions. When we reach our stations the heliographers select the roof of a temple on the highest elevation and try and pick up the land column. Seeing the large number of allied troops that are taking part in this expedition one can readily understand the immense flotilla that is required to carry provisions and men to do outpost and picket duty.

This is a hog's life. I have not had my clothes off for days, but this afternoon while waiting for the land column, I entered into a contract with a Chinese boy to wash me down daily with warm water and carbolic soap. ...The terms of the agreement are, the boy boils

water after Char [?] in the morning – about 10 pm [sic], and washes me from head to feet, dries me and provides me with shaving water, washes my towels – in my presence – if I did not watch the swab he would wash them in the canal which would be certain death-. The remuneration for the above services is 10 cents per diem – a little over twopence. The boy will in time become a bloated Chinese capitalist.

Our junk is armed with a 12 pr. Field gun and two others carry .45 Maxim guns. Our junk is quite unsuitable for a 12-pr. And I'm afraid that either the guns or the junk will suffer if we go into action. We are informed that 9 armed war junks are about two days ahead of us, but whether they will stay to exchange compliments with us remains to be seen. We are ready to compare notes with them and are constructing a handy magazine in a Chinaman's sleeping compartment.

18 October

Another addition to our column has just appeared, about 30 junks containing an Indian regiment joining us, making our squadron now 100. More numerous than that which William of Normandy brought the Army that fought the battle of Hastings. The Italian and French water transport also came up, there are in all 170 junks and when they are all under sail the scene is a most imposing one, the column being about 5 miles long. I forgot to mention that when we passed the town about 100 French Cavalry lined up and saluted the Victorian ensign. It is needless to say that the French flag adorns the fort, we seem to be the last everywhere.

21 October

We passed a terribly cold night, the ice was ¼ inch thick on the deck in the morning. This is worse than a hog's life, and has a brutalizing influence on one, although I would not have missed it for a good deal. One calls the Chinese the most blasphemous names in the most unblushing manner, and makes remarks about the tomb of their ancestors and the virtue of their relatives that would get us six months in any other country. However as they don't know what we are talking about it does not matter much – to them.

26 October

Eight Boxers were shot yesterday. The Victorians were offered the honor of shooting them, but declined. Anyone can shoot prisoners. The Germans gave them their quieters. The sappers and miners are busy mining under the Inner Temple which is to be blown up. The Chinese really believe that that the Foreign Devils are only hastening on their own destruction by desecrating their temple.

We are on the opposite side of the canal to Pao-Ting-Fu and have to cross a stone bridge of Chinese construction to reach the city. An immense number of Chinese expose their wares for sale, and I think all the disease in the universe is congregated there. We saw sights that made us shudder - and we had almost seen enough to make us callous. … We named that bridge 'The Bridge of Sighs'.

We have seen all that is to be seen here have fulfilled our mission so far and preparing to leave for Tien-Tsin but I think we are going to have some rough work before we reach there. There are nine Chinese war junks to be captured and eight or nine large villages to be burned down by the water column.

29 October

After proceeding up a broad canal for about 3 hours could distinguish some tall spars which did not look like those of the ordinary Chinese junk. Upon closer inspection we discovered that they were the vessels we were in search of, and are wondering if they will have the pluck to fight. We now hurried in as quickly and as silently as possible (the only way to keep silence in a Chinese junk is with a bamboo [cane?]). We were well hidden by the rushes and our masts were lowered. A bend of the Canal brought us into open water in front of the village and we came on the alleged war junks so suddenly that they could absolutely offer no

resistance. Boarded them and made prisoners of the crews and put guards on board and proceeded to land. The expeditions were well timed the land force arriving about the same time as we did. But again the wily Chow would not fight and it is impossible to tell who are Boxers and who are peaceful villagers. On the approach of any superior force they hide their weapons and indulge in their usual occupations. The peaceful people are afraid to assist us in getting the ringleaders for as soon as we are gone everyone of them would be minus his head. This is another of our many bloodless victories. We have defiled the tombs of their ancestors, made improper remarks concerning the virtue of their lady friends, but we are greeted with nothing but smiles – they beat us every time.

1 November

Started down the canal at 10 a.m. At 1 pm. a party landed and burned down a large village, the inhabitants of which had given a great deal of trouble. They evidently had expected to be dealt with as the majority had run away and only a few cripples and old women remained. When we had finished with this village we proceeded some distance down the canal and burned down another village. When the column left this morning two of the war junks were sent back to collect the indemnity which it had been arranged the village should pay, an indemnity of I believe $13,000.

4 November

Continued down stream until we reached Tulin, when, during the time we were waiting for the land column, all the rubbish was cleared out of the captured junks. The junks are divided into a number of small compartments which contain the clothing and all the worldly effects of the crew. These compartments also contained canisters of black powder, percussion caps, fuses, projectiles all mixed up in the greatest confusion. The armament consisted of one 4¾" brass muzzle loading gun, and they were actually loaded right up to the muzzle. If they had attempted to fire them, the result would have been worth looking at, but would not have been a pleasant sight. When they were cleaned out, the flags were placed in one heap, the muskets in another and a collection of miscellaneous rubbish in another. The powder was placed about 200 yards inland and sentries were placed on it. Each officer had the privilege of selecting a flag. The muskets most of which were loaded, like the guns right up to the muzzle, were destroyed. The swords etc. were distributed among the land and water column. It was the intention of the Colonel to explode the powder etc. but man proposes and God disposes. I had just got my flag and was walking up the gangway of our boat when two terrific explosions took place.

It appears that the Cooleys thought that some loot might be had from the heap the sentries were guarding, and they evidently overpowered them (the sentries). Some one must have stepped on a percussion cap or thrown a lighted match among the powder.

I hope I shall never again see such a sight. The bodies were blown about 60 feet high, and those who did not get the full shock of the explosion were a terrible sight, the poor wretches were simply balls of fire. They ran for the river, but very few reached it, being burned to a cinder. One unfortunate dropped at my feet just a few yards from the river. A number of bodies were thrown right over the junks into the river minus heads arms etc. I saw one body 500 yards from the scene of the explosion. I went with the doctor and two Sikhs, who were told off to shoot those who were beyond recovery, a circumstance that shows the demoralizing effect of war on a man who at one time would have made scurrilous remarks about anyone else who voluntarily performed such a task.

The Indian doctors worked like slaves, they are a highly trained and very skilful body, and the work they performed on this occasion I'll never forget. If there were the slightest hope of recovery no man was shot – and a Chinese Cooley's life is not a high priced one. We were not able to ascertain how many were killed as the Chinese took numbers on board the junks with a view to burying them in Tien-Tsin, and a number of the victims also belonged to Tulin and the villagers took them away. We buried about 50.

14 November
Was transferred to the Royal Engineers today. Took over the plans and specifications of a number of buildings from Major Jeffries R.E. The following is what we have in hand for a start [the list includes stabling for 360 horses, buildings for 380 Indian camp followers, an infection ward for a hospital, numerous cook houses and latrines and some work in connection with the Victorian contingent].

7 December
I witnessed a quaint and picturesque sight this morning, although a very mournful one. A Captain in a Zouave regiment stationed here died, and a large number of all the Allied forces stationed in Tien-Tsin followed the remains to the grave. God's acre is a beautiful little spot behind an equally beautiful little chapel. When the procession arrived and the funeral service commenced it was snowing heavily – what a strange weird sight. With the exception of the clergyman's voice, everything was as still as the unfortunate officer, to whose memory we were paying the last tribute of respect. A strange feeling came over me, and I almost wished for the time when men will turn their swords into ploughshares. But the time is not yet.

13 December
The usual round of inspection, the buildings are approaching completion by dint of being continually on the heels of the Contractors & men. They are all very obliging. I made my friend Tuing-Yung-Hsiang pull down the side of a house three times because it was out of plumb. He is come to the conclusion that it pays better to do his work well, as I stop his progress payments occasionally.

25 December
Xmas day in North China. We spent the day very quietly, and the night in an equally sober manner. The rendezvous at night is the British Club and things are often fast and furious there. A favourite amusement consists in a number of officers getting behind the bar and a number in front of it and throwing new members of the Club backwards and forwards over it, very good exercise for all except the one who provided it.

1 Jan 1901
General Lorne Campbell and the British officers in Tien-Tsin gave a dinner at Astor House to celebrate the federation of the Australian Colonies. It was a splendid affair. All the Colonial Officers in Peking and Tien-Tsin were invited, and it was a very graceful compliment to the Colonies. There were only two foreign guests viz. Colonel Schister, an officer on the Russian Staff and a German officer whose name I can't spell. The former prided himself on ever since he could remember, having been sober after 12 o'clock noon. I saw a good deal of the gentlemen and but never saw him so drunk that he did not know everything that was going on around him. My private opinion is that he is a most accomplished Russian intelligence officer. After dinner speeches were made, some of them were rather incoherent. Some one managed to secure some blankets and a certain officer was tossed. Another who would have been similarly dealt with managed to escape and his grey hairs saved another, who deserved it. An adjournment was then made to the club."

About the Author

William Robertson was born in 1858 and joined the Victorian Navy. His service included an appointment as Engineering Officer of the Cerberus. He drowned in Williamstown in 1910.

The Directorate of Navy Historical Studies has a complete copy of the Robertson diary.

Shiphandling Corner

KANIMBLA Class LPA

By Commander Ray Griggs, RAN

In this edition we continue the series on new classes of ship introduced into the RAN in recent years. Unlike last edition's focus on a new ship this edition looks at one reborn; the KANIMBLA class LPA. In recent months the LPA has been very much in the news over the asylum seeker issue and more recently in respect to the war on terrorism. It seemed then like an appropriate time to investigate the shiphandling vagaries of the LPA. I am indebted to Lieutenant Michael Moore, the Navigating Officer of HMAS *Kanimbla*, for his significant input to this article during what was a busy and demanding workup period.

There has been more than enough written in various defence magazines and journals about the conversion of *Manoora* and *Kanimbla* from Newport County class LSTs to the distinctly different and more capable KANIMBLA class LPA.[1] To that end I will not dwell on that phase of the ship's life. Their re-introduction into service has been relatively recent and the significant structural changes that occurred to the ships in their conversion have had an impact on certain aspects of shiphandling.

Handling flat-bottomed ships is always a challenge as anyone who has ever handled an LCH can attest. That said, once the idiosyncrasies are mastered they provide great satisfaction.

From the table below a number of things are immediately obvious, including its unusual engineering configuration and relatively light draught for its displacement.

Engineering Configuration

The six ALCO diesels provide flexibility in the configuration options available. Each shaft can have one, two or three engines connected to it

giving approximate maximum speeds of 10, 16 and 20 knots. The engines are housed in three engine rooms with two of those engine rooms each having a Machinery Control Room.

The plant is controlled by a new Bird Johnson Propulsion Control System, which was fitted during the LPA conversion. The main change was the replacement of the pneumatic components of the old system with a microprocessor based electronic control system. This system allows for regulation of Controllable Pitch Propeller (CPP) pitch and engine speed, engine load sharing, load control and station transfer (between Bridge, MCR and local control) through the Allen-Bradley modular processor. The processor and associated modules are all rack mounted which eases accessibility and maintainability.

Length	168.2m
Beam	21.2m
Draught	5.3m
Displacement	8450 tonnes
Speed (max)	20 kts
Range (15kts)	14000 nm
Engines	6 ALCO Diesels
Propellers	2 Controllable Pitch Propellers
Rudders	Twin
Bow Thruster	800hp transverse Bird Johnson

A combinator (pitch and engine speed) throttle is used to adjust ship's speed. In normal conditions when the engines are not under heavy load, the pitch control system compare actual and commanded pitch settings and adjust accordingly. As the load increases then the key determinant becomes the fuel rack position on the engine versus the pre-determined maximum allowable fuel rack position for that setting. This difference is called the rack error and, if it is positive (the actual rack position exceeds the maximum allowable), then the engine is deemed to be overloaded and the system is transferred to load control mode. In load control mode the system will start to shed pitch to reduce the rack error. Once in this state, propeller pitch becomes a function of shaft rotation speed and engine load rather than the combinator setting itself. This is of course an essential system in a CPP fitted ship to protect the plant.

With multiple engines driving a single shaft, load sharing becomes an important engineering consideration. The LPA system operates a master and slave engine arrangement depending on whether two or three engines are in use. To load share the slave engine(s) fuel rack position is compared and adjusted to the master engine fuel rack position until both or all three engines are equalised.

Shiphandling Issues

The LPA conversion had a significant impact on the physical structure of the ship. The bow area was re-arranged following the removal of the 'horns' which supported the old bow door ramp. The area forward of the bridge was widened and modified to provide a forward helicopter deck. A 70 tonne crane was installed immediately forward of the bridge to enable embarkation of LCM8s onto the deck. The amount of superstructure in the central part of the ship was increased with the addition of the hangar, helicopter control position and training classroom (which is now the Joint Operations Room). Down aft the ship became entirely flight deck and two sponsons were added on the quarters to facilitate berthing and other seamanship requirements.

The shape of the ship is now more akin to a coke bottle. As a result, visibility during shiphandling becomes a major issue. When berthing the hull curvature means that the conning officer cannot see the stern, even when perched out on the extremities of the bridge wing. This brings with it all sorts of challenges, particularly when trying to judge when the ship is square with the wharf.

Visibility is also an issue due to the positioning of the 70 tonne crane. This is probably one of the more stunning examples of the need for a nexus between the naval architect and the shiphandler. For those who have tried to handle *Tobruk* with the Velle derrick elevated and stowed for flying, you will know the frustration of having your ship's head totally obscured and know how annoying that is. The LPA crane virtually obscures the bow and completely obscures the conning officer's view of the starboard side. When berthing starboard side to, the crane must be positioned fore and aft to allow this evolution to be conducted.

As in any flat-bottomed ship; leeway is a significant issue. The LPA, with its increased sail area due to the superstructure modifications, gathers leeway very quickly. This makes waiting in the stream and trying to maintain position very

interesting if there is any significant wind. When berthing, opposing engines to kick the stern away from the berth will have little effect if the ship has started to gather leeway. As a result in anything but the most benign conditions a large tug is required aft.

The LPA is however quite handy when underway at a decent turn of speed. Of course she will skid and slide through her turns as do her flat bottomed relations but her tactical diameter is quite tidy for her size. Like most ships the LPA is anything but handy at low speeds, a peculiarity is that the ship will lose steerage way at quite high speeds (around 6 knots) when power is taken off quickly. Steerage way can be regained by coming ahead again, but if ships head has started to pay off, it will take some time to arrest that. If the reduction is more gradual steerage way can be kept down as low as 2 knots

Towing is a tricky evolution in the LPA as there is no provision to tow from the centreline aft due to the flight deck modifications during the conversion. Notwithstanding the LPA has recently successfully towed an MFU from one of the 'quarter sponsons'.

Going astern is also a challenge to the ship handler as movement of the stern is not always predictable. LPA shiphandlers report that the stern has a mind of its own and will invariably choose the most inopportune moment to go in the least desired direction. Early and bold use of the rudder will catch the stern in most cases but often either the bow thruster or tug needs to be employed to get the stern back under control.

The bow thruster is very useful and will handle most requirements for manoeuvring even in quite strong winds. The usefulness of the thruster is reduced at speeds of over 5 knots which is normal for transverse tunnel style thrusters. A dedicated generator needs to be online to provide for the 800hp electric motor. Because of the thruster's effectiveness, it is very rare to need two tugs to berth the ship.

All in all the LPA is one of the more challenging ships in the RAN to handle. The combination of flat bottom and increased sail area combine to keep all LPA shiphandlers on their toes. There is no doubt though that it is one of the most versatile ships and provides the RAN with a number of capabilities that it has not had at sea for some time.

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[1] See *Ugly Duckling or Swan*, Commander T. Vine, RAN, *Journal of the ANI*, Summer 2000-2001.

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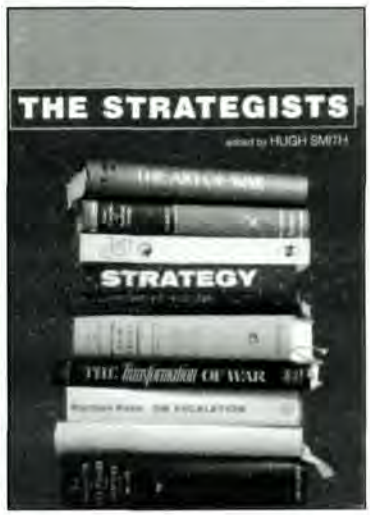
BOOK REVIEWS

The Strategists



Edited by Hugh Smith
Australian Defence Studies Centre, Canberra, 2001
Paperback, 145 pp., index
ISBN 0-7317-0453-3
$27.50

The Strategists is a series of short essays on some of the better known military strategists and is based on public lectures held at the Australian Defence Force Academy during 1998. The strategists covered are Sun Zi and Clausewitz from the classical period, and in the modern period: Mahan and Corbett on seapower, Fuller and Liddell Hart on mechanised warfare, Douhet on air power and Mao Zedong on revolutionary warfare. Each essay provides a brief biography of the strategist, the era and circumstance within which they wrote and a basic outline of their major ideas. There are also three papers on contemporary issues: the nuclear strategists, the Revolution in Military Affairs (RMA) and the end of strategy.

In his introduction, Hugh Smith provides an outline of the levels, nature, context and future of strategy, as well as the character of the Strategists. It has often been remarked that these Strategists are more quoted from than read, but perhaps more pertinently, the question is whether they are actually understood. Given the propensity for many to misquote these Strategists, an understanding of context is essential to understand their utility (or otherwise) to current events.

The essay by James Cotton provides a succinct outline of Sun Zi's thoughts, their context, and more importantly, the difficulties over time with translation. While Sun discussed the technical details of warfare his interest appears to have been in the psychology of war and the use of deception in warfare. This shows a sophisticated concept of strategy that sought to defeat an enemy before their armies had to meet on the battlefield, and one assumes this is the aspect of Sun's writings that appears in management texts.

Hugh Smith's essay on Clausewitz and *On War* provides the context for examining what Clausewitz meant. The oft forgotten issue with *On War* is that it was a draft. While Clausewitz wrote extensively on the technical details concerning land warfare, he is chiefly remembered for his linkage of warfare to government policy. It was this notion that led to rewriting of the entire manuscript, although only one chapter of 125 was in fact rewritten before his death. Given the unfinished nature of his work, Clausewitz is perhaps the most misquoted and least understood strategist.

John Reeve's essay on Mahan and Corbett shows their use of history to explain the nature and utility of seapower. Mahan's work was used to justify large battle fleets concentrating on capital ships, the notion of the decisive naval engagement and concepts such as the command of the sea, while Corbett focused on the joint nature of operations (Navy support to the Army) and concepts of sea control. This essay is particularly interesting as it shows the influence of Strategists is inextricably linked to the acceptability of their theories. Mahan's proposals for large ships was acceptable to many navies worldwide and he was regarded as a prophet, while Corbett's rejection of the concept of the decisive engagement in lieu of joint operations put him at odds with the British Admiralty.

The essay on Fuller and Liddell Hart by Peter Dennis shows their writings to be a reaction to the carnage of World War I, and their theories on mechanised warfare were only implemented in a

limited manner. This was due, in part, to their entrenched criticisms of the Army establishment during the interwar years (not conducive to having your theories accepted!) and personal foibles. Fuller being discredited as a Fascist and Liddell Hart having his theory about defence being stronger than the offence disproved at the beginning of World War II.

Given the innate tendency for inter-Service rivalry within armed forces, John McCarthy's essay on Douhet is instructive in outlining the initial rationale for independent air power, based on a bomber force that would undertake pre-emptive strikes against an enemy's civilian population. Unfortunately history has yet to prove Douhet's theory that under sustained bombing civilian morale will crumble and an enemy will be forced to surrender. Interestingly, Liddell Hart was an early proponent of air power until its lack of precision caused a rethink. While theories relating to land and sea power also have their problems, many air power theorists have overstated their case (that independent air power is all that is required) as this essay ably demonstrates.

David Kelly in his essay on Mao shows how dated the concept of People's War has become in a more technologically driven world. Mao was successful in China, and while his writings influenced the development of revolutionary theory in Vietnam, it is not clear that the remaining guerilla movements (whether communist or Islamic) are able to translate his theories into practice. The continued use of People's War (updated for high technology conditions) in Peoples Liberation Army-Navy planning shows how strategies can become limiting when they become dogma rather than a flexible tool.

While these essays act as a good primer for those about to attend a staff college or a university-level course in military strategy, the contemporary essays are the most interesting. Paul Keal provides a concise and easily understood outline of the issues surrounding the development of nuclear strategy over the past 50 years. Strategists had to deal with a range of political and military issues that arose with the first use of nuclear weapons, with the basis of nuclear strategic theory being deterrence. However, continued technical innovation in both yield size and delivery systems threatened to breakdown deterrence with new concepts as first strike, counter-strike etc. As Keal notes, the early strategists recognised that the nature of nuclear weapons led to a self-regulating order of behaviour between the nuclear powers. However, the ending of the Cold War and the demonstrated testing of nuclear weapons on the Sub-Continent have upset this ordered behaviour, as has concern over the possible access to and use of nuclear weapons by non-state actors.

If strategic theories are developed as a reaction to changes in warfighting and technology (as demonstrated in the earlier essays), then the final two papers examining the RMA and the future of strategy are a fitting conclusion to the volume. Steven Metz, who has been intimately involved in the conceptualisation of the current RMA, provides an overview of progress to date. More importantly, and rarely described are the difficulties in controlling the direction of the RMA, how it might be applied and the possible outcomes. This is something for Australia to consider and the current policy of waiting and watching the US would appear wise. The essay by Martin Van Crevald questions the paucity of strategic thought concerning conventional warfare since World War II, and discusses the misunderstanding of low intensity conflict and the misapplication of these theories to those conditions. More importantly, Van Crevald notes that current strategic theories (which are based on the Clausewitz's notion of the State) are becoming less useful in an environment where notions of the nation state are declining and/or there is an increase in non-state actor activities that impact on the nation state. This is the fundamental strategic debate for the 21st century - how to reconcile the possibilities of the RMA for warfighting against the possible decline in importance of the nation state.

The standard introductory text for strategy courses has been *Makers of Modern Strategy*, either the 1943 version by Meade or the updated 1986 edition by Paret. Students have long considered the Paret version to be a book written by academics for academics and therefore difficult for the average (and perhaps uninterested) student to understand. *The Strategists* therefore acts as a valuable introduction to the ideas of the military strategists, before either moving onto *Makers of Modern Strategy* or directly to the works of the strategists.

Reviewed by Andrew Forbes

Pearl Harbor

by H.P. Willmott
Cassell
Hardcover, 224 pp.
ISBN 0304358843
$49.95

Pearl Harbor: The Day of Infamy. An Illustrated History

by Dan van der Vat
Allen and Unwin
Hardcover, 176 pp.
ISBN 1865085758
$49.95

The Japanese attack on Pearl Harbor on 7 December 1941 was one of the most traumatic events in the history of the United States of America. The attack resulted not only in America's entry into the Second World War but also, from the point of view of Winston Churchill, ensured ultimate Allied victory.

The very nature and success of the Japanese attack has also made Pearl Harbor the subject of books, movies, documentaries, computer games and countless conspiracy theories. These two books by Dan van der Vat and H.P.Willmott are just the latest in a long line of books dealing with the Japanese strike on the US Pacific Fleet in 1941. Perhaps surprisingly, both books take a very similar approach to the subject, even to the extent of being in the same format. They would both appear to be targeted at similar markets during the 60th anniversary year of the attack.

Although neither book is a truly academic text on the subject, they are both well written and researched. Both are aimed at the layperson or armchair historian with a general interest in the subject. But they also provide students and researchers with a good starting point. They both cover the origins of the Pacific war as well as the events leading directly to the attack itself. Given the international and strategic significance of the attack and the multiplicity of inter-related issues, the overall depth to which matters are covered by both books has necessarily been limited. To do otherwise would require an encyclopedic treatment and defeat the popular purpose.

Both books make excellent use of photographs, maps and computer generated graphics. Personal accounts and recollections help to bring the story alive for the reader and clearly convey the human side of the tragedy.

That the attack on Pearl Harbor had major significance for the direction of the Second World War is undeniable, and it is this impact which has given rise to the myriad of conspiracy theories surrounding it. For all the digging and finger pointing of the revisionists, however, they have still been unable to prove their case that Churchill and/or Roosevelt conspired to bring America into the war via the Pearl Harbor attack. This issue is discussed in both books. The attack was a disaster, which was more the result of strategic error than conspiracy.

All in all, both authors have produced very readable books, which cover the strategic and intelligence aspects, the causes and the effects of the Pearl Harbor attack, although Willmott's book suffers somewhat from some poor editorial work. The books are well written and illustrated and in a 'blind taste test' it would be difficult to tell them apart. The final decision as to which one to buy will ultimately come down to personal choice.

Reviewed by Joe Straczek

NAVAL IMAGES OF THE WAR AGAINST TERRORISM

Photographs:
Above - An AH1W *Super Cobra* helicopter flies above a US Marine Light Armored Vehicle (LAV) Kandahar, Afghanistan.
Below: The *USS John C. Stennis* Battle Group. The fast combat support ship *USS Bridge* (AOE 10) leads other ships, from left, the guided missile cruiser *USS Port Royal* (CG 73), the Canadian Patrol Frigate *HMCS Vancouver* (CPF 331) and the destroyer *USS Elliot* (DD 967). (Both Photos US Navy).

Above: A F/A-18 *Hornet* from the "Mighty Shrikes" of Strike Fighter Squadron Nine Four (VFA-94) returns from a strike mission. VFA-94 is assigned to Carrier Airwing One One (CVW 11) aboard *USS Carl Vinson* (USN Photo)

Below: A SH-60E *Seahawk* helicopter prepares to lift stores from *USNS Walter S. Diehl* (T-AO 193). In the background is *USS Curtis Wilbur* (DDG 54) (USN Photo)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