Transforming Australian Army Logistics to sustain the Joint Land Force
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Chief of Army Scholar 2017

October 2017
Australian Army Occasional Paper Series

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Abstract

There is need for the Australian Army and its logisticians to address the transformation of its logistics capabilities, concepts and processes. This is not only because Army must look to the future and the ever-changing face of war, nor is it because of revelations gained through nearly twenty years of operational experiences. It is not simply because the Chief of Army, Lieutenant General Angus Campbell, directed his senior logisticians to lead a ‘revolution’ in late 2016 or that Army’s balance of forces between the ‘tooth’ and the ‘tail’ is awry. Army needs a transformation of its logistics, now, because of the intractable nature of change as it applies to logistic modernisation. It needs to reinvigorate a stalled evolution of its logistics capabilities and capacities by making transformation less of an extraordinary activity, and part of the daily business of Army logisticians and planners. It is because Army must be ‘primed’ for the real revolution in logistics that comes with a modernising Army; Army’s logisticians ensuring the ADF’s land force is well-prepared and optimised to accept the benefits of future technology, process and concepts.

Transforming the Australian Army’s logistics to sustain the Joint Land Force addresses the topic of logistic transformation in two parts. The monograph will first outline Army’s track record with transforming logistics to establish the context behind which transformation should be examined in the future. The changes described have been a combination of those imposed upon Army, but also the consequence of operational experiences. During the 1980s and 1990s transformation of logistics was centred upon establishing a force structure based upon the Defence of Australia strategy. However, it was a series of reviews by successive Labour and Coalition
Governments. Army to, as part of the Australian Defence Force writ large, over-exuberantly cut its ‘tail’ to fund its ‘teeth’. The flaws in this approach resulted in a harrowing experience in deploying to East Timor in 1999, and Army was forced to consider its logistics strengths and weaknesses in considerable detail. However, the transformation of Army logistics largely stalled as operational imperatives changes with successive operations in the Middle-east, and with managing organisational change occupying much of Army’s time in garrison.

In the second part of Transforming the Australian Army’s logistics to sustain the Joint Land Force, four challenges facing logistic transformation will be discussed. These four challenges will articulate why transformation is now required. Ideas relevant to future wars will be discussed, including emerging operational concepts relevant to the provision of logistics in contested environments. Doctrinal ideas will be challenged, and alternative concepts proposed. However, the monograph will not prescriptively outline the detail; this is the work of the concept developers, doctrine writers and those logisticians and commanders who will ultimately lead the implementation of transformation plans. Instead Transforming the Australian Army’s logistics to sustain the Joint Land Force focuses upon observations and conclusions about the direction of transformation, proposes how problems may be prevented in the future, and identifies operational and non-operational issues that must be overcome in future transformative efforts. Moreover, it contends that the Australian Army’s logistics community must lead its own agenda in this period, else others will do the leading for it.

Transforming the Australian Army’s logistics to sustain the Joint Land Force exists because there is need for public discussion on the topic of logistic transformation simply because the subsequent consideration of the problem will be directly relevant to successful change. This is because the real problem facing the transformation of the Australian Army’s logistics is not that Army does not know the problems or the solutions, although the monograph describes these issues. Army has already spent considerable time and planning effort to identify logistics issues which need resolution. Rather, the monograph asserts that it is the manner and means by which transformation in logistics has occurred that is the central problem. As Army ventures into a period of considerable change, both environmental and in terms of opportunities offered by new capabilities, it is time that logistic transformation becomes a focal point for Army and its continued evolution.
Introduction

In late 2016, the Chief of the Australian Army challenged the senior Army logisticians to revolutionise Army’s logistics. This was not because sustainment operations were not happening successfully; nor was it a condemnation of any imagined inadequacy in the efforts of the soldiers, officers and civilians responsible for delivering Army its logistics, and by extension, operational capability. Such operations and efforts, also borne by the joint logistics community and the wider Defence organisation, have kept Australian forces in the field for nearly 20 years of operational activity. Rather, the CA’s challenge was a direct statement that logistics transformation must come from within Army’s logistics community; an encouragement to find innovative ways in which Army’s logistics capabilities could be enhanced without substantially growing the land force. Furthermore, it reflected a need to break from tradition and custom to progress logistics development in a new direction. While neither an indictment on Army’s logisticians nor their leadership, the challenge compels the community to realise transformative efforts in balance with current operational needs, and with a speed of execution that will enable the entire Army to continue its evolution.

Long-term transformation in any component of the land force has always been a difficult and consuming process. Most Western militaries have had difficulty in logistics transformation, and various individuals have written about such challenges as a consequence. John Louth, writing about the model used in the UK, describes unrealistic expectations being made of logistics capability, the inability of the logistics community to successfully make the intellectual and business case for investment, the
general unwillingness of the organisation to accept their advice once offered, and a widespread ‘misreading’ of the significance of lift and sustainment capabilities to numerous operational scenarios. Numerous American reports and papers attest to similar difficulties, and describe the consequences of logistics transformation stalling in recent operations such as Operation Iraqi Freedom in 2003. Although few Australian Army logisticians have written on logistics transformation, a number of notable papers exist such as Lieutenant Colonel Susan Smith’s research paper in 2000 which examined East Timor operations and the need to change Army logistics. More recently the need for logistics transformation featured in Army’s 2014 Institutional Lessons Study and was regarded as Army’s primary concern by its leaders. It was subsequently discussed further during the resultant ‘On Operations’ conference and publication during 2015. The problem has never been that issues requiring transformation have remained unknown; rather, the problem has been the manner and means by which change is implemented.

Army’s logistics capability and capacity has endured tremendous transformation over the past thirty years. During the 1980s and 1990s a series of Government-induced reviews by successive Labor and Coalition Governments compelled the Australian Defence Force (ADF) to cut its ‘tail’ to fund its ‘teeth’. Army bore the brunt of the cuts, and within Army, the commercialisation process affected Army’s logistics capabilities the most. Since the harrowing experience of a deployment to East Timor in 1999, Army considered its logistics strengths and weaknesses in considerable detail. During the seventeen years since Operation WARDEN, strategic planners have conceptualised various pathways to effect land-force logistics, and senior commanders and logisticians have argued persuasively and campaigned consistently for further investment or force structure adjustments.

We are, however, still left with an unpleasant feeling that Army’s logistics capability is a ‘sword of Damocles’, waiting to play havoc with the future Army’s operational performance. Dr Albert Palazzo and Colonel Chris Smith recently noted that to prepare for expeditionary warfare, as envisaged under Australian ‘Maritime Strategy’, ‘any chance of success [in expeditionary operations] requires a higher ratio of ‘tail’ to ‘teeth” than expected from current operations’. Furthermore, their paper claims that there is potential for a shift in balance within land forces from the combat arms to ‘enabling
and support’ elements.\textsuperscript{6} Therein lies the base assumption that the Army is ‘unbalanced’, its logistics capabilities are ‘hollow’ and that most attempts to transform logistics have led to unsatisfactory outcomes.

There is more to transformation than getting the ‘tooth to tail’ ratio, or any other abstract measure of force balance, right. Yet there is a real need for further investment in the right logistics capabilities, as there is also an obligation by Army and its logisticians to steward this investment. This is the component of transformation which, for many years, has been forgotten. Concepts seem repetitive, assumptions are outdated, and senior logistics community leadership has recently commented upon how logisticians seem to have lost control of their own agenda.\textsuperscript{7} This is a tremendous risk to changing Army’s logistics for the better in an epoch in which ‘austerity’ and ‘efficiency’ are terms used to complement logistics, budgetary limitations and growing costs in delivering combat capability necessitate funding to be found in other programs, and in the systemic uncertainty which exists as the entire ADF changes the way it undertakes its business during the First Principles Review. Arguments are riven with assumptions that are well beyond their usefulness, and it is becoming increasingly clear that the ever-changing nature of warfare requires such shibboleths to be abandoned. It is now time for logisticians and planners to look to the future and reinvigorate and transform Army’s logistics capabilities accordingly.

This monograph will articulate the need to transform Army’s logistics, and the way in which such transformation should occur. Its primary focus will be on operational logistics rather than the complexities associated with logistics in the support of developing and sustaining capability. Giving the latter issue the consideration it deserves would require a much more expansive paper than is possible here, acknowledging that its exclusion is a limitation to the analysis undertaken here. In addition, the paper will not prescriptively describe concepts or design optimised force structures but pose challenges to the concept developers, doctrine writers and those logisticians and staff who will ultimately lead implementation. However, the monograph will make observations and conclusions about Army’s track record in logistics transformation, discuss how problems may be prevented in the future, and highlight the challenges that must be overcome in future transformative efforts. It may seem an unfair criticism of leadership or others in Army, but blame is certainly not the point. At
times, Army has experienced tremendous pressure from external sources with respect to what logistics capabilities it should possess, and how they should be employed. Army’s logisticians and commanders have performed the best they can with the means available. Instead, the monograph looks to the future as an opportunity to support meaningful change that will give Army transformed logistics to win the land battle as part of a joint force. It compels Army to take action now to ‘prime’ Army for the real revolution in logistics that will come with technology.

What about logistics in support of operations must change?

It is a common anecdote for many in Army, especially logisticians, to conclude that Army’s logistics has remained fundamentally similar since the Vietnam War, if not the Second World War. David Horner notes that ‘after the Second World War this [expeditionary] logistics infrastructure was allowed to wither, but it still retained its broad shape’. Form and function, if not doctrine, echoes practices and control methods that would be familiar to those who fought over seventy years ago, and Army’s logistics organisations have not been radically changed for thirty years. Many logistics capabilities, and the opportunities those capabilities offer to the deployed force, have been consistent over this time period although technology has allowed for upgrades in some areas. These comments, of course, oversimplify the situation and a number of significant, positive, changes have been instituted by Army. Nonetheless, there will come a point when war’s characteristics will change to a point that old assumptions are rendered invalid, outdated doctrine useless, and capabilities practically ineffective. Army’s own Future Land Warfare Report 2014 and Smith and Palazzo’s paper suggests, supported by a variety of reports and papers from other Western militaries, that such a time might be coming sooner than is convenient.

Alternatively, we can highlight the consistencies in war as reason to avoid enduring a painful transformation process. The Australian Army has not seen a recent operational failure attributed to issues with its logistics, giving reason to those who might seek to do nothing more than implement incremental, but ultimately insufficient, changes to logistics capability. Although the Australian Defence Force has been severely stretched on
the basis of logistics on a number of occasions, short-term modernisation achievements such as increasing the capacity of particular capabilities or balancing forces has often staved off the need for more fundamental changes. Furthermore, and despite the flux it generates at the outset of an operation, logistics ‘ad-hocery’ at the last safe moment actually seems to work for the most likely operations on which Army might deploy. After all, given that it is virtually impossible to prepare Army for every possibility it is likely to face, it is natural that operations will always commence with some confusion.

Army logisticians have always distinguished themselves through improvisation and adaptation. This attests to their skills and the consistent effort of Army’s soldiers and officers, and the members of the Australian Public Service and industry who support them. But it would be an indictment on the state of Army’s logistics capability, measured by many varied factors, that ‘adaption’ should be relied upon as a force design ‘safety net’. There are significant capability, doctrinal, force design, conceptual and cultural gaps that ensure problems are repeated, if not expected, in successive military operations. Despite all the effort that is undertaken in understanding problems, from operational analysis in the field to experimentation in the barracks, such issues seem intractable and unresolvable. This is not the case. Meaningful change in Army’s logistics is possible, and should be unrelentingly pursued; anything else is an abrogation of professional responsibility. When we recognise that Army is in a perpetual state of change, to avoid changing Army’s logistics now would leave not only Army’s logisticians unprepared for future wars, but will likely compromise Army’s efforts elsewhere.

Before progressing this study of logistics transformation and making recommendations for Army’s future direction, we also have to recognise that Army’s logistics capabilities are, and have always been, incontrovertibly interconnected with the broader joint force. Furthermore, the sustainment of armies comprises a variety of logistics functions, not all of which are directly operational in nature. Acquisition, capability development, infrastructure management and personnel management may be peacetime aspects of logistics, but they contribute to the net effect. As described earlier, ADF doctrine describes ‘logistics in support of operations’ and ‘logistics in support of capability’; the former describing the provision of support to deliver tactical effect, and the latter to generate and sustain,
in the main, materiel. For these reasons, logistics transformation in Army must be synchronised with numerous efforts; logistics ultimately being best described as a process which integrates these many activities so to ensure that a forces’ combat potential, or actual combat power, is ultimately realised.

Too often militaries forget the complexity of logistics, and the many activities it comprises, to their detriment. The idea that logistics is a process appeared sixty years ago, with US Naval Historian Duncan Ballantine profoundly citing,

\[\text{The logistic[s] process is at one and the same time the military element in the nation’s economy and the economic element in military operations.}\]^{12}

It was from this recognition of logistics as a process that United States Navy Rear Admiral Henry Eccles developed his theory that logistics was the bridge between the national economy and actual combat operations.\(^13\)

Logistics is about taking national resources and transforming them into a form that is useful in combat occurring in the operational area. Army, and the capabilities it owns or operates within the land domain, forms a small part of this process. In reality logistics is a system; a comprehensive ecology of military and civilian functions that interact to sustain combat effect. But who is responsible for the process? With so many agencies involved in the inputs to combat power, the responsibility for the ownership of the logistics process falls to no one, yet to everyone at the same time. Operational commanders can only ever achieve control over the process for temporary periods, although in peace-time the responsibility for logistics is often clearer.\(^14\) However, more often than not, the idea of the ‘logistics system’ is used to reduce the logistics process to a category of specialist activity. This view is part of the problem why logistics has tended to receive much less attention than it should warrant from Army.

If logistics is a process, and even if considered a system, questions about Army’s role within it emerge. How much of the process is within Army’s capacity to control? How much can it influence? Where and whom should it influence? What should it allow itself to be influenced by? What can Army, and its logisticians, realistically change? Prior to any logistics reinvention
of force redesign it is necessary to have at least a sense of answers to these questions. It also means that planners cannot forget that adapting Army’s logistics will inevitably require the support of, and effort by, other organisations that contribute to the joint force. To approach transformation in a reductive manner excludes a variety of activities that might have a considerable battlefield effect. For example, acquisition and capability development activities may include long-term maintenance contracts that may limit the flexibility offered to operational logisticians when they seek to repair equipment forward. The activities and operations of joint agencies, such as Joint Logistics Command (JLC), impose their own demands upon Army as is evident through the Defence Logistics Enterprise Strategy. To fully transform Army’s logistics necessitates broad organisation-level activity, and as Army does what is in its power to influence within the land domain, and in others, it cannot approach transformation in isolation. This truism is evident if one takes Army’s last thirty years into consideration.
Part One — A short history of change in Army’s logistics

As much as we might like to think that militaries change because of strategic necessity, rational modernisation plans and operational concepts, they are also beholden to a variety of social, economic and institutional influences. The developmental path undertaken by Army in adapting its logistics capabilities is a complicated mix of organisational culture, responsibility to Government, an element of happenstance, and operational pressures. Many influences in transformation are simply out of Army’s control. For many mid-ranking to senior serving officer and soldier logisticians, Australia’s deployment to East Timor in 1999 on Operations STABILISE and WARDEN might seem to be the most profound event which compelled a generation of changes to logistics capabilities. Certainly, straight after this operation, quick action was undertaken to address a variety of capability deficiencies that this operation so painfully revealed. The focus on systemic hollowness within several key logistics capabilities after the East Timor operation was important, but its long-term effect on Army’s development has proven relatively minor. The fundamental changes to Army’s, and the ADF’s, logistics capabilities made in the decade prior have left greater legacies in terms of organisation, responsibilities and expectations relevant to the operational performance of land forces. Therefore, it is from this point that the history of Army’s attempts to transform its logistics must be understood.
The First Wave of logistics transformation — 1987–1999

Army, and the logisticians who serve within it, tend to view the twenty-year experiment with ‘Defence of Australia’ strategy as mythos. As a post-Vietnam Army sought to find its footing, growing societal and political moves for strategic self-determination, coupled with extensive capability programs fighting against the ‘block obsolescence’ of equipment but in a period of national financial pressure, placed immense pressure on the ADF’s logistics capabilities. Just as strategists contended with implementing the ‘Defence of Australia’ operational concept, born out of the 1986 Dibb Review and subsequent Defence of Australia 1987 (DOA87) White Paper, logisticians began the process of rationalising capabilities under a variety of initiatives.16 It was not strategic policy however, that would be the biggest concern of logisticians. Industry policy, and a bipartisan desire in Government to deregulate the government sector would prove to be particularly influential. It was not until the 1990 Wrigley Review, the 1991 Force Structure Review and the Defence Commercial Support Program (CSP) which accompanied it (the latter of which saw a great transition of the ADF’s logistics capability to the private sector), that the policy implications of DOA87 and a greater union between Service logistics and commercial support from the national support base really hit home.17 The atrophy of Army’s organic logistics capability through the commercialisation process undertaken over this period would have considerable consequences in the future. The degradation of base and force level logistics is well known, but the degeneration of deployable logistics capability also affected formation and unit logistics elements.

It is easy for a logistician to look back upon this time with concern. However, there were positive changes to Army logistics occurring during this period that are often overlooked in the hyperbole. Modern approaches to operational command and control, as well as logistics jointery, developed to support ‘Defence of Australia’ and other imposed changes, left long-term benefits for the ADF. Within Army, logistics command and control was investigated in detail and with vigour. Efficiency seeking led to the growth of joint institutions that better coordinated logistics activities across the ADF. Systematic experimental and exercise-based analysis of logistics performance complemented conceptual development to produce force modernisation outcomes which continue to be implemented today. This period may have comprised paradigm-changing events and processes
which had enormous implications for the ADF’s operational performance. There were, however, other incremental changes occurring to Army’s force design that were, arguably, just as influential. Before assessing logistics transformation any further, it is important to appreciate other themes and issues which were affecting the force.

Post-Second World War operations, including the more recent Vietnam War and peacekeeping operations such as in Somalia (Operation SOLACE), had accentuated a shift in Army’s approach to where the bulk of its logistics capability resided. This move was reflective of the changing character of operations, and emerging thoughts on combat logistics. During the Cold War period, and in a stark contrast to the major wars which preceded, most deployments were of Task Forces or units, usually conducted within a coalition which provide some measure of sustainment. Furthermore, the ‘light’, ‘motorised’ and ‘armoured’ specialisations of Army’s three regular brigades were seen to require their own bespoke logistics capabilities, thus emphasising the need to develop equally bespoke logistics units at the unit and formation level. Army was also under pressure by Defence to move from a divisional model that perpetuated hollowness across the Service, and adopt a force structure better suited to the demands of Australian continental defence. Thus, it was felt, there was no need to centralise capability at the divisional level: Army was evolving from one designed to fight formations of at least brigade in size within a ‘two-division structure’, to one that deployed battalion groups within independent brigade-sized formations for a variety of different requirements. Larger ‘divisionally’ oriented logistics regiments were slowly but surely decentralised, adjusted or simply disestablished as Army reluctantly abandoned long-held but impractical ambitions.

These changes were only accentuated by the operational concepts and doctrine developed to enable a ‘Defence of Australia’ strategy. The ‘Defence of Australia’ concept required an Army that was capable of fighting in extremely dispersed conditions, in an inhospitable geography defined by distances between units measured in the hundreds of kilometres. As stated in the Chief of General Staff’s Advisory Committee in 1986:

*The priority demands on our ground forces are for the protection of military and infrastructure assets…in the north of Australia from a protracted campaign of dispersed raids.*
Based upon this prevailing view in Defence and Government, it is understandable why there may have been a desire to outsource many purportedly ‘non-core’ logistics functions; functions which might be obtainable from the national support base in a time of crisis.

This was only part of the reason for the truly transformational change that was to occur to Army logistics in the early 1990s. Due to funding pressures that made attaining the capability desires of the 1987 White Paper impossible, support capabilities were seen as less vital than preserving combat capabilities. Three reviews were fundamental to reshaping Army logistics in this period with this in mind. Firstly, Defence was compelled by Government to examine its force structure to implement the ‘Defence of Australia’ approach through the 1991 Force Structure Review. At the same time, Dr Alan Wrigley was appointed by Government to examine a holistic, national-based, approach to defence.

Wrigley’s report, *The Defence Force and the Community: A partnership in Australia’s Defence*, and the subsequent Inter-Departmental Report which reflected the endorsed Government outcomes, advocated an increased role for industry in the support of Defence activities.21 Finally, the CSP that was released concurrent to the Force Structure Review reflected the intended commercialisation of the ADF’s organic logistics capability.22

To fund $200 million of capability programs, the Force Structure Review required Army and the other Services to examine what were ‘core’ (directly combat and combat-support) and ‘non-core’ (largely ‘rear-echelon’ logistics functions) activities.23 Those activities identified as ‘non-core’ would be market-tested for commercialisation, with many outsourced under the CSP. This process of reducing numbers in the ‘tail’ would hit Army the hardest; the Force Structure Review acknowledging that:

*The combat structures of the Navy and Air Force are largely major equipment oriented and have been the subject of detailed reviews over the last decade, while Army is organised around personnel based structures. Any significant reduction in ADF personnel numbers inevitable involves a more fundamental review of Army’s structure to maintain the viability of the combat force.*24

In addition, landholdings would be rationalised, the ‘Military District’ model of regional engagement would be abandoned because of the *Defence*
Regional Support Review and the institution of the operational level of command in the ADF, and training institutions and practices consolidated across all Services. It was a period of ruthless cost-cutting and manpower saving, where logisticians themselves would have to volunteer options to reduce the size of Army’s organic logistics capabilities. Although the goal was to ensure the combat force was funded, these three programs in unison are now anecdotally regarded as creating structural weaknesses with respect to Army’s capacity to sustain itself on future operations.25

Accompanying the force structure changes were the conceptual ones. The need for Army to draw more of its sustainment from external sources began to be reflected in operational concepts. In 1992 Major General Geoffrey Carter, Deputy Chief of General Staff, described the logistics support required for ‘Operations in Defence of Australia’ as:

Logistics support to implement these concepts will tend towards austerity coupled with maximum use of the civilian infrastructure. While it can be expected that we may harness all available national resources, we may need to seek assistance from friendly nations.26

At the unit level, battalion groups were expected to operate without an abundance of logistics support but also independently; yet it was recognised that logistics capacity – the ability to ‘move and maintain’ forces – would temper the ability to conduct operations.27 Local civilian industry was expected to support the hypothesised military operations, but the reality was forces were too dispersed, and national support capacity, in the remote environments it was believed that operations would be conducted in, was limited. Battalion-group-level manoeuvre forces would be resourced with whatever would be required for defence of Australia tasks so to make them operationally responsive.28 Army’s transformation path had optimised it for fighting at the battalion level, and this continued a growing emphasis on pushing logistics capabilities into brigade formations. This necessitated growth in unit-level logistics echelons, as well as confirming the importance of the Brigade Administrative Support Battalion in its role as the provider of modular logistics components to units as required.

While new concepts favoured the battalion group as the principle fighting formation of the Army, there were reasons for change in other areas in Army. As defence planners started to think about the means by which operations in the north and north-west of Australia could be sustained, it was realised
that these forces would require a greater level of logistics support than had been experienced when in operations with coalition partners. Thus the Logistics Support Group (LSG) was created on the basis of Vietnam war experience; consolidating many of the divisional-level logistics functions and assuming the responsibility for operational-level logistics support for land operations. This formation (later known as the Logistics Support Force (LSF) and now 17 Combat Service Support Brigade) additionally served as the ‘third line’ of logistics capability, meaning divisional-sized operations could – in theory – be sustained. However, this formation proved to be a poor cousin to the combat formations, themselves heavily hit by the pressure on Army to cut the size of its force. Combined with the downsizing of the ADF’s logistics elements (the Army’s permanent force had downsized from 34,000 to 24,000 over this period) with Government policy and reform initiatives, the LSF would prove to be quite hollow. This was an issue with significant ramifications for future operations in East Timor.

Elsewhere, and as the operational concepts continued to mature and major strategic-level changes in logistics occurred, Army found itself more and more integrated in the fortunes of the ‘national support agenda’ and the burgeoning joint force. Army’s own strategic and operational-level logistics organisations and capabilities, including Logistics Command, had been merged with those of the other Services into Support Command Australia (SCA) and other Departmental strategic agencies in the mid-1990s. This was a natural progression to the development of operational-level command within the ADF, but also in centralising and more efficiently managing ADF logistics from acquisition to service delivery. Furthermore, SCA was directed, under the 1997 Defence Reform Program which established it, to accelerate the commercialisation of ADF logistics. This process resulted in programs such as the Defence Integrated Distribution System for transportation within the national support base amongst other major programs which integrated commercial operations with Army activities.

SCA would, in 2000, meld with the National Support Division and Defence Acquisition Organisation to form the now defunct Defence Materiel Organisation (DMO). Planners had conceived SCA to be an organisation that could exert control over the strategic and operational components of the logistics process, but in practice it was focused on the acquisition and sustainment of Defence capabilities, rather than their operational use. When
DMO was created, this weakness in the SCA design would lead to planners establishing a subordinate Joint Logistics Command whose purpose was to perform numerous operational functions Navy, Army and Air Force had undertaken for logistic operations in the past. Nonetheless, until this happened, the logistics process as it applied to the ADF’s land operations was fractured and confused. The constant changing at the strategic level of Defence which began in the late 1980s until 1999 had been immensely disruptive, and created a great deal of uncertainty around supply-chain responsibilities for land forces around operations such as Operations BEL ISI (Bougainville) and WARDEN (East Timor).

With respect to the tactical logistics activities left to Army, in the mid to late 1990s, and learning from the US Army’s Task Force XXI study, Army began to approach the problem of defending Australia through a series of planning events and experiments.\textsuperscript{30} These would support the development of the Army 21 (A21) concept, launched in 1995, and the subsequent change process known as ‘Restructuring the Army’ (RTA).\textsuperscript{31} Although the 1996 election resulted in a change in Government, and a nominal shift from a continental approach to strategy, the RTA trials maintained the same vision of war as practised the decade before. Army would become an integrated full-time and part-time Army, comprising highly mobile task forces and units, capable of autonomous operations in dispersed, joint operational environments.\textsuperscript{32} For logisticians, these concepts once again emphasised the robustness of forward echelons as a means of ensuring sustainment for forces vast distances away from historical lines of operation. These forces would have to be sustained for operations of 15 months at a time, with 30 days of combat operations held organically.\textsuperscript{33} However, just as the sustainability requirements for offshore deployments were to be tested in 1999 under the rubric of ‘Defence of Regional Interests’, the vote for East Timorese independence from Indonesia profoundly changed the direction of Army’s logistics transformation, if not its strategic focus more broadly.
The East Timor Crisis

‘In the past the Australian armed forces have not had to invest in substantial deployable logistics capabilities. Our forces have relied upon major allies such as the US[A] and [Great] Britain. The logistics support for INTERFET was magnificent, but sustainment was not achieved without frustration and some failures. Frankly, if the ADF is required by the nation to go offshore again in a lead role or as a contributor to international military action, we will have to underwrite our operations with a responsive and effective logistics system with stamina. At the moment there is room for enhancement of our capability to support offshore operations. We succeeded in East Timor but our logistics engine was under extreme pressure most of the time’

General P. Cosgrove, Commander INTERFET

 Commenting soon after the completion of Operation WARDEN, former Commander INTERFET General Peter Cosgrove made a stark reference to pre-operational logistics capability gap; a consequence of a decade of reforms that history now regards as over-zealous. It is impossible to believe that Army leadership was not well and truly aware that a major regional operation would severely test Army’s logistics capacity, but it is evident that this operation surprised many with the extent of the hollowness within Army’s logistics capabilities. Given the challenges this operation placed on the Army’s logistics elements, it is unsurprising that several well-known reviews and academic papers now document this operational challenge.

Foremost amongst these reports was that drafted by the Australian National Audit Office (ANAO). In the ‘Management of Australian Defence Force Deployments to East Timor’, the ANAO commented that logistics should have been ‘as easy as it gets’ given the proximity of East Timor to Australia and the absence of the ‘stresses and demands of sustained combat’, suggesting that the ADF was ill-prepared for ‘low-intensity’ operations. In academic research conducted after a career in operational analysis, Colonel Bob Breen outlined numerous issues in logistics planning and execution, the ad hoc and inefficient nature of logistics arrangements at the tactical level, and the inadequacy of the embryonic operational and strategic approach to logistics of the time.
Turmoil had been caused by widespread organisational reform at the strategic level of the ADF, there was uncertainty as to who was performing the ADF’s ‘strategic J4’ function at the time, and the youth of joint logistics agencies conspired to create a confluence of problems. Being cautious about SCA’s operational-level logistics responsibilities, Commander Headquarters Australian Theatre, Air Vice Marshall Bob Treloar, tasked the LSF to support the deployment of forces and equipment to Darwin; a difficult mission given it was simultaneously preparing its own forces for offshore deployment.\textsuperscript{37} If it was not for the efforts of a range of individuals and commanders of Army’s logistics units, and the appointment of a JTF commander (COMNORCOM, RADM Bonser) to control mounting in Darwin, the logistics support to the deployment process might have been severely compromised.

The key weaknesses in Army’s logistics capabilities at the time are well-known now and, perhaps unsurprisingly, were those contributing to the projection of forces from Australia rather than those required for operations within it. In an important paper prepared within the joint domain by National Support Division and Joint Logistics Command, the Chiefs of Service Committee in 2000 were informed:

\textit{Ongoing organisational rationalisation, particularly at force level, has resulted in severe limitations in critical skill areas, such as \{sea and air\} terminal operations, which are virtually impossible to reconstitute for short warning contingencies.}\textsuperscript{38}

This report recommended the Chiefs of Service Committee, amongst other crucial changes, to endorse growth in a number of theatre-level logistics functions; operational contract management, bulk water and fuel transportation, petroleum management, support engineering and a number of areas in the joint force Army were responsible to raise, train and sustain personnel such as operational movements.\textsuperscript{39} The assumption that commercialised logistics arrangements could substitute for deployable land force logistics capability was reported as having failed, and the inadequacy of the national support base to respond at short notice to an operational crisis was similarly reflected upon. It became clear through the post-operational analysis that Army had lacked the capacity to logistically sustain a coalition as effectively as one would have hoped.\textsuperscript{40} This was due to a combination of training and preparation, but predominately a
consequence of a lack of capacity within Army’s deployable logistics capabilities. Most coalition partners arrived lightly equipped, with expectation of Australian theatre support. They were deficient in transportation, basic consumables and victuals, as well as a variety of administrative services. The only way some could be sustained due to a paucity of distribution assets was due to command decision-making with tactical consequences: certain coalition forces were allocated to areas of operation on the basis that they could be sustained in the field, rather than the tactical effect they could provide.\footnote{41}

However, the biggest problem for Army’s logistics force elements, was also the most obvious: they lacked sufficient capacity in those capabilities fundamental to launching independent expeditionary operations beyond Australian borders. Subsequent discussions in Parliament noted concerns that in an Army of nine regular and reserve brigades, Army’s force (which it referred to as ‘field’) ‘logistics capability cannot support more than two brigade deployments’; highlighting a ‘serious underlying force structure problem’ that made a reviewing House Committee ‘uncertain of the Army’s capability to support two dispersed operations’.\footnote{42} As operations in East Timor had proven, these logistics elements could not easily be reconfigured from elsewhere in an \textit{ad hoc} fashion.

RTA Phase 2 trials were due to begin in 1999 and might have examined this very capacity in Army, but due to changes in 1 Brigade’s readiness notice to support potential East Timor operations, this activity was delayed\footnote{43}. Exercise Crocodile 1999, a predecessor to the biennial Exercise Talisman Sabre, would have also tested the national capacity to support major operations. Perhaps had this trial phase been conducted, or Exercise Crocodile had been earlier in the year, opportunities may have emerged to address a number of capability gaps in Army’s logistics force structure. However, given the rapidity of the East Timor crisis, it is extremely unlikely that any short-term changes may have had a noticeable effect on operations. Whatever the case, Army now had a compelling reason to embark upon a major transformation of its logistics.
The Second Wave of transformation — 1999–2015

The operations in East Timor are commonly seen to be a litmus test of Army’s logistics capability, and the primary reason for a second wave of logistics transformation. Operation WARDEN certainly gave cause for transformation, but the seeds for a range of logistics adaptations had been sown many years earlier. As mentioned earlier, RTA Phase 2 trials would have tested Army’s capacity to deploy beyond Australian shores. A move towards preparing Army for offshore deployments had begun under the stewardship of Lieutenant General Frank Hickling, Chief of Army from 1998 to 2000, in response to the new Governments Australia’s Strategic Policy (ASP 97) yet within the context of RTA. Like many land forces of the post-Cold War period, considerable academic attention was being directed by Army to understanding expeditionary operations and maritime strategy; through this, Army had begun a fundamental transformation of its orientation.44 The first draft of the concept later known as ‘Manoeuvre Operations in the Littoral Environment’ was prepared around the time Army deployed on operations, and its implications for a variety of Army and Joint logistics capability programs such as JP 126 – Theatre Distribution and L121 – Project Overlander were being considered.

The conceptual shift in Army transpired into Army’s capstone doctrine, Land Warfare Doctrine 1 – The fundamentals of land warfare (LWD-1), which outlined the principles of Army’s future expeditionary orientation.45 It would later be continued through concepts including Entry by Air and Sea was developed by Army’s research directorate.46 This concept was eventually subsumed into the ‘Developing Doctrine’ LWD 3.0.0 – Manoeuvre Operations in the Littoral Environment (MOLE), finally acknowledged in doctrine in 2004.47 However, while the conceptual path to transformation in Army was relatively clear and rapid for a time, changes in Army’s logistics capabilities occurred at a far more measured pace. Much attention at the highest levels in Defence was being directed towards resolving issues within strategic and operational-level logistics capabilities, as well as in the formation of the Defence Materiel Organisation, and as a consequence little energy was being directed towards Army’s internal issues. This being said, a number of key theatre capabilities residing within the Logistics Support Force were immediately reinforced, with five hundred positions to be funded with the 2000 review of Australian strategic policy. Army experiments such
as *Headline 2000* were conducted with logistics in mind, with lessons learned continuing to filter into Army’s logistics capability programs.

There are two main reasons why logistics transformation along this line of effort began to stall, and with it the desire in Army to rapidly improve its logistics capabilities. Firstly, the Army’s attention shifted dramatically to deployments in Afghanistan, and later Iraq, following the ‘9/11’ attacks in New York. Although these were expeditionary operations, they had more in common with the peacekeeping operations conducted in the 1990s and other niche deployments than they did with Operation WARDEN. With forces deployed as specialised task units and operating independently from one another, sustainment was often achieved under coalition auspices, host-nation support or the use of contractors. An Army-based Intermediate Staging Base supporting the early insertion of special forces into Afghanistan in 2001 evolved over the course of the decade into a relatively robust joint theatre logistics unit that supported the reception, staging, on forwarding and integration activity of all ADF forces in the region and other tasks, but it paled in the scope of its tasks to the Force Logistics Support Group of Operation WARDEN. Tactical lessons filtered back from operations and began to influence doctrine and concepts, and as more of Army rotated on deployment through the theatre, the lessons of East Timor slowly diminished in relevance to logistics transformation; an echo of the same fate that befell A21 and RTA had the moment the first boots hit the ground in Dili.

Secondly, experiences taken from operations in the Middle East, combined with the *Hardening and Networking (HNA)* initiative, also changed the priorities for investment for a range of Army capabilities. Army had been reminded of the lethality of the contemporary battlespace by operations in the Middle East, but also of the obsolescence of its vehicle fleet and communications measures. Consequently, Army’s attention in capability development shifted towards enhancing combat formations rather than specifically focusing upon the MOLE concept and logistics capability gaps relevant to coalition leadership or offshore operations in Australia’s immediate environment. HNA did consider the lessons of past developmental programs ranging from A21 to MOLE and the ‘Army.
Objective Force’ program, as well as operational and historical analysis. However, battlegroup and internal-to-formation logistics capabilities became prioritised for investment, as did intellectual attention. HNA and successive programs including the Enhanced Land Force increased the size of Army, largely though raising the 7th Brigade to full-time capability and the addition of another infantry battalion. These initiatives also came at a cost; many of the five hundred positions identified to remediate logistics deficiencies were whittled away in the growth of combat forces as Army faced a new direction.

Army’s force modernisers did try to blend the ideas of maritime-based expeditionary warfare and other needs, and achieve transformed logistics capabilities designed for both. In 2002 Army’s Land Warfare Development Group responded to the absence of new logistics projects within the Defence Capability Plan with new initiatives to remediate capability gaps as part of the logistics review of the HNA initiative. Joint Project 126 – Joint Theatre Distribution System (JP 126 Ph 1) received attention in a Kellogg-Brown-Root review that quantified many of the requirements for logistics support for operations in the littoral environment. In 2005, a second logistics study of HNA was undertaken, resulting in an ‘Army Capability Requirement’ (ACR) which outlined the logistics requirements for the future battlefield. This report stands above many others written in the following decade for its deep consideration of what logistics transformation should have achieved. The opening statement of the ACR gave good reason to progress transformation, especially in terms of capability development:

*The upgrade of existing Land-based systems, acquisition of new combat capability and developing concepts, such as NCW (network-centric warfare) and FLOC (Future Land Operating Concept), are likely to severely challenge the Army’s ability to provide CSS (combat service support) capability to support future warfighting in a disaggregated and complex battlespace. This proliferation of new combat capabilities is without commensurate improvement to CSS in the DCP (Defence Capability Plan) and it would be short-sighted to assume there will not be serious consequences without this appropriate investment (or development) in key areas.*

*Army Capability Requirement – Combat Service Support 2015, 2005*
Soon after this document was released, and after a small expeditionary deployment to the Solomon Islands, in 2006 Army once again deployed to East Timor as part of Operation ASTUTE. This operation was much smaller than Operation WARDEN had been, but it did confirm that logistics transformation was progressing. The arguments for reinforcing Army’s, and the ADF’s, expeditionary logistics capabilities had borne fruit, and improvements in deployability had led Brigadier Mick Slater, as commander of the task force, to conclude, ‘we have largely solved the deployable logistics problem since 1999’. He noted that the ADF had ‘poured resources into rectifying the problems we had in getting water, POL [petrol, oils and lubricants] and key war stocks into theatre and sustaining ourselves away from our Australian bases’ and that 2500 people were sustained ‘superbly’. Considering the coalition force deployed to East Timor was one-third the size of that during Operation WARDEN, it is understandable that the theatre-level logistics capabilities which had been reinforced in small numbers since 1999 would prove effective. Nonetheless, the validation Army received that the response to logistics weaknesses, underwritten by a growth of 3500 ‘enabling’ personnel since East Timor, had also diminished the need for further change.

Indeed, the concept writers and force designers turned their efforts towards the Middle East operations in a series of Force Modernisation Reviews, set within the context of Adaptive Campaigning – Future Land Operating Concept. In the two conducted in the decade after HNA was announced, and operations in the Middle East commenced, further changes to force design were promoted. This was complemented with a shift in approach for logistics-related capability projects. For example, Land 121, the replacement for Army’s transportation, encountered multiple design changes to account for the enhanced protection and other enhancements needed for the future battlefield. Investment into theatre logistics capabilities (including JSP 126), logistics information systems and other logistics projects endured cuts as other operational requirements, and expenses, had to be accounted for elsewhere. With force designers leaning forward into the distant future, the absence of effective and acceptable transformation plans ensured any change in Army’s logistics was incremental.

This is not to say that major changes to Army’s logistics forces did not occur during this period. In fact, it was because of the need to force
generate logistics capability for operations that the most significant changes in logistics force design occurred. Soon after Operation WARDEN had concluded, Army had begun to discuss in public a new logic for force design. This logic would have greater consequences for logistics transformation in Army than any concepts relating to an Army expeditionary, amphibious, orientation ever would. Army had long been concerned about the ability to rotate forces for sustained operations; a weakness that was complicated by numerous bespoke units, or specialised capabilities in Army. It has informed government as early as 2003 that:

‘The lack of any uniformly structured, trained and equipped brigades is the result of the necessity to deliver a broad range of capability outputs within funding constraints’.

When launching HNA, and preparing to commit forces to Middle Eastern operations for an extended period, the Chief of Army, Lieutenant General Peter Leahy, described HNA as embracing an Army of ‘twos’ to support deployment rotations. Furthermore, he sought to establish a modular force in which operational formations could be designed as required, claiming that the Army ‘in barracks is not the Army that will deploy on operations’.

Despite the earlier investment made by Army into the management of combat supplies, catering, medical support and other force enabling capabilities, the need to support Army’s emerging force generation model and sustained operations was creating a considerable strain. HNA established a force that could sustain a major brigade-level stabilisation operation, exemplified by Operation WARDEN 1999, but carried ‘risk’ into second rotation logistics forces; many of which were expected to be provided by military reserves or contractors. In addition, this force was underpinned by ‘logistics priorities being maintained in the Defence Capability Plan (DCP)’, a hope that was rapidly unravelling.

It was as a consequence of this pressure, and Army’s desire to reinforce its combat capabilities, that the centralisation of a number of capabilities began to be discussed in the higher committees of Army. In the health domain, structural personnel weaknesses encouraged the concentration of capability into the growing Joint Health Command. Other functions, such as catering, were considered secondary by Army’s senior leaders and reduced in size with personnel directed to other initiatives. Hollowness within combat
supply capabilities could not be overcome. The question became, where would this centralisation most effectively support the sustainment of the operations of the time?

The centralisation of these functions into 17 CSS Bde occurred during 2011–12 in a contentious move. It was believed that by concentrating these elements in one formation that the force generation of these elements would be improved, and a minimum level of capability preserved. Furthermore, it was also clear that no further resources were going to be directed to logistics capabilities in the short term to overcome structural hollowness under the developing Army force generation model. This decision occurred amidst Force Modernisation Review discussions that questioned the number of echelons Army possessed; echelons that were thought to be unnecessary given the characteristics of current and potential logistics operations in deployed settings. Amongst the broader changes occurring under the scope of the spiritual successor to HNA, Plan BEERSHEBA, a plan that sought to take HNA’s ‘army of twos’ to one of ‘threes’ and rotate them through periods of higher readiness, the centralisation of hollow logistics capabilities within 17 CSS Bde made sense. It allowed Army to prioritise these force logistics elements in accordance with the readiness status of the combat force; whether they were ready, readying or in a period of reconstitution known as ‘reset’.

Despite Army emphasising it would be ‘concept-led, capability-driven’, its focus in the ‘second wave of transformation’ ultimately became to implement a force structure based upon readiness commitments. In terms of logistics, like other functions, the organisational focus was on sustaining operations rather than radical movements in long-term force development. Furthermore, the need to reinforce combat capabilities to support sustained operations saw logistics numbers reduced accordingly. Various concepts came and went, including the 2014 issue of ‘Archipelagic manoeuvre’, a modernised version of MOLE, as a logic for Army’s future force structure, and a second iteration of the Future Land Operating Concept, and its supporting concepts. However, after quickly responding to the capability gaps that had emerged during Operation WARDEN, very few major changes to Army’s logistics had eventuated. Incremental changes were undertaken, and capabilities were being modernised, but they could hardly be described as transformational in their influence upon the development
of new ideas, doctrines and other aspects of preparation for war as they applied to land force logistics.

While Army Headquarters was considering the distant future, Forces Command was undertaking a significant review of Army’s logistics capability in the context of the force-in-being. The centralisation of logistics capabilities into 17 CSS Bde may have been a watershed moment for an Army which typically held as much of its logistics capacity within its forward units as possible. However, at its core and as described above, it was simply a reflection of Army’s broader change processes. It was achieving the objectives of Plan BEERSHEBA, but in an environment where the hollowness resident within certain logistics capabilities precluded anything other than centralisation. The final logistics review of the nominal ‘second wave of transformation’ of the last thirty years, however, sought to examine logistics in the context of a tactically-oriented concept once again. In 2013 the now Major General and Commander Forces Command, Mick Slater, directed further work into the logistics capabilities of his Command.61

Unlike what Lieutenant General Leahy proposed with respect to HNA, and perhaps even what Lieutenant General Morrison viewed of Plan BEERSHEBA, Slater saw the like combat brigades as a fighting formation. Following the preparation of the Concept of Employment of the Reinforced Combat Brigade (CONEMP) which proposed how it would fight, the Concept of Operations for Combat Service Support for the Reinforced Combat Brigade was prepared.62 This concept, now being implemented, has since resulted in the centralisation of logistics capabilities at the formation level and from the units, a significant shift that tested Army tradition and created ongoing controversy. In an absence of additional resources, it has relied upon adjusting process rather than truly remediating capabilities long known to be vulnerable. However, this review has, perhaps, signalled a return to concept-driven force structure planning. It was conducted because of the absence of a firm intellectual direction on how Army would conduct its logistics in the future, and a recognition of the limits of incremental change on Army’s logistics capabilities. With this in mind, it has given Army a good basis upon which to transform its logistics in the future.
What are the lessons we can take from logistics transformation undertaken in Army?

The first and second waves of logistics transformation in Army were distinct, and with their own lessons useful in considering future transformation of Army’s logistics. The first, from the late 1980s to Army’s deployment to East Timor in 1999, was essentially defined by the pursuit of Australian continental defence strategy and the far-reaching programs of commercialisation that transitioned much of Army’s organic logistics capability into the private sector. It was a period during which change was imposed, and Army’s logisticians were forced to make compromises and difficult choices about which capabilities had to remain organic to Army. It also serves as a reminder that contemporary logisticians should not take the opportunity to lead transformation for granted. Although the basic operational concept applied in this period was proven strategically faulty, and Army’s logistics capabilities had been mauled by imposed policies, a few significant and ultimately positive changes did occur. Army had redesigned its logistics capabilities to fight beyond and outdated divisional model, and had consolidated various logistics organisations into arguable more efficient – and less hollow – units and formations. Furthermore, a more collegiate relationship with industry and other Services had emerged from new policy, and the progression towards improved operational jointery in the ADF.

The second period was shaped by Army’s focus on fighting wars in progress. Although concepts were developed, and Army developed modernisation plans and an ‘objective force’ based upon a long-term view of the future, the need to rapidly adapt for operations saw logistics transformation occurring as a series of many incremental, and at times hard-won, steps. The achievement of a goal pursued over no less than three decades by Army’s most senior leaders, to prefer Army’s structure on the basis of readiness, also had a significant effect on the objectives sought out of logistics transformation. It was a period in which Army, and its logisticians, became used to meeting minimum readiness requirements rather than being optimised for specific contingencies. Sustaining and supporting an Army on continuous operations over the last fifteen years has required Army’s logisticians to develop solutions to numerous, and serious, problems but it has come at the cost of developing innovative concepts and doctrine to prepare Army for the future.
Transformation in Army’s logistics capabilities has always required a combination of incremental and revolutionary changes usually made in response to externally-driven pressures. It is possible to infer from Army’s responses to the continental defence requirements of the 1980s and 1990s that revolutionary change in logistics has only occurred through a systematic, conceptually-based, process. Once Army had addressed several logistics capability gaps after the East Timor crisis, logistics transformation was rarely conceptually based at all, and more oriented to facilitating organisational change in Army than preparing for the operations of the future. In the turbulence caused by supporting operations, and Army’s transition under HNA and Plan Beersheba, attempts to progress transformation were therefore hampered. The transfer of funding from logistics capability programs, and manning to support combat capabilities, further complicated transformation in this time. In sum, this period was not conducive for logisticians to describe what they wanted (or indeed, what Army needed), define the steps to get there, or assemble the requirements to achieve it. Considering this, it is understandable, though hardly ideal, that ideas have tended to stay just that. Substantial transformation of doctrine and procedures have yet to occur to reflect innovative ways of sustaining the force, and many ideas remain as ‘bullets on a slide or paragraphs in a glossy pamphlet’ and therefore unusable in actual practice.63

The irony here is that much of Army’s most recent effort towards logistics transformation has been retained in the intellectual domain, fed on a diet of experimentation, and without an effective transition into evaluation and exercising, doctrine development or the modernisation of Army’s logistics. Concept development and experimentation are vital first steps to transformation, and there is a wealth of useful material available which reflects a diligent approach by a range of Army and scientific personnel to understanding the logistical needs of the future Army. Due however, to its rightful attention towards the conduct of operations, Army has had difficulties taking the results to completion. Where the experiments conducted or concepts presented have led to tangible outcomes, those outcomes have been marginal and have been reflected predominantly in subtle shifts to major Army capability programs, rather than significantly influencing logistics transformation. There has been virtually no transition of ideas from the ‘laboratory’ to the training area since the RTA trials were conducted in the late 1990s,
with training time and capacity largely consumed by the need to certify forces operationally for deployments or their preparedness obligations.

Moreover, transformation in Army has always been complicated by the way in which it synchronised with efforts undertaken elsewhere in the joint force. Admittedly, the idea of ‘joint logistics’ is relatively young; its organisations frequently restructured in an unhelpful turbulence, and the approaches required to support Army at the strategic level have been a considerable culture shift for a Service which used to perform many now-Joint logistics functions internally. However, with its most recent focus on enabling a force generation cycle, the logistics transformation undertaken by Army has been less about structuring the right balance of capabilities and concepts with the joint domain than ‘simply’ getting forces to the operational area. Logistics, as a process which begins in the national economy and ends at the front line of the battlefield, depends on all Services and Defence agencies to be effective, and to work together efficiently.

If transformation is to be given a chance to succeed, a greater proportion of time must be spent getting the joint relationships right. The gradual empowerment of Commander Joint Logistics Command (CJLOG) as the ‘strategic J4’ and logistics process owner over the last decade, and under the First Principles Review, should give impetus to future systemic consideration of logistics capability. Furthermore, a new approach to the Capability Management life-cycle (Capability Life Cycle, or ‘CLC’) under the First Principles Review may give senior logistics leaders greater authority to promote logistics capability development and protect resources; a failure of which has been seen in the delays to JP126 and other recent investments into logistics information systems. Nevertheless, there is always the risk that the bigger the problem that logistics transformation appears to be in the future, the less likely logisticians will invest the considerable time required to do it properly.

This alludes to the greatest problem seen in Army’s approach to successful logistics transformation: logisticians have not embraced logistics transformation as fully as they should. This is not an indictment upon the attempts made by many logisticians to have a positive influence on Army’s modernisation outcomes. Rather, it is a collectively held belief that a more comprehensive investment in their time is unlikely to be productive. Army’s natural bias to organisational change over the last twenty years, as well as its
conceptual focus upon its front-line formations, are just two of the reasons why major logistics transformation has been viewed as wasted effort.

Secondly, the rapidity with which Army has introduced major force structure initiatives including HNA and Plan BEERSHEBA, has created an environment in which simply responding to short-term change is all that capacity allows. Army's logisticians are so consumed by performing the day-to-day function of sustaining training and operations that it is understandable that many would consider themselves unable to promote transformation outside the staff environment. Thus, it can be entirely expected that changes to doctrine or concepts rarely find their way out of the hands of planners and into those who will be expected to execute transformation. Perhaps this means that the prospects for future logistics transformation are not good, and a review of history gives logisticians a reason to disengage themselves even further from logistic transformation. For those who feel this way, they should keep in mind the considerable personal effort undertaken by many who have been engaged in Army’s future – from the senior-most logistician leader who fought to get Army’s logistics thus far, to the forward-thinking soldiers and officers who promoted their own ideas by whatever means possible. Insularity caused by an unhealthy scepticism of attempts to transform logistics capabilities and processes does nothing more than perpetuate problems. Nor should inadequacies of time be an excuse for a failure to intellectually and practically invest in the future: any efforts undertaken by logisticians now are ultimately for the benefits of others on the battlefields of tomorrow. This is because Army is changing; facing new external and operational challenges that will require adaptation from the short to the long term. Adapting to these challenges requires everyone to appreciate lessons from the past in a way that they can apply to the future, identify what must be changed from the present way of delivering logistics because it no longer works as well as it should, and – most importantly – understand the nature of the change that is required, or will be imposed upon, Army.
Part Two — The problems of the third wave

There is always a need for logisticians to be interested in transformation; applying professional knowledge and experience to better prepare Army’s logistics capabilities, and Army itself, for future operations. However, it is sensible to examine the future of Army’s logistics by asking why it might need a ‘revolution’ now? Evolution within Army is a normal part of life, and incremental changes as needs arise have, in the main, served Army well during two decades of consistent operations. Revolutions in technology seem far off, and Army has just completed a series of major reviews of its logistics system, force structure and concepts. Army’s logisticians are already in the process of implementing significant changes, with much more work to be done if transformation is ever to be regarded as being achieved. Embarking upon further systemic changes in Army now risks upending these efforts, in turn damaging any confidence people may have that transformation will work in the long term. The reason it is important to embark upon a new period of logistics transformation right now is, as the points above indicate, that changing Army takes time. The work Army completes now will be vital in ensuring the future Army, the recipient of true transformational change, will be well prepared, resilient and structured to transition effectively.

Of course, there are other more immediate reasons to embrace change. First, the adaptations in Army seen under HNA and Plan BEERSHEBA have been largely completed, with the restructuring of Army and its logistics elements to support a ‘Force Generation Cycle’ now daily business. Army can now afford to look forward into the future again. It now has
an opportunity to examine in detail the way in which its formations can be more efficiently sustained. Second, Army is about to embark on a significant period of physical change with major capability programs, such as Land 121 (transportation vehicles) and Land 400 (combat and armoured vehicles) now delivering, or about to deliver results. Army is becoming heavier and has – perhaps unwittingly to some – made sustainment factors more relevant than they have ever been. Army’s logisticians must examine ways in which the consequences of these changes can be planned and prepared for, so logistics factors do not impose undue constraint on their effective employment. Finally, Army faces a major conceptual shift as joint warfare continues to evolve, and it becomes increasingly concerned with the prospects and nature of future wars. This has important connotations for concepts, doctrine, and the focus of training and education within the logistics community.

The challenges facing Army and its logistics community presented here are by no means exclusive, and are offered as a starting point for discussion. These challenges could very well change form, magnitude of consequence or dissipate entirely as time progresses. However, they are useful as a as an examination of the likely environment that Army’s logistics force designers and concept writers will face. Furthermore, they offer a vision of a future in which future logisticians will have to operate. All are significant issues for resolution by Army when considered independently, but in collusion, these challenges are likely to make the time ahead for Army’s logisticians, turbulent.

**Challenge one — understand what change is required, and that it is inevitable and necessary**

The thirty-year history of change in Army’s logistics domain reveals revolutionary moments amidst long periods of incremental advance. Even as events such as the RTA trials or force structure reviews were being conducted, and force structure changes tested, there were a number of changes to Army’s logistics capabilities and capacities which occurred in the background. In fact, a review of Army’s transformational trajectory would suggest that despite the efforts of concept writers to argue the need for transformation, much of the recent developments in Army logistics have come from changes won in discrete arguments and cases; through briefs,
committee decisions and the grinding progression of staff work. We could look to the relatively recent centralisation of health, catering and combat supply capabilities from combat brigades, to the ‘third-line echelon’, or to the recent ‘CSS CONOPS’ as examples which may counter this view. However, despite the organisational change that followed, both were very much part of a larger body of reviews and efforts that took a decade to produce. Army’s logistics capabilities have not been extensively transformed for at least twenty years.

The present environment, however, should not be looked at as an opportunity to embrace change for change’s sake. As an American military scholar wrote when the US Army faced its own transformation of logistics, it is less important for Army and its logistics community to ask itself what kind of change it wants than it is to face up to what kind of change is necessary given the circumstances. This requires reflection. The community must take a measured look at its recent history of transformation and adaptation, confirm what has succeeded and what has failed, and determine what changes should be made.

Similarly, a thorough examination of the work that has already been completed, the methodologies and assumptions behind previous transformational requirements, and why previous conclusions were reached must be undertaken prior to launching new programs of change. This includes examining the concepts of use for capabilities being introduced into Army, the many experiments conducted by the Defence Science and Technology Group, and the lessons learned from operations and collective training exercises. All sources must be evaluated for their applicability, and if it cannot be made to segue with the newest operational concepts, the logistics community must determine why this may be the case and what other options there may be. This process of assessment is critical for the development of a viable plan for logistics transformation. Furthermore, it is also a requirement for the development of a transformational vision that is practically achievable.

This process of self-reflection will most likely reveal that it is not a ‘logistics revolution’ which is required, and that it is – in fact – a distraction from achieving meaningful outcomes in the short term. A real logistics revolution is likely to come with technology which will substantially influence the way logistics is coordinated, conducted or the demand upon logistics
capabilities is substantially reduced. Army’s futurists and supporting scientists are already examining ways to employ technologies relating to unmanned aerial vehicles (UAV), additive manufacturing and battlefield manufacturing, methods of generating power, more efficient fuel use for vehicles and more. What Army must do in the immediate future is to create efficiencies that make the joint land force more combat effective without the addition of logistics troops. Logisticians must work together, bringing their technical expertise of points of view set by career experience, to a logical conclusion that gives Army the greatest combat potential it can possibly have for the least logistics cost. At the core of this effort they must do all they can to reduce the constraints logistics might impose to the future land force with no fear, nor favour to outdated ideas and concepts that impede meaningful change. They must be supported in their endeavours by all others in Army, particularly those responsible for considering new capabilities or developing warfighting concepts; for if these two groups create logistics requirements which must be borne by the operational force, the best efforts of Army’s logisticians will be undone.

**Challenge two — understand the joint and tactical imperative for logistics transformation**

Although militaries are prone to hyperbole, most Western armies now consider the characteristics of modern warfare to have changed. Over the last two years, a succession of concepts has been developed as allied armies consider conflicts against ‘near peer’ adversaries. The challenge of operating in environments characterised by precision weapons, more capable adversaries and non-conventional threats has not been lost on the Australian Army. For example, with new computing and sensor technology, long-range precision strike weapons and other capabilities, land forces find themselves able to create opportunities for the joint force, rather than being a recipient of assistance in a joint fight. In concepts such as the US Army and Marine Corps-led ‘multi-domain battle’ new technologies increasingly enable domain ‘owners’ to influence outcomes in other domains, and with greater integration across a joint force. Multi-domain battle also comes with the development of capabilities that can integrate effectively across the domains to improve the queueing of combat power onto an adversary. For example, if every vehicle, aircraft and ship is considered a sensor in this
version of ‘hyper war’; operating in unison through modernised command and control systems, the greatly improved ability of militaries to detect and utilise joint fires promises to fundamentally change the way the force fights.

Technological developments are not the only reason that multi-domain battle exists as a concept, nor are they necessarily why Armies are so interested in promoting it. Multi-domain battle is a euphemism for an evolution in war, in the context of conflict between adversaries who are challenging traditional Western strengths in joint warfare, considered alongside other aspects of a changed battlefield. With near-peer conflict an increasing possibility, and with the proliferation of precision rocketry and stand-off weaponry available to even the most poorly resourced combatants, a flourishing debate on operations within an ‘anti-access, aerial-denial’ (A2AD) environment forced Western militaries to reconsider their concepts and how their logistics forces might operate in such environments. Initial responses such as ‘Air-Sea Battle’ gained broad interest, but as concept writers realised that such strategies gave the enemy the operational initiative, an expectation that land forces would be required to operate in ‘the keep-out zone’ became evident. Furthermore, it was also realised that A2AD zones could be penetrated and defeated by land forces, and integrated with the effects provided from other domain ‘owners’, A2AD could be systemically defeated. Up until very recently, the logistics implications of sustaining these type of operations were treated very broadly.

Despite the limited probability that the Australian Army in its present form will participate in such conflicts in the short-term, these visions of future war are worth considering in the context of Australian logistics requirements. For one, it is always useful to understand how your coalition partners will fight, and how they envisage sustainment operations being conducted. Furthermore, these concepts are relevant to understanding how logistics capabilities might support dispersed land force operations, in areas of threat, and as part of an integrated joint force even if land force design is focussed upon supporting operations and contingency outside of outright warfare. Army has been examining the sustainment and capability implications of near-peer conflict as well as stabilisation operations, tested through a variety of experiments and exercises conducted over the last year, with valuable lessons being learned. Assumptions regarding sustainment operations are increasingly
being challenged in Army’s collective training activities (such as Exercise HAMEL 2016), as they are likely to be so with major joint exercises; but there is a convincing case for greater attention to be given to determining ways in which forces can be sustained in such scenarios.70

In order to enable effective sustainment in tactical environments that are exceptionally fluid, current thinking on logistics demands adaptive yet efficient supply chains that can be switched to support the commander’s main effort, yet equally emphasise the minimisation of logistics forces on the battlefield. To achieve the flexibility required in operations requires logistics command and control capabilities to be appropriately enabled to do so. Maintaining a high volume of supply to whichever commander might have the lead at any one time will require effective information systems as capable as those which support the synchronisation of intelligence, surveillance, reconnaissance, and joint fires.

Militaries have had a mixed track record of success in establishing such efficient supply chains in areas of operation, or in introducing the logistics information systems required to coordinate them. Ideas such as ‘distribution-based logistics’ and other strategies to achieve what contemporary planners envisage, have not always led to effective operational outcomes, and logistics information systems programs, often a soft target for cost-cutting, are rarely introduced as originally intended. This must change if Army, and the ADF, modernise logistics as it integrates further into the joint force. Failures in logistics information systems were highlighted in numerous operational reports following operations in East Timor; and in the twenty years since, ad hoc solutions and under-funded projects still hamper the ability of Army and Defence logisticians to progress transformational change in this area. The fact that Army cannot electronically track its equipment using computing technology found commonplace in industry is an indictment of its capacity to achieve what is desired in numerous logistics concepts.

Improvements in coordinating logistics in a tactical setting naturally lead to the issue of joint integration. Progressing a joint approach to logistics has been a major factor in the force design of ADF and Army logistics capabilities when compared to many other areas. Over the last thirty years the ADF’s joint logistics capabilities have coalesced through multiple imposed reviews. Generally, this joint approach has been considered in the
context of capability delivery and materiel sustainment in these reviews, rather than in terms of logistics in the operational area. The time is right to progress joint logistics, in the context of operational sustainment, further. The ADF is now used to operational supply-chains which have, in the main, been jointly controlled and coordinated. Military logisticians of all Services routinely consider the ADF’s logistics as a joint system.\(^\text{71}\) The improved integration of effects envisaged under new concepts only supports the further progression to joint methods of movement and sustainment, especially at the tactical level.

Even without adopting major organisational changes, emerging warfighting concepts for joint operations conducted on land might require Army and the other Services, to rethink who might do what for whom at the tactical level. Dispersal could very well result in forces in one Service sustaining another; a practice which, historically speaking, occurs frequently on both exercises and operations. Domain ‘owners’ should not necessarily abandon their own integral logistics capabilities to create permanent joint arrangements in all instances, but synergies should be considered for mutual benefit. There is a strong logic for improvements in joint behaviour in terms of theatre support within an area of operation, where Army, Navy and Air Force land-based logistics elements are synchronised. At the very least, all three Services should train and prepare for operations with this outcome in mind. Army might look at cases such as the United States Marine Corps (USMC) whose force structure and recent concepts such as ‘Expeditionary Advanced Bases’ offer a model which is inherently joint at a tactical level.\(^\text{72}\) The thought of a combat unit receiving logistics support from another Service within the operational area must not be an exception, but a rule for a modern, joint force.

Of course, the actions of the enemy will remain the most powerful influence on logistics operations and there are powerful tactical imperatives for change whether it be in the context of the near-peer conflict of Multi-Domain Battle, or the ADF’s own notion of ‘mid-intensity’ conflict or stabilisation operations. Without repeating these well-known challenges in detail, the problem is that sustainment of dispersed combat forces for transitory periods in lethal environments, requires a lot from logistics elements. Logistics forces are seen to have to be able to hide alongside the combat forces, with an ability to move with speed and to disperse and coalesce when and where support is required.\(^\text{73}\) These are not small
challenges to overcome; operating in a highly-complex and ever-changing
distribution network poses major risks when to move is to invite detection,
and detection leads to destruction. Efficiencies gained through economies
of scale offered by bases, fixed supply points and routine logistics traffic will
be lost as logistics elements are thinly spread. A fine balance of logistics
capabilities close to dispersed combat forces must be achieved to ensure
they do not become a liability on manoeuvre, or at worst, indicate to an
enemy – or become themselves – a target.

Despite concepts such as ‘sea-basing’ which aspire to prevent the need
for deploying large logistics forces into an operational area, and with every
attempt being made to disperse logistics forces forwards, logisticians will
have to remain prepared to operate in fear of all forms of interdiction.74
The threat might be different during stabilisation operations than it is
during peer-on-peer war, but logistics elements will always be targeted
by enemies seeking asymmetric advantage. Stabilisation operations as
seen in the Middle East remind logisticians that battlefields have always
been complicated and complex for logisticians to negotiate. These
same threats are likely to remain familiar in the future. Interdiction will be
commonplace and at times impossible to counter with active measures.
Forward operating bases will require a combination of appropriate
defensive measures, from anti-air weaponry to surveillance capabilities,
forming vital but semi-secure nodes from which combat or stabilisation
forces will be sustained. The USMC’s ‘Expeditionary Advanced Base
Operations’ exemplify this form of practice, but an Australian Army
variation set in an appropriate context should be sought.75 Whatever
the case, proximity to logistics bases will determine sustainability, rather
than current doctrinal methods. Just as the ideas of ‘supporting’ and
‘supported’ might apply to joint fires in multi-domain battle, so too might
this control method be applied to logistics.

The importance of an intelligence, surveillance and reconnaissance
picture to logistics operations within an operational area will be vital to
take advantages of changing situations, and to reduce the distance
combat forces will have to move to be sustained. But it will also
support effective task prioritisation and coordination despite the type of
operation being conducted. The dispersal of these combat forces will
mean logistics elements will be required to take greater responsibility for
self-protection than experienced on recent operations. However, and
as described above, this will have to be conducted in such a way to keep the logistics footprint small and as difficult to detect as possible. Any discussion on the logistics footprint must come second to the requirement for the distribution network to be survivable and with inbuilt redundancy; a requirement that may, in a battlefield irony, necessitate larger forward logistics elements. All of the challenges of modern warfare described here have to be considered if future force design is to be regarded as rational.

If the recent discussion surrounding Multi-Domain Battle, or war with precision weapons, has done anything, it has been to focus Army upon preparing for wars against potential peer threats. Is this the most likely form of operation Army will face in the future? Most likely, no, but this should not stop logisticians from exploring the topic with diligence and detail. Stabilisation operations, if this is to be the benchmark to which Army is prepared, may require Army to operate using procedures similar to that in higher-intensity conflict. A recent article in the *Small Wars Journal* promoted the idea that future wars may be won by exerting control akin to the way the ‘ink-blot’ method was used by Australian forces to stabilise East Timor during Operation WARDEN in 1999. We can also look to the many years of operations in the Middle East, particularly with respect to those the US military has been facing in Iraq, to see the similarities. Whatever the case, as a variety of concepts are developed further by Army, it is likely that effective and efficient logistics will be instrumental to its successful execution at the tactical level. Of increasing importance will be modern technologies which promise to offer options for operating in this environment, and are well worth the detailed consideration they are being given. However, until these technologies are introduced successfully, the problems of sustaining forces in future operations will rest firmly in the realm of experimentation and exercising, concept development, and in doctrine. After all this study and concept writing, multi-domain battle and ‘war with precision weapons’ might simply prove to be little more than an intellectual diversion. Yet understanding the concept and the context in which it has been developed better prepares the logistician, if not land forces in general, for the possibilities of the wars of the future.
Challenge three — understand the ‘blue force’ imperative for change, and the methods to adapt logistics for operational effectiveness and efficiency

Army is evolving with every modernisation program completed, and every capability system introduced. Logistics requirements, and therefore the capabilities and processes that are required to fulfil them in turn, are determined by such changes. Army is in the process of replacing obsolete materiel with a range of alternatives that will be employed for many decades. Although much as been said of new armoured and logistics vehicles, new types of systems including rocketry and unmanned aerial vehicles, as well as C4ISR capabilities; the vast proportion of these developments will not profoundly change the way the future land force will fight. There are areas however, in Army’s modernisation which will have significant implications for their sustainment in both the garrison and deployed environments. These factors, understood through a strenuous self-assessment or ‘blue force’ study, need to be considered as part of future transformation efforts.

The most notable change to the nature of Army, and evolution that began with the ‘second wave’ of transformation, is that it has grown in combat power. It is also substantially heavier. Due to a range of threats upon typically Middle Eastern battlefields, the importance given to protection, motorisation and mechanisation has increased substantially. Furthermore, with Land 400 and L121 addressing the obsolescence of Army’s armoured and transport vehicle fleets, Army’s desire to improve its tactical mobility and vehicle protection is being made manifest. The introduction of modern technologies including UAVs and other sophisticated materiel poses new challenges to maintainers and those involved in sustaining such technologies. Army’s capability programs are being introduced following periods of study, exercise and experimentation that explore the consequences of this change. These activities have revealed a considerable number of operational logistics costs to this improvement to battlefield performance. The future Army will require more fuel, consume more ammunition, radically change the way in which repair is undertaken, and incur other new demands on a logistics system that must adapt to suit both operational tasks and preparedness activities in garrison. To prevent these
costs from resulting in a greater deployed logistics tail, many militaries - including the Australian Army – have undertaken a range of initiatives.

There are several categories of initiatives that can improve logistics performance without the introduction of additional personnel. In most cases, however, these initiatives must originate from outside of logistics community as part of the capability development process. In 2003, the RAND Corporation presented a brief on transformation to the US Army Deputy Chief of Staff ‘G4’ (Logistics), who had been given the unenviable task of ensuring the US Army’s logistics and combat support capabilities were strategically responsive. This task was given at the height of planning for the ‘Objective Force’, but also as the Stryker-based ‘Interim Force’ saw combat in Iraq. The core philosophy in this logistics transformation was to enable strategic mobility while preserving combat power, but also to reduce the total cost of logistics.

The philosophy applied by the US Army in 2003 has been reflected in a variety of evolving concepts recently published by American military Services, such as the USMC’s ‘Hybrid logistics’ which expands upon improvements in logistics to enhance ‘operational reach’. Although the US Army and USMC may have applied a different logic to logistics transformation – to reduce logistics demand - than the Australian Army might be applying now, the intended result is basically the same; improved logistics performance without the requirement for additional logistics troops. Therefore, the strategies that they have employed are relevant to the Australian Army’s own attempts to transforms its logistics.

The first strategy, and undoubtedly the most obvious, is platform efficiency. It is also the strategy that logisticians have the least ability to influence outside of describing logistics costs to key decision makers in the acquisition process. Platform efficiency refers to the application of technology to minimise the amount of logistics support required to deliver and sustain a capability. In recent years, energy (fuel) management has exemplified this approach to logistics demand reduction, but other technologies such as on-board power and water generation exist. Even the use of precision munitions is a way in which greater combat effect can be delivered at a lower logistics cost, with less ammunition required to complete a fire mission. With much-vaunted revolutionary technology such as fuel cells, additive manufacturing and new materials which can
protect vehicles with lower weight, we are likely to see many ways in which combat power can be improved in the future while improving *platform efficiency*. If Army seeks to improve its combat capabilities, it must seriously consider – and fund – supporting logistics technologies that might obviate logistics costs.

Technology will be transformative, but it is a long-term solution. Furthermore, Army has only just recently introduced (or are in the process of introducing) new combat and logistics capabilities through projects such as Land 121 (transport vehicles) and the future Land 400 (armoured vehicles). This means the opportunity to influence *platform efficiency* is now very limited. The next strategy for reducing logistics demand – *force efficiency* – is an option that can be implemented now.

*Force efficiency* refers to initiatives which require fewer force elements to achieve a desired effect. In developing the US Army’s Stryker-capability, the organic intelligence, surveillance and reconnaissance available to brigade combat teams, coupled with precision fires, ostensibly complemented and enhanced the capability of the medium-weight nature of the platform. In this case, some might argue that *force efficiency* did not deliver operational effectiveness – at least in terms of the operations in which the Stryker would subsequently find itself. Nonetheless, we are continuously reminded that the combination of modern armed, and increasingly cheap, UAVs supported by surveillance capabilities and guided weapons, offer forces firepower with consequential savings in permanent presence on the ground and logistics cost.

In terms of logistics-specific activities there are other *force efficiency* opportunities that can be, and indeed are currently, undertaken. Adopting common components, ammunition and other items, and standardisation across coalition boundaries as practiced by NATO or under the ABCA program, greatly simplifies supply between likely coalition partners. Collectively, and in an operational environment, there may be possibilities to share capabilities and prevent the unnecessary duplication of effort. Elsewhere, the modularisation of vehicle componentry, supported by information systems that better predict maintenance requirements as vehicle-monitoring technologies, also offers prospects for improving *force efficiency* in terms of the maintenance of materiel. Implemented effectively, such an approach limits the need to position maintenance personnel
forward with most deep repair occurring rearward (although, admittedly, this approach can make a maintenance problem a distribution one). Self-offloading distribution vehicles as being introduced under Land 121, or more effective ways to store and package supplies, also exemplify a force efficiency strategy.

Force efficiency can also be improved through conceptual and doctrinal means. At the macro level, land forces – as part of joint forces – can achieve greater efficiencies by removing duplicate functions, or if demand cannot be reduced, sharing functions to create greater opportunities. Doctrinal approaches to logistics which move away from philosophies where logistics elements are devolved and owned at the lowest level, as it was predating the recent CSS CONOPS, to those where modularised logistics capabilities are surged to support missions and tasks for limited time periods, also offer the prospect of improving force efficiency. Rethinking assumptions about who ‘owns’ what in the battlespace, and the logistics control methods such as ‘lines’ or ‘levels’ of logistics support to use Australian doctrinal terms, must therefore be part of future logistics transformation efforts in Western land forces. A good place to start would be to consider what activities must be done where, and question the validity of current organisational models such as echelon systems; as should the development of a culture in land forces which tolerates the inevitable periods where limited logistics support must be directed away from one unit to another to support combat operations.

Closely aligned to force efficiency is personnel efficiency. Personnel efficiencies seek to find ways in which fewer people are required to do a job. This could be achieved through several methods. Personnel ‘multifunctionality’ could be sought; at one extreme, logistics and combat force personnel might ‘mix’ tasks such as armoured fighting vehicle operations and maintenance. Given that Army already has maintainers who crew armoured vehicles, and that vehicle crew command will be a skill-set applicable to a wide range of vehicles in the modernising Army, there are examples which highlight the fact that such a progression is not as revolutionary as it first might seem. There is a training burden and competency risk imposed in developing multi-functional personnel, but many small militaries extensively engage in cross-training; a noteworthy example being the New Zealand Army whose land terminal, movements, and aerial delivery personnel come from a base trade. There is no
philosophical reason that the skills possessed by personnel from logistics or combat arms cannot be similarly transferred between one another in such a way. Technology can also support personnel efficiency, and is being rigorously pursued by armies as a way of enhancing the effect each deployed soldier or officer contributes to the deployed force. Examples of such include modernising ‘logistics information systems’ and ‘common operating pictures’, both of which promise to improve supply chain performance thereby enhancing the capacity of managers to respond to emergent tactical requirements.

The final strategy promoted by RAND was mission focus. For an Army that has transitioned its force structure to reflect a readiness cycle which enables a consistent, rotatable force amongst available combat elements, the term mission focus may be antithetical. Mission focus refers to the specialisation of formations for tasks thus avoiding the costly logistics capabilities that might enable the formation to be prepared for all tasks, or those tasks which might be perceived as unlikely. There are, however, inventive ways in which land forces can be structured appropriately to achieve mission focus without abandoning preparedness-based force design methodologies. Temporary allocations of modularised logistics capabilities based upon emerging operational requirements is perhaps the best-known method in this regard, and should be rigorously applied in future attempts to transform land forces. Nonetheless, land forces should always be prepared to abandon force design models which are based upon an assumption of being able to ‘do it all’ when the need arises, and prepare logistics capabilities accordingly.

One area that deserves further exploration by Army and relates to mission focus is the use of non-permanent military personnel to perform functions that may not require a soldier or officer to perform. Whether it be a civilian contractor performing a transportation function, a representative of a capabilities ‘original equipment manufacturer (OEM) performing repair on military equipment, or a public servant providing contract advice and financial support in the field, there are a variety of opportunities that can be explored by Army to achieve an operational and garrison logistics effect while apportioning military personnel to actual operational service delivery’. There are considerable operational risks to this approach, and as Army’s experiences in East Timor in 1999 highlight, the notion that non-military staff can or contractors might fulfil operational requirements during periods of
crisis can be tested. Recent experiences from other militaries also highlight a variety of other costs and problems created through contemporary experiences with contractors. Furthermore, in a non-contiguous battlespace, non-military personnel may be placed in vulnerable positions within an operational area. However, when used appropriately and with cognisance and acceptance of such risks, there are ways in which logistics support can be provided effectively and efficiently, allowing military personnel to be directed elsewhere.

The strategies mentioned here are useful for structuring thought, but it is worth concluding with a sobering point from RAND’s own summary, before land forces race ahead to make changes. In reference to applying these strategies to reduce the logistics ‘tail’ of the interim and objective force, it was noted that although it was relatively easy for Training and Doctrine Command (TRADOC) to implement force design changes in the US Army; when these strategies required other organisations to participate, transformation stalled. Logistics is an end-to-end process, and although the Australian Army might seek to improve its logistics performance through a variety of comprehensive strategies, its work will be undone by a failure to properly integrate their planning with other activities and change programs outside Army. Army’s logisticians must ensure that in applying these efficiency strategies, the broadest and most consultative approach is taken to ensure a robust and effective logistic process from the strategic to tactical level.

If Army hopes to improve its logistics performance, its capability developers must consider in detail, the consequences of ‘physical’ changes to its forces. This starts with a greater appreciation of operational sustainment factors in the development of capability. If this issue is not taken seriously, there is a real risk that Army will miss considerable opportunities that would otherwise limit the growth of its logistical tail. Perhaps the second-order question to be asked with regards to the physics of Army is whether, because of the increase in combat power, do we actually need the same number of combat forces to deliver decisive effects in future operations? Reducing the demand upon the deployed logistics system may ultimately prove to be the only reliable way in which logistics demand can be reduced. In any case, logisticians must be the intellectual ‘kernel’ around which any plan to more efficiently support combat capability must be formed, for it will be their lot in the operational environment to advise, if not resolve, numerous challenges which come from increased combat power.
Challenge four — focus force design on adaptability and resilience

In terms of its force design, Army has always had two major choices when it comes to shaping its logistics forces. It can prepare a force for combat which will most likely occur in a coalition setting, or it can opt for a force capable of conducting the typically regional stabilisation missions as evinced in Operation WARDEN. Of the two bases for force design, the latter has been the more difficult to prepare for, particularly if we seek an ADF leading such operations largely independent of external, great power support. This is because it requires the ADF to maintain its own capabilities, or plan for access to capabilities, for force projection and sustainment of itself and whatever coalition is formed around it. Many specialist capabilities essential for these functions reside within 17 CSS Bde, and were found in particularly high demand during 1999 in East Timor. The alternate approach, prepare for coalition combat operations, arguably requires much less from 17 CSS Bde and more from forward echelons, with operational logistic support being provided by a larger partner, most likely American. At various stages in the ‘second wave of transformation’ Army has oscillated between the two operational needs, without ever satisfactorily taking the force design process in either form to completion.

Success in war has always demanded forces that are adaptable because it is so difficult to predict the future. The way in which Army has designed an adaptable force is through modularisation, a method which remains applicable as we look forward. Most logisticians will be well-familiar with the idea of ‘modularisation’ as a way in which logistics forces can be organised with adaption in mind. It has been a central feature of the Army’s preparedness processes, and its ‘Force Generation Cycle’, where force structures are optimised so that components can be kept on varied ‘notices to move’. For example, the Australian Army rotates its three regular combat brigades and ‘modules’ of discrete support capabilities through phases of ‘ready’, ‘readying’ and ‘reset’ (analogous to reconstitution from a period of heightened readiness). This enables operational planners to have a selection of basic building bricks of capability available that can be chosen to suit a routine operation, or a discrete contingency. However, there is a considerable difference between modularity in preparations for war, and modularity when conducting it. Modularity offers flexibility to a force, to enable the appropriate logistics resources and capabilities to be directed
to the right mission and task. Furthermore, it offers the force resilience by creating discrete packets of capability that if lost due to enemy action or other circumstances, can be reinforced by other similar force elements.

Logistics is contextual, and this means the appropriate tactical logistics force structure is always determined by a combination of distance, dependency, duration and demand. This nature of logistics has always given validity to the idea of modularity, although it might be more efficient to specialise logistics elements as part of unit echelons. In practice, and as prescribed by doctrine, a modular approach is normally seen in the use of Combat Service Support Teams (CSSTs) to sustain different battlegroups for different tasks. It is a well-employed approach which requires the identification of a ‘capability brick’ which represents an irreducible minimum of a logistics resource, with multiple ‘bricks’ and command and control elements being allocated to suit a particular task. This approach reflects what is applied elsewhere. Tactics such as ‘combined arms’ and joint warfare, both of which combine constituent capabilities to enhance battlefield effects, show that this approach to warfare has a fine heritage.

Modularity and the importance of adaptable logistics elements will become more relevant to logisticians in the future if one takes a survey of developing concepts, or views several predictions as to the character of future wars as certainty. Firstly, modularity supports the idea that forces can be logistically resourced to conduct self-sustaining, independent, operations. In a recent online article for the US Army’s Military Review, Commanding General US Army Pacific, Gen. Robert Brown describes Multi-Domain Battle as not only requiring the integration of joint capabilities but outlines a vignette in which a Task Force of different capabilities allowed for such an eventuality. The idea of a task force is not new and as described above, the practice of grouping various modular elements is routine practice in Western militaries. It would seem that under Multi-Domain Battle, and with ideas such as the USMC’s hybrid logistics (an expansion of expeditionary logistics which integrates proposed technologies with concepts), or those contained within the Australian Army’s recent concept paper on operations within ‘the modern way of war’ that organisational adaptability will be a battlefield requirement. Rather than the deployment of an echelon-style series of logistics units, such as a Force Support Group (FSG) and a CSSB, we might find operations will necessitate groupings based on logistics effect.
Furthermore, as our concepts reveal an intention for forces to operate with greater dispersion, particularly in environments where geography divides forces from one another or threat requires forces to avoid detection and precision fires, logisticians must find ways in which their forces can be sustained by combat service support capability bricks spread even more thinly through the battlespace than they are used to. Although the CSST is a useful construct for supporting battlegroup activities, due to combat forces being increasingly dispersed, logistics formations need to be structured to allow for much smaller groupings within the constraints of existing, or future, force designs. The limits to dispersion need to be tested, as Army has done through a variety of experiments and exercises. As Land 400 experimentation has revealed, adaptive logistics may be fundamentally constrained by key logistics capabilities such as medical elements or distribution platforms such as individual fuel trucks or recovery vehicles.  

Such issues bring us to one of the perennial problems for military logistics. History shows us that logisticians are often required to compromise between a need for decentralisation and dispersal of capabilities, and the need to have a capacity to ‘mass’ logistics capabilities that are few, or simply best employed in such a way, for best effect. As most land forces have done in the past, we can plan logistics force structures on attending to this dichotomy. If the lessons contained within Huston’s opus, Sinews of War, Army logistics, 1775-1953 are to be learnt; Army would centralise the control of all transportation and mass-sustainment effects – much like it had many years ago under its divisional structure - and decentralise control of small-volume, localised activity such as health care. Arguably, this would raise questions as to whether the formation required its own logistics capabilities, with investments made into unit echelons and force-level logistics capabilities. Army would enable tactical success with a responsive logistics management system, enabling logistics forces to provide the greatest possible effect at a decisive point on a battlefield or in the area of operations when they are required. Army would try to balance the structure to avoid rigidity through over-centralisation, or over-dispersal to prevent the inefficient use of critical logistics resources; but because logistics forces will be inherently modular, there is always the prospect of being able to reallocate forces from one point to another as required.

This approach requires the limitation of integral support capacity of a unit to that which is essential, with the allocation of sufficient capability
bricks to support a task or mission occurring later. In describing ‘modular manoeuvre unit support’ as it was applied in the US Army, the RAND Corporation saw that ‘capability bricks’ would be provided through ‘reach’ and ‘phased in’ as the operation evolves.87 This was important because it kept forward units lean, in turn enabling rapid deployment or combat manoeuvre. In terms of Multi-Domain Battle, this eliminates the need for a larger logistics footprint in areas where it will be especially vulnerable. Supporting logistics force elements rearward will then be in a much better position to allocate, in accordance with the commander’s priorities, capability bricks to those areas and units requiring the greatest efforts. This very idea was applied in the Australian Army’s recent review into its logistics, and has supported a change of focus from a tactical culture based upon fighting individual battalions to one emphasising formation-level operations.

Technology, and in particular C4ISR capabilities, will significantly enhance the ability to employ modularised logistics forces even if we apply it in the context of current doctrinal methods and practices. With commander’s decision making supported by a tremendous evolution in ISR which began twenty years ago at the time of the RTA trials, and with digital communications enabling the rapid flow of information within formations and to elsewhere, the ability of formations to adapt their forces structure to suit operational changes has been enhanced considerably. These very systems are essential to the control of dispersed combat forces, but also form the backbone of battlefield distribution and potentially in enabling the ‘massing’ of logistics capabilities. Will these technologies overcome the insufficient numbers of logistics elements that normally characterise austere operations, as all operations in contested environments tend to be? The answer is a resounding ‘no’. Logistics and battlefield common-operating pictures will greatly enhance the commander’s ability to redirect logistics effort to where it is required, but they cannot overcome the physical limitations of the force. In this respect, land forces are looking to other technologies to overcome capability gaps – or to keep the deployed logistics footprint small - such as additive manufacturing, new sources of power generation, or different forms of distribution including increased use of air-drop or logistics-oriented drones to support existing tactical techniques and doctrine.
Certainly, there are grounds to challenge some of the assumptions we make when considering modularity and how it is best employed. As described above, there is a great deal of complexity in this approach beyond the over-simplified view of centralising modular logistics elements at the rear, and fragmenting and dispersing logistics capability bricks forward. Such approaches apply a very traditional form of logistics, breaking a force into sequential components that naturally fit within a layered echelon system, or ‘lines’ of support, from unit to brigade to joint task force; the approach well-practiced by the Australian Army since the Second World War. It may be completely impractical to apply this model in an environment where geography or detection and destruction prevents massed logistics capabilities from being easily switched from one area or force to another. It may be however, equally impractical to enhance the capabilities of forward echelons, even though it may be tempting to form logistics echelons robust enough to enable task forces to operate independently as per General Brown’s article. If this trap is fallen into, land forces might find that the need to spread modularised logistics capabilities across a battlefield to support the dispersion of combat forces requires the deployment of more of them to the theatre, increasing the force’s logistics tail in the process.

Furthermore, the tactical requirements of deploying into a highly-contested environment – into combat - are likely to challenge the ideas of what a modularised force might look like. The need to fight into an area of operations, and to sustain a force for an extended time during which it might be cut-off from supply-chains and logistics support, could mean that the practice of neatly dividing modular forces into discrete combat, combat support or combat service support echelons becomes limiting. Forces deploying into such environments must be packaged in a manner which integrates combat and logistics elements from the beginning to prevent force projection from turning into a complicated mess, or at least more so than is usual of deployments. In this environment, a systematic process of reception, staging, onforward and integration in this environment, a process land forces are now accustomed to due to recent operational experiences, is likely not to be possible. Logistics and combat forces must be trained and prepared to operate instantaneously upon deployment. One option is to continue to emphasise force adaptability by dividing combat and logistics forces into ‘combat packages’, which biases force modularity by function or effect, rather than by any particular technical proficiency, trade or specialisation.
Land forces including the US Army and USMC seem to be moving in this direction, a logical extension of pre-existing doctrine, with flexibility in force structure filtering into recent tactical and operational concepts. However, modularity could go further and challenge existing technical divides by taking the tactical method of modularity and making permanent force-structure changes. For example, a future distribution capability brick might include armoured fighting vehicles, ground-based air defence and even integral ISR and access to fires capabilities. In some circumstances, contractors and contract-provided capabilities might need to be included. Similarly, basic combat teams optimised for independent operations might require their own solutions that ensure sustainment but do not inhibit their manoeuvrability and which give them greater access to the logistics system. It will be less important for these ‘force packages’ to have their own integral support capabilities than it will be for them to successfully identify and access sources of sustainment from whomever might hold them in the joint force. Multi-functional personnel will be required in this environment, where austerity and competition for resources will be the norm and a capacity to reinforce elements is significantly degraded.

If logistics transformation within the Australian Army is to be holistic, assumptions that have been carried into force design must be tested. The suggestions here may prove institutionally impractical and are entirely contestable, but there are opportunities for force designers to create better organisational structures that set the conditions for adaptive logistics. Martin Van Creveld in *Supplying War*, notes armies rarely get force structure right before war, and designing adaptable forces and logistics capabilities through modularity may never entirely deliver what it promises. Yet operations in the contested environments of the future, whether it be in combat or stabilisation operations, are likely to demand a greater unity of effort between all of the ‘arms’ of land forces. We can look at this as a force design and conceptual problem, a training requirement; or we can leave it to deployed commanders to adjust the forces available, enhanced by better technology and training in the future, once they deploy. After all, a force’s sustainment requirements are only ever known with some certainty once ‘boots are on the ground’. Although a combination of force design, training and command judgement is always required, Army – and the joint force more broadly – must apply intellectual rigour to confirm what the balance between the three must be.
Conclusion: Priming Army for the transformation of its logistics

This monograph, in two parts, provides a succinct history of logistics transformation in Army and several reasons why logistics transformation must continue. It is primarily concerned with the conduct of operations rather than the logistics requirements for generating and sustaining capability in peacetime; this matter deserves a paper in its own right. Although the paper describes logistics transformation as a series of ‘waves’ in which dominant organisational themes are applied to force and conceptual design, adapting Army’s logistics to emerging needs must be considered daily business despite the major organisational trends of the day. It has always been the role of a well-informed logistics professional to seek out efficiencies to improve practices, thereby enhancing the Army’s combat power – actual or potential.

Unfortunately, logistics transformation to better sustain future operations has been routinely co-opted by programs of reapportionment or rationalisation whereby the logistics ‘tail’ has been consumed to feed the ‘teeth’. Many armies are aware of the risks in proceeding down such a path; the Australian Army had its own precarious moment during Operation WARDEN in 1999. It is important that as the Australian Army looks to the challenge proposed by its Chief, or any other aspiration to transform Army logistics, all risks are examined in detail by planners as logistics capabilities are redesigned or doctrine rewritten. Army’s logisticians should be careful not to overstate their capacity to deliver a logistics system in Army and ADF that proposes to solve the ‘logistics problem’, whatever that may be seen to be. Instead, logisticians should be focussed on what can be achieved
practically and as soon as possible, and work hard to deliver meaningful change. The success of any future transformation of Army’s logistics will depend upon its narration, and the way in which Army is ‘primed’ for change.

Communicating the need and nature of the intended change is the practical method of imparting understanding of the transformation process. This is an Army, if not a Joint problem, although the key agents of change may be the leadership within Army’s logistics community. The need for and nature of transformation must be forced into public discussion because the subsequent consideration of the problem will be directly relevant to the transformation’s success. As many logistics problems originate from the requirements of combat forces, and not logisticians, it is vital that all within Army are included as part of the transformation process. Notwithstanding this nature of logistics evolution, progress in transformation will be a measure of the state of professional leadership within and without the logistics community. Lessons from earlier efforts to transform logistics have shown how important an influence commanders and senior non-commissioned officers are in promoting the need for change, and where transformation has been the most successful, it has been because of their direct influence. Divergence of opinion amongst the senior leadership can be expected, and is a tremendously positive influence in achieving the best outcomes in transformation.

There are opportunities that logistics leaders must exploit. The first is to set, and subsequently describe, a consistent vision. Narratives and vision statements serve several purposes regarding organisational transformation. Narratives link multiple activities by common themes and ideas, and set a path and a logic for action when the effort of an entire organisation is required. A future narrative should not be a theory of logistics, nor necessarily a concept. Instead it should be a practical and pragmatic description of the desired outcome and the process of transformation which will be undertaken; what must be done when, and by whom. Some might argue that because logistics is a system, the task of establishing a vision is complicated by a whole variety of Joint and Service needs. Given that a Defence Logistics Enterprise Strategy has been prepared for the ‘Strategic J4’, CJLOG; it may seem that Defence has already fulfilled this requirement. If Army is to retain responsibility for the delivery of land logistics to the joint force, it must also bear the weight of responsibility for outlining what
Those contributions to the joint force must be. As this paper has shown, outsourcing logistics and its ideas to the joint world is unlikely to result in effective solutions to all of Army’s logistical problems.

Second, transformation should be established as core business for Army’s logistics leadership. A regime of routine meetings between select groups has characterised many attempts to transform logistics. If transformation is to be considered an Army-wide venture, the entirety of the logistics community must be invited to contribute in one form or another. The problem is too big for any one person to own, just as logistics is too big for any one commander to truly control. It will always remain important to maintain forums for specialised, or focused, approaches to logistics subjects. However, logistics transformation largely becomes the responsibility of the people expected to implement it – logistics commanders – and an avenue must be established to encourage and maintain their participation in change. The 2016 Army Logistics Leaders Symposium, auspiciously timed to discuss the Chief of Army’s challenge to logisticians, was a major step to progress logistics issues in transformation. Best efforts must be applied to ensuring its continued existence and longevity, and to avoid regressing to a fractured and stove-piped approach across the logistics community.

Finally, logistics transformation must become the centrepiece around which the curriculum of logistics courses is based, and as an inclusion within the training of combat arms. In the context of logistics training, this would predominantly include generalist courses offered by the Army School of Logistics Operations, as well as in the range of courses taught at other logistics Schools within the Army Logistics Training Centre. Not only will this improve the standard of awareness of issues within the logistics community, but it will encourage a discussion which supports the efforts of the leadership to engender transformation. Furthermore, it will institutionalise transformation as something the logistics community must work towards as part of its daily business.

Similarly, the importance and conduct of logistics transformation should be briefed alongside other initiatives at generalist officer and senior non-commissioned officer courses, Pre-Command courses and to Australian Command and Staff Course (Joint) students. It is vital that members of the combat arms and future commanders are trained and
educated to enable them to appreciate logistics in war, and how logistics concerns will influence their plans. There is a major training and education deficiency within the ADF with respect to logistics, and this creates an underappreciated operational risk for Army. Overcoming this systemic intellectual and arguably cultural problem is critical for the efficacy of change in Army’s logistics, as well as to the modernising of Army’s combat and support forces such that they are robust, available when required, and can be employed effectively. Without overcoming this problem, Army is likely to be building capability ‘castles’ on ‘foundations of sand’.

Putting the philosophy of transformation aside, the most important challenge for Army and its logisticians to resolve at an early stage in the ‘third wave of transformation’ will be the ‘written word’ as it applies to concepts and doctrine.91 Concepts and doctrine are the intellectual component of preparedness, and any misalignment between them is translated to the battlefield. All too often concept development outpaces the preparation of doctrine; and this ultimately leads to concepts that are practically unimplementable, and doctrine that seems woefully out of date. Neither is wholly true when it comes to the Australian Army, but the divide between the two is a real impediment towards effective transformation in Army’s logistics now. There is a considerable risk that any achievements in transformation range ahead of Army’s capacity to address the growing divide between concept and doctrine. For example, there remains a need to ensconce the ‘CSS CONOPS’ in Army’s doctrine, and reflect a more modern approach to Army logistics in a variety of concepts relating to incoming capabilities.

Concepts and doctrine, however, are by no means a substitute for actual logistics transformation. Much of the staff effort directed too far in the future becomes wasted when there are real problems for Army’s logistics right now: problems that will magnify very quickly as circumstances change. There are always opportunities that can be taken immediately, thus, whatever concepts are written they must provide the intellectual leverage to use any available resources properly, and for the benefit of future operations. Although Army’s logisticians may have worked hard to implement the successful changes implemented throughout its history, there has been little tradition in Army’s logistics community of engaging the wider Army in a coherent, collective, manner. Opportunity exists to remedy this problem at the beginning of a ‘third wave in logistics transformation’. The logistics community must devote time and attention to examine the
transformative efforts of the last 20 years for there has been a great deal of work already conducted that remains useful today. The community must write and share its ideas, and in doing so, make logistics and logistics transformation a discussion worth having. Finally, it must regain its own agenda, not for its own purposes but to help institute meaningful change in logistics capability, and ultimately to prevent Army from making a misjudgement as it prepares itself for the future.

As CJLOG, Major-General David Mulhall, recently said with respect to the greater Defence logistics community,

‘my perception, rightly or wrongly, is that Defence’s logistici[s] community is not leading our own agenda and is not as deeply engaged in the professional and intellectual mastery of our work as we once were. As a community we are overly focused on managing organisational change and we are constrained in our thinking by the force design and support paradigm arising from 15 years of operations in the Middle-east region. How adaptable, agile and responsive would we be to a demanding joint, operational scenario in, say, the Indo-Pacific region?’

The history of transformation of logistics in Army demonstrates that Army’s logisticians have always possessed the capacity and capability to challenge practice in a positive and productive manner. It is vital that they take the opportunity to do so now, and it is equally vital that Army is receptive to their proposals for change. Much effort has already been devoted by non-logistician and logistician alike with respect to transforming Army logistics, as have there been numerous reviews of logistics and programs of change that provide a wealth of information to support Army’s next step in its evolution.

The first step in progressing transformation is for Army personnel to have a greater awareness of the history of transformation, where and why it has failed or stalled, and what is still left to implement. Secondly, Army’s logistics community needs to take active ownership of the problem and steward the Army towards an operationally sustainable, but transformed, force. Thirdly, Army must give logisticians greater opportunity, empowerment and resources to implement change. From this start, other aspects of transformation can be continued, and practical effort applied to force design, concept development, the reinvigoration of doctrine, and
other modernisation activities from the strategic to tactical levels of the organisations. But beyond all else, all of Army must recognise that the transformation of Army’s logistics, in the context of the joint force, is a contemporary problem, critically important, and that it requires a collective effort, now, for it to be successful. Solutions to Army’s challenges must be delivered, and it is always the right time for addressing them with whatever capacity exists to do so.
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**Journal articles**


Presentations and briefs


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**Endnotes**


27. ibid., p 266.

28. ibid., p 265.


30. Ibid., p 42.


33. Ibid., p 12.


35. Ibid. pp 52, 88.


37. Ibid., p 136.


39. Ibid., p 57.

40. This was a subject area covered in the Australian Army’s classified *Army Institutional Lessons Study*.


42. Joint Committee on Foreign Affairs, Defence and Trade, *From Phantom to force: towards a more efficient and effective Army*, Commonwealth of Australia, 2003 This referred to the strategic imperative to support a one brigade deployment, with another battalion operation elsewhere.


44. For example, the Land Warfare Studies Centre became a centrepiece for articulating Army’s future requirements. An example of its work is Evans, M., 1998, *The role of the Army in a maritime concept of strategy*, Working Paper, no. 101, Land Warfare Studies Centre, Australia.


52. Ibid., p ii.


54. Ibid., p 11.

55. Australian Parliamentary Committee, JFADT, Army Chapter 4, 4.18.


58. Ibid., p 34.


60. Ibid., slide 63 (‘Outcomes’).


62. Ibid.


64. Ibid, p 15.


78. In late 2016, the USMC released a brochure titled ‘Hybrid Logistics’. Although not available in public, it is unclassified. Copy held by author.


91. Maccagnan, V., p 16.

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