ASPI
AUSTRALIAN STRATEGIC POLICY INSTITUTE

The Cost of Defence

ASPI Defence Budget Brief 2018–2019

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Note on title:

The figure of $99,606,202.74 represents one three-hundred-and-sixty-fifth of the consolidated Defence appropriation (including the Australian Signals Directorate) for 2018–19. This does not include funds appropriated to the Defence Housing Authority, nor those administered by Defence for military superannuation schemes and housing support services.

Contents

Executive Director's foreword

This is ASPI's 17th annual *Cost of Defence* budget brief. Mark Thomson, who ably prepared the first 16 editions of the brief, has departed to enjoy a well-earned retirement, so we have decided to take a slightly different approach. We intend to move much of the data included in previous editions online, where it's more easily accessible. This has resulted in a substantially shorter brief. Nevertheless, our aim remains, as ever, to inform discussion and scrutiny of the defence budget and the policy choices that it entails now and in the future.

Special thanks are due to Mark. While this brief differs in size and format, he has strongly influenced it, both through the many years of data he compiled and through his intellectual rigour.

As has been the custom in the past, we explore particularly topical issues. This year, we examine aspects of the Australian Government's defence industry policy, as well as the affordability of its Naval Shipbuilding Plan.

Acknowledgements are due. The considerable task of preparing the document for publication has been capably taken care of by Steve Clark. Many others, in particular Michael Shoebridge, have helped by providing comments, offering advice, checking facts and proofreading. ASPI intern Christopher Dixon assisted with our new 'Defence in 10 tables' section. The judgements in the strategic context section in Chapter 1 were based on inputs from a number of ASPI's analysts.

My colleague Marcus Hellyer, who is ASPI's Senior Analyst for Defence Economics, has pulled together the brief in the short time available. For this I extend my sincere thanks. As always, responsibility for the judgements in this brief lie with Marcus and me alone.

Lastly, I acknowledge that we at ASPI are not disinterested observers of the defence budget. Our long-term funding from Defence (now around half of ASPI's overall funding) comes at the rate of nine thousand, six hundred and sixty-five dollars and seventy-five cents ($9,665.75) per day. Details can be found in our annual reports, which are tabled in parliament and available online.

Peter Jennings

Executive Director

Executive summary

Australia's strategic situation is deteriorating. The 2016 Defence White Paper set out six drivers that shape our security environment. None has improved since the White Paper appeared, and most have worsened significantly.

The existing rules-based global order is under threat. China simply ignores it when it chooses, for example with its de facto annexation and subsequent militarisation of the South China Sea, and is embarking on creating a new regional order that it seeks to define alone. The current leadership of the US appears unable to decide whether it wants to support the existing order, ignore it, or tear it down. Meanwhile, the relative power gap between the two continues to decrease, as China's economy and military grows.

Defence budget 2018-19	
Defence (with Australian Signals Directorate) funding, 2018–19:	$36.4 billion
Share of GDP:	1.91%
Real growth on prior year:	1.35%
Defence (without Australian Signals Directorate) funding, 2018–19:	$35.5 billion
Expenditure shares	
Investment:	$11.0 billion (31.0%)
Personnel:	$11.8 billion (33.1%)
Operating:	$12.7 billion (35.8%)
Cost of deployments	
Afghanistan & Middle East:	$697 million
Border protection:	$53 million
Key budget measures	
+$500 million brought forward into 2017-18, repaid over forward estimates.	

The development of emergent technologies such as cyber, space-based capabilities, artificial intelligence and hypersonics continues apace. We're also seeing clear Islamic State links into terrorist attacks in Southeast Asia, some involving returned fighters. All of these developments, taken together, suggest that the ADF will be confronted with an increasingly broad spectrum of threats. The question is whether Defence can be stretched even further to cover them all, or whether it should focus on addressing particular ones.

Unfortunately, the *2016 Defence White Paper* doesn't provide clear guidance on prioritisation. It might be time for the government to revisit some of the White Paper's assumptions, either to confirm that it does set out the right path, or, as we believe it should, make some changes to the plan.

Against that strategic background, the 2018–19 defence budget continues to deliver the vision set out in the White Paper. In 2018–19, the government is increasing the defence budget towards its commitment of 2% of GDP by 2020–21. Based on the Defence Portfolio Budget Statements (PBS) and GDP predictions in the budget papers, we calculate that it will fall just short, at 1.98%, but that's essentially a $400-million rounding error. And, based on forward estimates predictions, the Defence budget will grow past 2% in 2021–22.

We should note, however, that Defence's funding, as presented in this year's budget, falls short of the fixed funding line presented in the White Paper by around $5 billion by the end of the forward estimates. The government essentially made two funding commitments—2% of GDP and a fixed funding line—and it's possible it could meet one without reaching the other. Nonetheless, Defence continues to enjoy real increases to its funding.

The growth continues to be centred on Defence's capital program. While capital investment has historically been the poor cousin alongside personnel and operating funding, the three are now roughly equivalent, and by 2020–21 capital funding could exceed the others for the first time. But it will need to, if Defence is to be able to afford the future force.

Defence has used that increase to invest heavily in remediating infrastructure. And while the shipbuilding enterprise is still in its early days, many other capital investment projects are delivering capability—Air Warfare Destroyers, P-8 maritime patrol aircraft, trucks, battlefield communications and airlifters, for example. And the Air Force's transformation into a fifth-generation force is well underway. There is no doubt we are getting a more capable ADF.

But, as always, there are things to be concerned about.

Full-time ADF personnel numbers are programmed to grow to 59,794 this year on the way to the White Paper target of 62,000. But actual growth has been slow, and Navy (potentially the service whose future platform growth is greatest) is going backwards. Civilian numbers fall by around 2,000 due to the Australian Signals Directorate becoming a statutory agency. Overall, however, net civilian numbers remain unchanged at the White Paper level—that is, well below where they were five years ago, potentially requiring greater reliance on expensive contractors. Funding for personnel effectively flat lines at less than 1% real increase annually over the forward estimates. That seems to be inviting future cost pressures, since ADF numbers are meant to increase, and individual personnel costs have historically increased in real terms.

Also, sustainment budgets appear to be increasing faster than predicted. Between last year's PBS and the mid-year Additional Estimates update, the sustainment budget increased by $1.5 billion, or 16.7%. And this year's sustainment budget is around $1 billion more than predicted last year. Some of that is likely to be due to different accounting practices that Defence has adopted, but one gets the sense that perhaps the sustainment requirements of an increasingly complex force were underestimated in the White Paper and Defence is having to adjust.

That could be one reason why Defence is underachieving against its predicted capital spend. Overall, its capital spending is increasing at a healthy rate, but it is likely to fall short of the spend predicted over the 2016–17 forward estimates by about $4 billion or so. Half of that may be due to foreign exchange adjustments, so it's not a huge shortfall in the grand scheme of things, but probably confirms, first, that it's always hard to ramp up investment spending quickly and, second, the sustainment increase had to come from somewhere.

Investment in ICT appears to have crashed last year, falling by 72% or $644 million between the PBS and Additional Estimates. It may be that ICT projects failed to deliver, or that sustaining current legacy ICT systems sucked funds away from investment in new acquisitions. Since there's a complete lack of public reporting on the ICT program, it's impossible to know what happened. The lack of transparency on ICT is particularly troubling, as the Integrated Investment Program foreshadows over $10 billion in ICT projects that are central not only to Defence's corporate information systems, but also to its war-fighting ability.

This lack of transparency extends beyond the ICT program. While the government is claiming to be approving record numbers of projects, there's no public record of what they are, let alone information on their scope, schedule or budget. For approved projects, there's no reporting on progress unless they're big enough to make the *Major projects report* of the Australian National Audit Office (ANAO). This year, for the first time, the PBS does not even include a list of project approvals planned for the coming year. That's unfortunate, because capital investment projects lie at the heart of the government's White Paper plan, so both the government and Defence should do better at transparency.

The Cost of Defence looks at two issues in more detail this year. The first is the government's defence industry policy. A few years ago, it seemed as if everybody had an opinion on which fighter planes and submarines Australia should buy. Now the discussion has moved on to whether and what we should build in Australia. At some level, this isn't a debate that can be resolved by data alone, as it involves issues of identity and ideology. At one end of the spectrum there are the economic rationalists who argue that there's no net national benefit in

subsidising uncompetitive industries, whether they be car manufacturing or shipbuilding. While Australia has been the world's fifth biggest arms importer over the past decade, that has enabled us to get access to the most advanced military technologies when we need them at a price we can generally afford.

At the other end there are those who argue, whether for reasons of sovereignty, jobs, or even parochialism and prestige, that we should do as much as we can here. And in between there are those who see merit in both sides; perhaps we should be doing more to keep some of the money that we send offshore to buy arms here in Australia, but not at the 30-40% premium RAND Corporation suggested we were paying for shipbuilding, particularly if it means less capability for our servicemen and women.

The government's industry policy includes elements of all of the above, which means that at times it appears inconsistent. Its policy documents state that, ultimately, developing Australian industry and exports is about improved capability for the ADF. Yet in practice it appears to favour building in Australia regardless of the cost premium and consequent decrease in output delivered to the ADF. Ultimately, our view is that we should support Australian defence industry when the costs and risks are understood and it makes sense to do so. However, based on the ANAO's analysis, it doesn't appear that Defence understands the premiums involved in local builds, so it's hard to see how robust the business cases for local builds can be.

That said, once the government has made the initial decision to build in Australia, its choice of submarines, offshore patrol vessels, and armoured vehicles appears to have been based primarily on capability. For their part, the international primes have got the message that to be competitive they need robust Australian industry plans and partnerships with local companies and universities. Centres of excellence and cooperative research undertakings have been established, so industry seems to be meeting the government's demand it put more skin in the game.

The innovation programs announced in the White Paper appear to be getting grant money out the door and, while it's early days, anecdotally at least we are seeing local success stories. Since the funding involved is small compared to that spent on things like shipbuilding, it makes sense to double or even triple it in order to support the government's broader innovation agenda, to keep up with other nations' investments in emergent technologies, and to enhance Defence's existing capabilities, which will have to remain in service for a long time until the future force is delivered.

In terms of exports, the goal of becoming a Top 10 defence exporter seems not only overly ambitious but also distracting. Rather than focusing on exporting platforms, there's probably more benefit to be had by leveraging our involvement in the shipbuilding and armoured vehicle projects into greater access for Australian industry into the international primes' supply chains for projects that they're conducting around the world, not just here. That can achieve economic benefits here long before the mirage of submarine exports is realised.

Which brings us to the second area that we've examined in more detail: the affordability of the Naval Shipbuilding Plan. There's no getting around the fact that building modern warships is expensive. There are two numbers that perhaps warrant closer consideration than the $89 billion headline figure that's widely quoted. The first is the $20 billion that the future frigate and future submarine projects will have spent between them before they each deliver usable capability (probably around 2028 and 2032, respectively). That's a lot of cash to have tied up while our strategic circumstances deteriorate and our current platforms age. As ASPI has suggested previously, it's probably worth looking at what Defence can do in the meantime in the form of cost-effective ways to enhance capability sooner.

The second number is the $3.5–4 billion in annual cash flow that we estimate the shipbuilding plan will require once it's up and running. Granted, the capital equipment budget is growing. But shipbuilding will potentially consume around 30% of it on an ongoing basis. On the one hand, this smooths out the peaks and troughs, but

on the other, since it sits at that level forever, it limits the room available for other capabilities. And since continuous local build appears to now be the government's policy, there are likely to be other builds locked in forever (protected vehicles, armoured vehicles and so on), further shrinking the funding space for other capabilities and future flexibility.

Since the Navy is essentially undergoing a transformation that will double its tonnage, sustainment costs will also increase. Submarine and frigate sustainment (currently the largest and third largest sustainment lines in Defence) are likely to triple and double, respectively. Submarines alone could cost $2 billion a year to operate, on top of $2 billion a year to build, which together will potentially require 10% of Defence's total budget for one capability. Granted, we are still a long way away from having all the future frigates and submarines, but at a time when western navies are shrinking due to the cost of building and operating modern warships, the fact that we are moving in the other direction raises questions about affordability.

And in order to get something close to a reasonable return on that capital investment, the Naval Shipbuilding Plan locks in a two-year delivery 'drumbeat' for frigates and submarines. Not only does this mean that it will be a very long time before the future fleet is delivered while our strategic environment is deteriorating, but it also limits Defence's ability to manage cash flow by slowing things down, as that will further delay delivery and affect jobs.

There are other cost pressures. The future sustainment cost of the Joint Strike Fighter is a big unknown, but if it's anywhere close to the jump from the classic Hornet to Super Hornet (around three times as much per aircraft), it will be hard to absorb.

In short, the megaprojects, in particular shipbuilding, have the potential to crowd out other capabilities. Historically, it's the enablers (facilities and ICT) holding everything together that suffer. But it could be that the big projects will also distort the overall force structure. There are already signs of that, and the ANAO has noted that Defence may have to increase the future submarine project's budget by $6.7 billion, even before the first submarine is delivered. That can only come from other areas of planned expenditure, most likely other capital investment.

In the light of their centrality, both to Australia's future military capability and to the government's defence industry policy, there need be informed understanding and public scrutiny of the future frigate and future submarine projects—the two biggest projects in Defence's, and potentially the nation's, history. That discussion must be supported by real data. As a minimum, the two projects should be included in the ANAO's *Major projects report*, regardless of whether they have received formal second-pass approval from government.

Because the media, the public and Defence often argue past each other when discussing the cost of military equipment, we have include a chapter (Chapter 7) that illustrates how Defence costs major acquisitions and shows why the 'sticker' price is very different from Defence's total project budget. Hopefully this will contribute to better discussion around what the cost of Defence and its capabilities actually is.

So to sum up, the government is broadly meeting its commitment to get the Defence budget to 2% of GDP. But the content and timing of Defence White Paper's investment program have not been revisited, despite changes (for the worse) in the strategic environment it was intended to address. Funding pressures are already emerging, with more to come in sustainment and personnel right at the time when a large share of the investment budget is being tied up in shipbuilding.

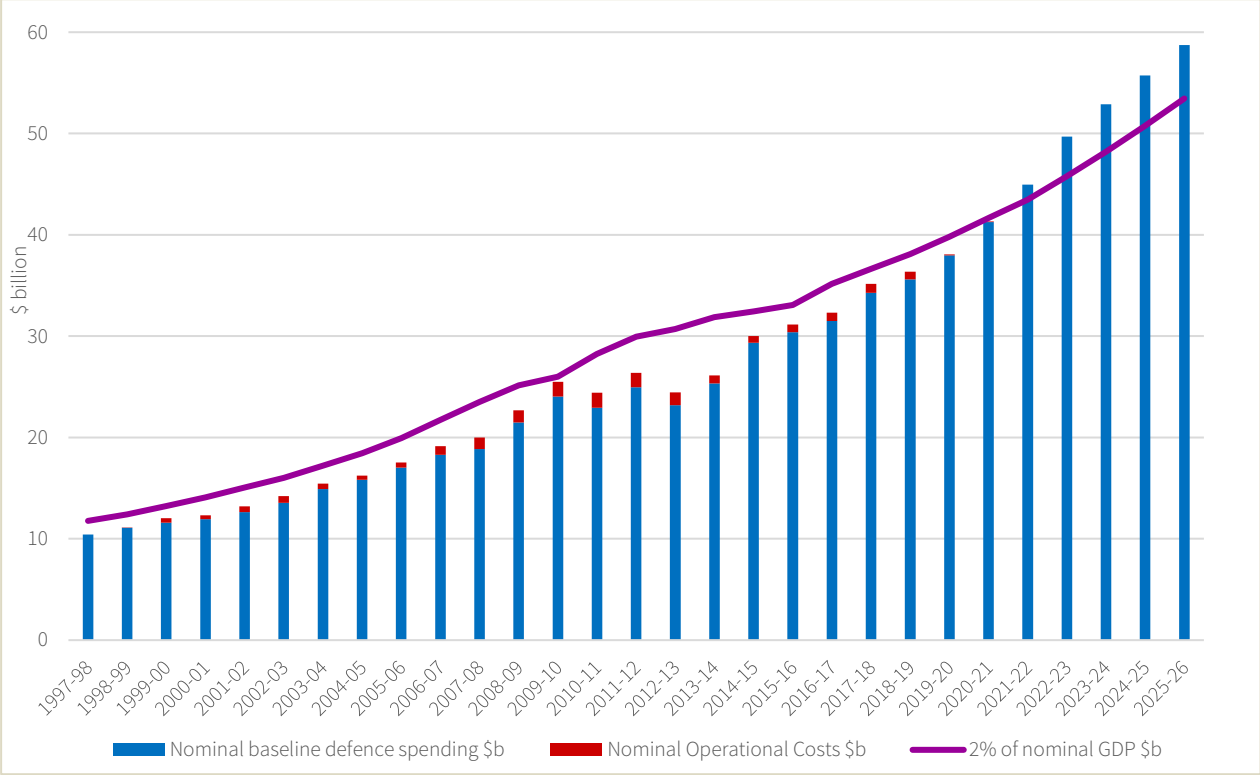
Informed decision making and public debate on these issues is essential to navigating them in order to keep Australia secure. To support this, the government needs to demand Defence provide greater public transparency in its planning and reporting.

Defence in 10 tables

The tables presented here are discussed further in later chapters, so we won't provide explanatory notes but we have noted where the material illustrated in the tables is discussed in more detail in this brief.

The defence budget 2018–19

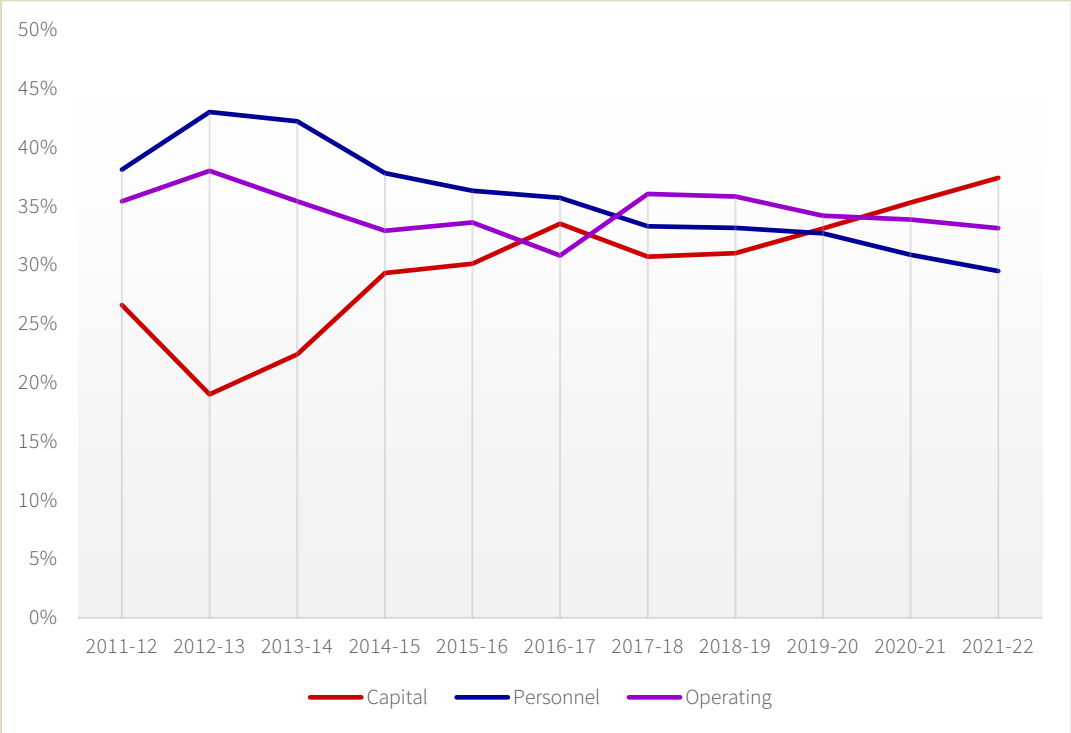
Figure A.1: The Australian defence budget as a percentage of GDP over time (see Chapter 2)



Sources: Spending—Historical Defence spending is taken from Defence annual reports and PAES. Spending data for 2017–18 to 2021–22 is taken from the 2018–19 PBS which extends to the end of the forward estimates. Beyond that, the spending line is taken from the fixed funding line presented in Table 1 of the 2016 White Paper. There are of course no guarantees that future funding will be delivered.

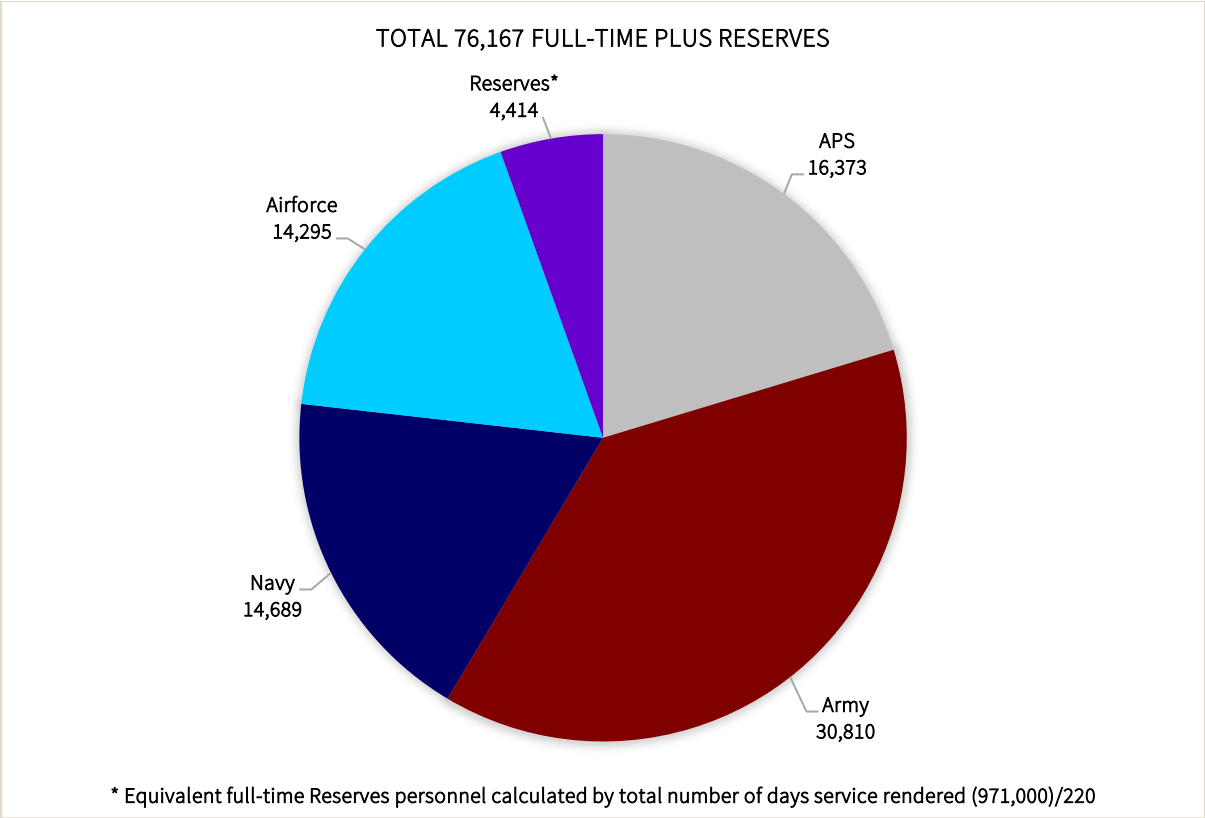
2% of GDP line—Historical data on GDP is taken from Budget Paper No. 1. Estimates for GDP over the forward estimates are also taken from Budget Paper No. 1. We have generated estimates for GDP beyond the forward estimates by projecting 3% real GDP growth.

Figure A.2: Balance of the defence budget, 2011–21 to 2021–22 (%) (see chapters 2 and 3)



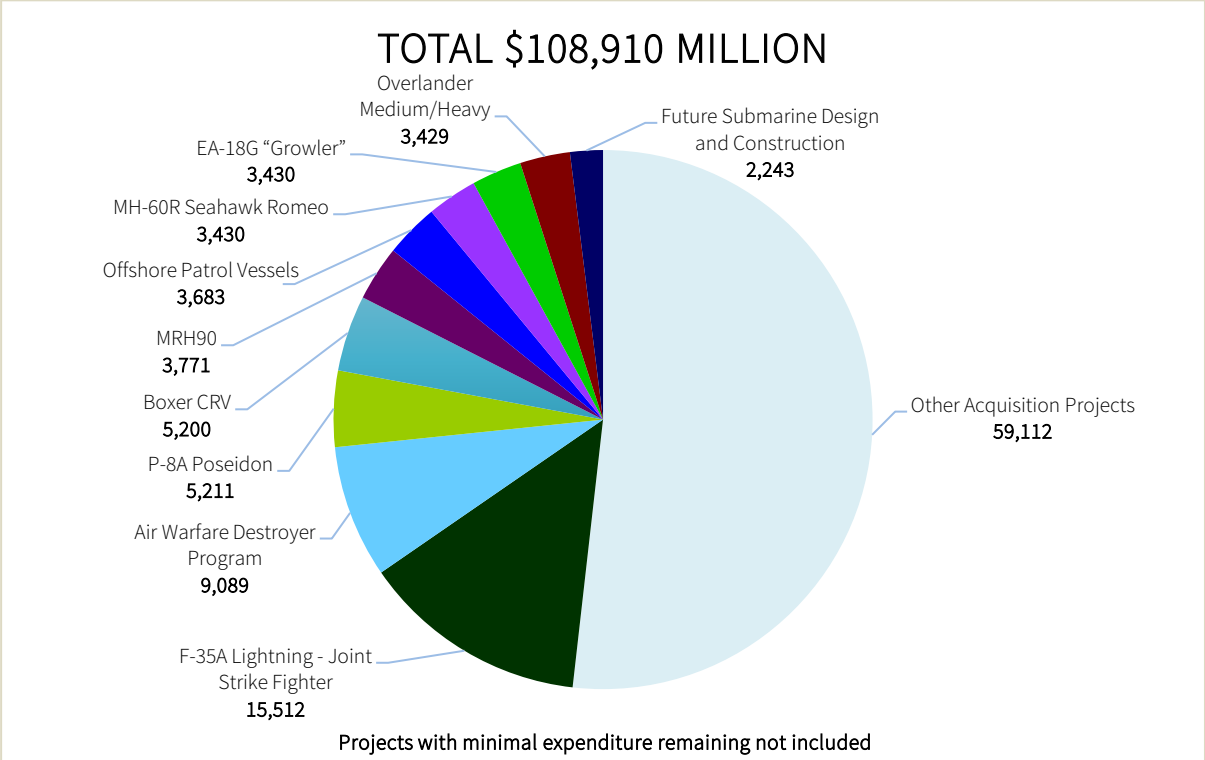
Source: 2018–19 PBS for 2018–19 onwards; previous ASPI budget briefs, derived from PBS.

Figure A.3: Breakdown of Defence personnel, by 2018–19 budget allocation (see chapters 3 and 4)



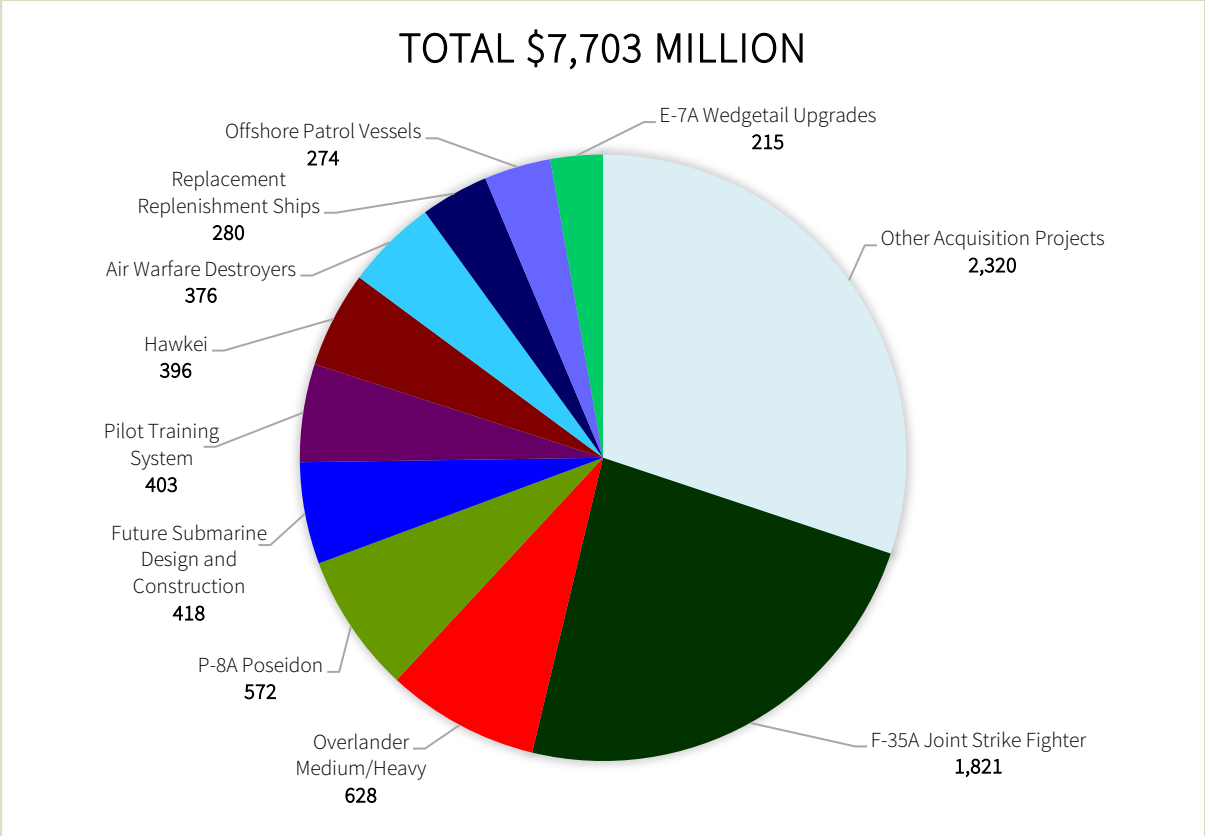
Source: 2018–19 PBS, Tables 8 and 9.

Figure A.4: Top 10 acquisition projects, by total approved project expenditure (A$m) (see chapters 3 and 4)



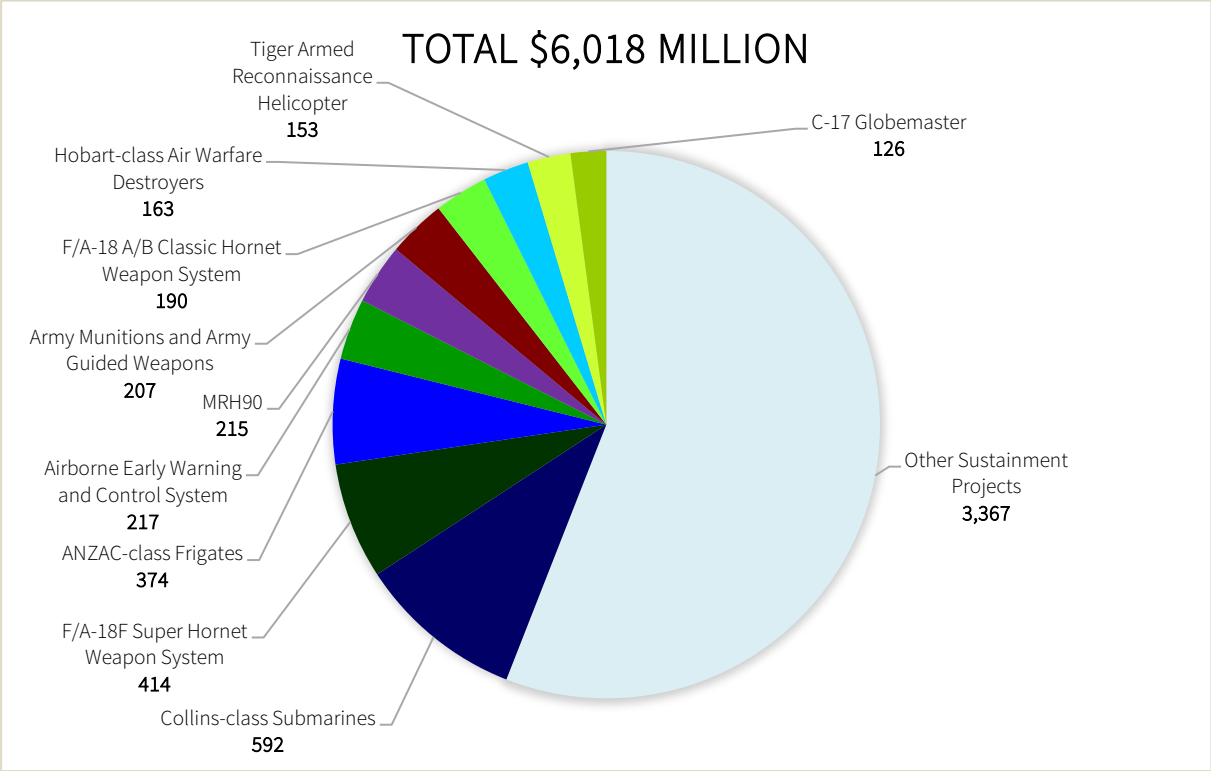
Source: 2018–19 PBS, Table 64; ANAO's Major projects report; media release for Boxer CRV.

Figure A.5: Top 10 acquisition projects, by budgeted 2018–19 spend (A$m) (see chapters 3 and 4)



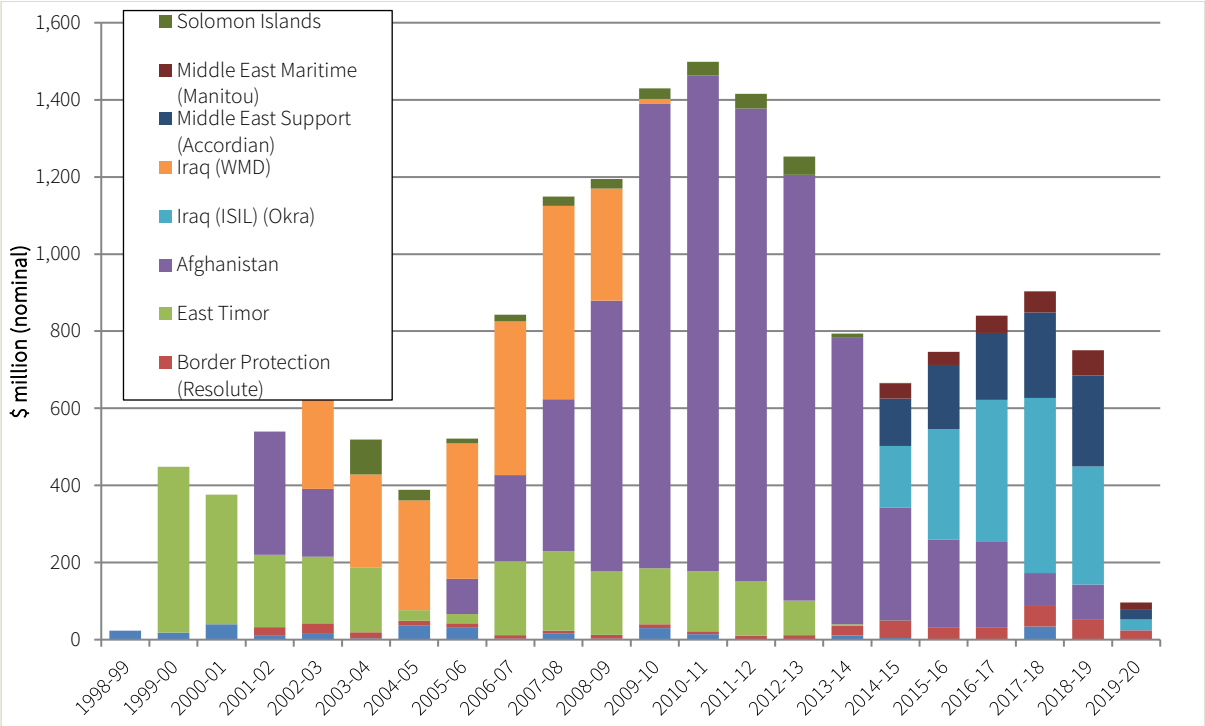
Source: 201819 PBS, pages 120–132.

Figure A.6: Top 10 sustainment products, by budgeted 2018–19 spend (A$m) (see chapters 3 and 4)



Source: PBS 2018 – 2019, Table 65.

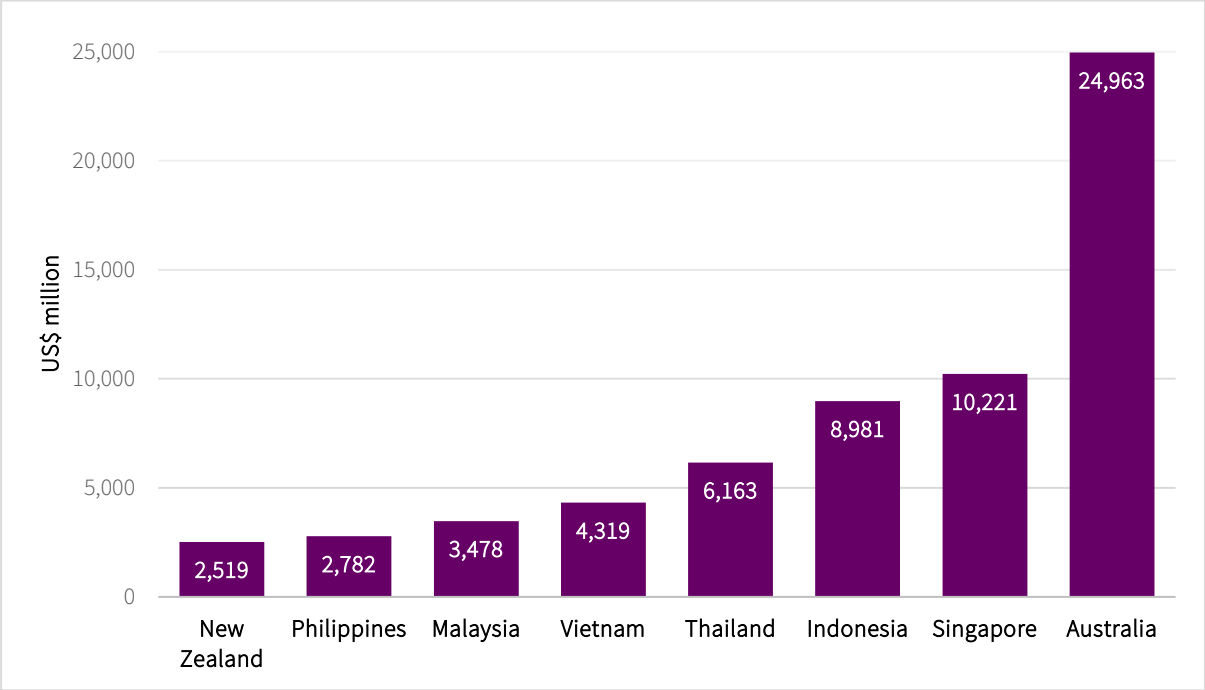
Figure A.7: Operational supplementation 1998–99 to present—total spend $17 billion (see chapters 2 and 3)



Source: DAR, PBS.

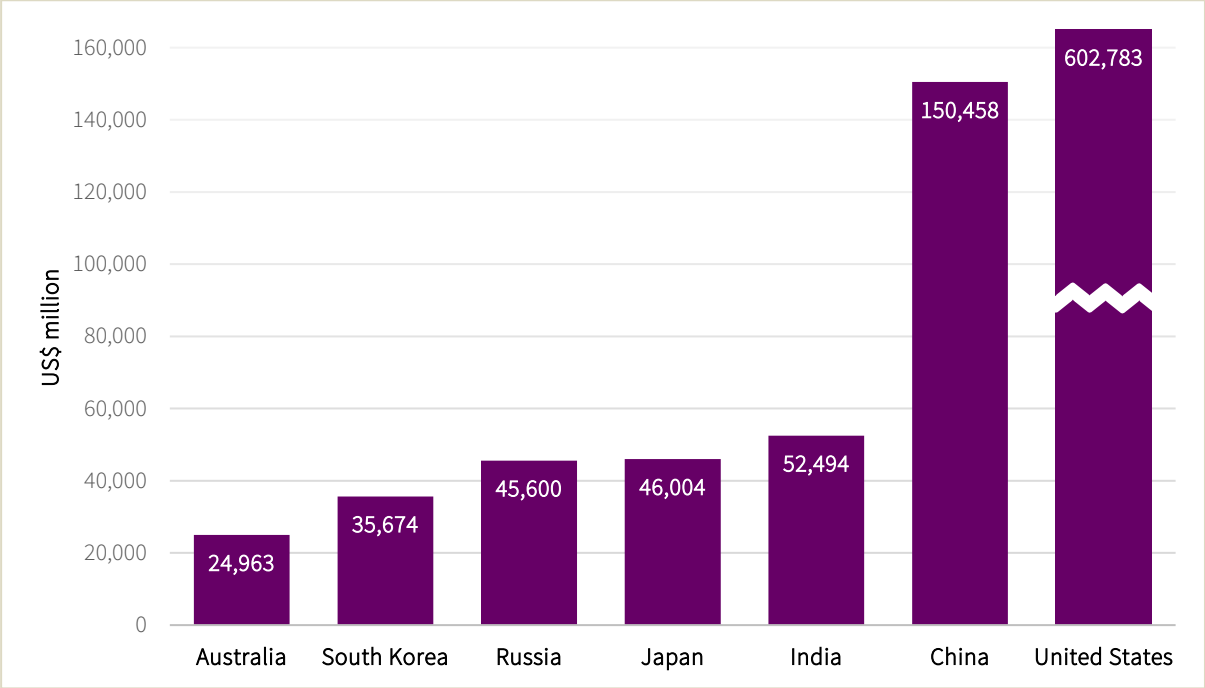
Australia's international ranking by defence budget

Figure A.8a: A big fish in a small pond: defence spending in maritime Southeast Asia (US$m) (see chapters 1 and 2)



Source: International Institute for Strategic Studies, The Military Balance 2018 (data from 2017).

Figure A.8b: A small fish in a big pond: defence spending in the greater Indo-Pacific (US$m) (see chapters 1 and 2)



Source: International Institute for Strategic Studies, The Military balance 2018 (data from 2017).

Imports and exports

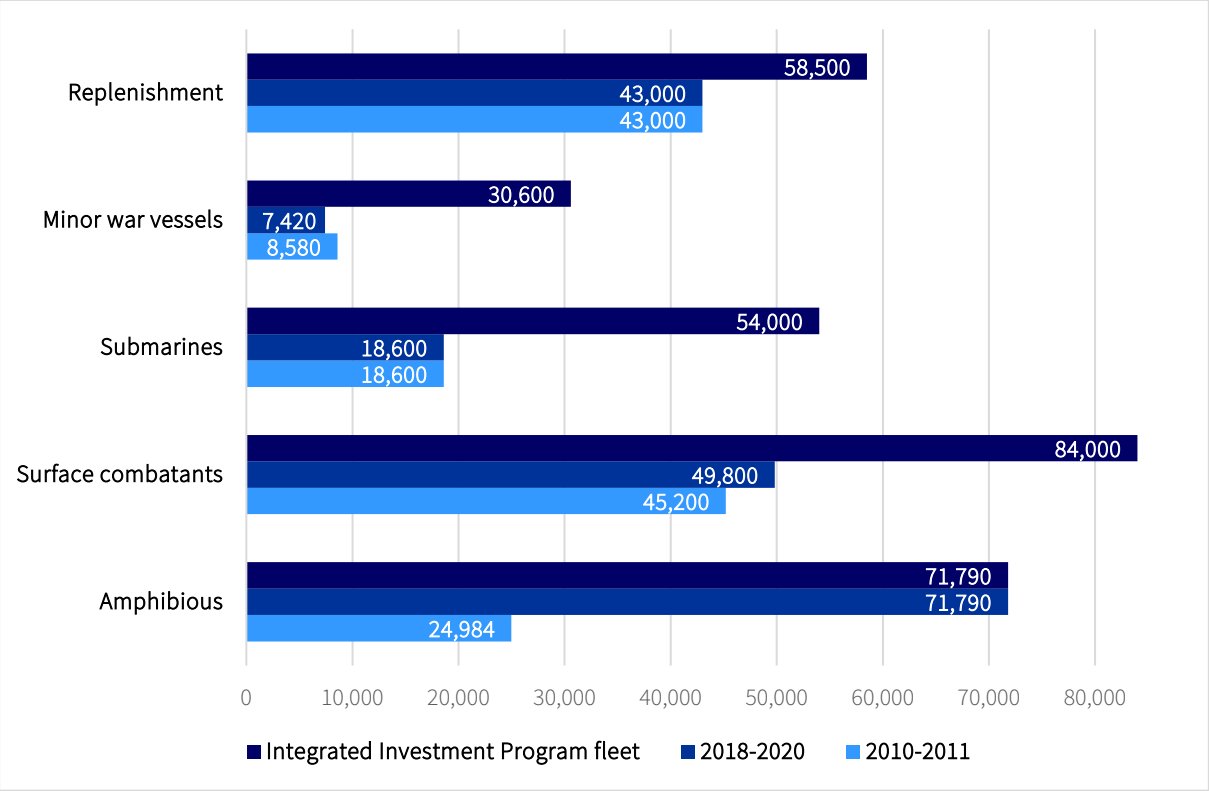
Table A.1: Top global arms importers and exporters, 2008–2017 (units: million SIPRI trend indicator values) (see Chapter 5)

Ranking	Top arms importers 2008 to 2017	Million TIVs	Top arms exporters 2008 to 2017	Million TIVs
1	India	32,657	United States	90,074
2	Saudi Arabia	19,357	Russia	65,865
3	China	12,899	Germany (FRG)	18,293
4	Algeria	10,786	France	17,332
5	Australia	10,730	China	14,343
6	Pakistan	10,666	United Kingdom	12,044
7	United Arab Emirates	10,588	Spain	8,052
8	South Korea	9,653	Israel	6,993
9	Egypt	8,662	Italy	6,754
10	United States	8,141	Netherlands	5,822
11	Turkey	7,674	Ukraine	5,818
12	Singapore	7,488	Sweden	3,940
13	Iraq	7,188	South Korea	2,863
14	Viet Nam	6,199	Switzerland	2,803
15	Indonesia	5,385	Canada	2,423
16	United Kingdom	4,554	Turkey	1,639
17	Venezuela	4,109	Norway	1,616
18	Japan	4,035	Belarus	1,237
19	Morocco	3,978	South Africa	1,087
20	Greece	3,889	Australia	876

Source: Stockholm International Peace Research Institute (SIPRI), Arms Transfers Database, online.

The past, present, and future of the Royal Australian Navy

Figure A.10: Tonnage of the RAN at three snapshots in time, broken down by type of ship (see Chapter 6)



Source: Navy Website; Wikipedia.

Chapter 1: The context

Key points

- Most of the key drivers that the *2016 Defence White Paper* identified as shaping Australia's security environment have worsened since the publication of the White Paper.
- The White Paper outlined a potent, if widely stretched, conventional future force, but key elements of it are still a long way from delivering useful military capability.
- Despite that, the Australian Government hasn't signalled a need to revisit either the White Paper's force structure or its funding model, but it could be time for the government to publish a strategic update.
- The government has capacity to invest more in defence capability, should it want to; however, it would need to make a compelling case for any additional expenditure to an Australian public that doesn't currently see national security as a key concern.

1.1 Strategic context

The 2016 Defence White Paper's strategic framework …

The formal strategic policy context for the defence budget is set by the *2016 Defence White Paper*, which the government released in February 2016. The policy settings and priorities in the White Paper were used to develop the government's Integrated Investment Program (IIP), which describes the set of future military capabilities, ICT systems and facilities that Defence will acquire and operate over the next decades so that it can meet the government's requirements for the use of the ADF.

The White Paper reinforced the government's 2013 election commitment to increase the defence budget to 2% of GDP within a decade, but stated that it would now achieve that by 2020–21.

… provides little direction for prioritisation

At the core of the White Paper's strategy are three Strategic Defence Interests, each of which has a corresponding Strategic Defence Objective. Essentially, the former are the outcomes sought, and the latter are what Defence needs to do to achieve each outcome.

Table 1.1: *2016 Defence White Paper* policy goals

	Strategic Defence Interest	Strategic Defence Objective
1	A secure, resilient Australia, with secure northern approaches and proximate sea lines of communication.	Deter, deny and defeat attacks on or threats to Australia and its national interests, and northern approaches.
2	A secure nearer region, encompassing maritime South East Asia and the South Pacific.	Make effective military contributions to support the security of maritime South East Asia, and support the governments of Papua New Guinea, Timor-Leste and of Pacific Island Countries to build and strengthen their security.
3	A stable Indo-Pacific region and rules-based global order	Contribute military capabilities to coalition operations that support Australia's interests in a rules-based global order.

Source: 2016 Defence White Paper.

The Strategic Defence Interest/Objective terminology was novel, but the approach of starting with Australia itself and moving outward into the region and world was consistent with previous White Papers. What was new was that, in contrast to previous White Papers, which identified the defence of Australia as the key priority in developing the ADF's force structure, the 2016 White Paper didn't prioritise among objectives. It stated that the government recognised 'the interconnected nature of the global environment and the fact that Australia's security and prosperity is directly affected by events outside our region and is not just linked to our geography or confronting threats solely in our maritime approaches (page 18).' Consequently, all three objectives were to inform force structure decisions—equally, it seems.

While the White Paper's recognition that the world is increasingly interconnected and that some forms of aggression, such as cyberattacks, aren't strictly geographically determined is accurate and useful, the lack of a prioritisation hierarchy for deciding what equipment to buy makes it difficult to make capability trade-offs—everything is equally important. Using one or more of the Strategic Defence Interests as a justification, you can make a case for everything from boots to aircraft carriers to intercontinental ballistic missiles or rail guns. But with Defence budgets, where there's never enough money to do everything you'd like, the ability to prioritise is essential.

Since the White Paper, the world has continued to change

The White Paper identified six key drivers that shape Australia's security environment. Essentially, they're the things going on in the world that influence how much we should spend on defence and what we should buy. If they change significantly, one would expect the government's plans for defence spending, capability, or both to adjust accordingly.

The US and China

The first driver listed was the roles of the US and China and the relationship between them. The 2016 White Paper took the view, consistent with previous White Papers, that the US would remain the pre-eminent global military power over the next two decades and that it would maintain an active regional presence that would underpin stability. It also stated that the relationship between the US and China was likely to be characterised by a mixture of cooperation and competition. But, despite frequent comments by political leaders, policy documents and analysts that the world is more uncertain than ever, what's certain is that the relative power differential between the US and China has continued to decrease, particularly in China's own backyard.

While the nature of the underlying relationship can be obscured by oscillations in President Trump's tweets on China and President Xi, the relationship appears to be moving towards one better described as explicit competition, both strategically and economically. The December 2017 US National Security Strategy stated explicitly that 'China and Russia challenge American power, influence and interests, attempting to erode American security and prosperity.'[1] Somebody who seeks to erode your security can't be described as cooperating with you.

China's economy and military spending have continued to grow at around 6–7% per year (however, no statistics collected and reported through the Chinese state system are particularly reliable).[2] While the US remains the pre-eminent global military power, senior US leaders are now describing China as a peer competitor in East Asia.[3] Limitations on US military power are becoming clearer as its forces continue to be stretched. For example, the number of US Navy ships has declined from a Cold War level of over 500 to the current 272. The US Navy would like to halt that decline and return to 355 to meet global commitments. However, to do that it would need to spend 60% more in construction costs annually over the next 30 years than it has averaged over the past 30 years.[4] Those funds are unlikely to be available; US deficit spending is already around 5% of GDP per year and is increasing. The structure of the US budget, in which most spending is non-discretionary and locked into social

security and benefits programs, means that the US Government has little ability to increase the military budget without increasing taxes or deficit spending.[5]

Stability of the rules-based global order

The second security driver came from challenges to the stability of the rules-based global order. Since the White Paper, those challenges have become more direct. As many leaders and commentators have stated, the world order we've known for 70 years is crumbling.

It has become more apparent that China is committed only to those elements of the rules-based global order that suit it, and will either ignore or seek to overturn those that don't. The clearest example of this occurred when it ignored the ruling of the Permanent Court of Arbitration in July 2016 on its claims to the South China Sea and denounced the court. It has not only continued to reclaim land around features in the South China Sea but has militarised them, turning reefs into air bases defended by radars and, most recently, missiles.

Earlier assumptions that economic development and the emergence of a middle class would lead China towards political liberalisation are proving to be misplaced. Chinese behaviours such as seeking to influence political processes in other countries, including Australia, developing its own industries through anti-competitive measures such as protective tariffs and demands for transfers of foreign intellectual property, and seeking to exert comprehensive control over what its citizens can read, say or think, confirm that it doesn't play by the same rules as the West.

While Russia has minimal ability to project conventional military power in Australia's near region, its actions in fragmenting and weakening international norms, institutions and trust in governments further erode the concept of a maintained rules-based global order as well as trust in the core institutions of democracies.

In the US, recent decisions suggest that two of the implied pillars of the rules-based global order are failing:

- that states are able to rationally assess what their interests are and act accordingly
- that they'll abide by agreements that all parties entered into in good faith.

More broadly, many, from presidents downwards, are questioning the value of trade liberalisation, despite its contribution to greater (albeit uneven) prosperity. A return to protectionism would significantly affect Australia and the region.

Terrorism and foreign fighters

The third driver was the threat of terrorism and foreign terrorist fighters. Progress in the campaign against Islamic State / Daesh has been significant, but the conditions in the Middle East that led to its rise haven't fundamentally changed. The trajectory of former foreign fighters after the defeat of Daesh has been varied, but there's no doubt that many are seeking to return to our region and some have done so. Al-Qaeda has rebuilt itself over the past decade while the focus has been on Daesh, and its franchises now extend into Southeast Asia—notably Indonesia. Al-Qaeda is now probably a more dangerous and longer term threat than Daesh ever was.

The perpetrators of terrorist attacks in Java and Sumatra in the first half of May 2018 had links to Daesh in the Middle East, and some had returned from there. Similarly, it has become clear that the radicals who took over Marawi in the southern Philippines had contact with Daesh in Syria, and it's likely that some had returned from the Middle East. The siege of Marawi confirms that areas where state control is weak can allow a substantial Islamist threat to flourish closer to home. While Australia has long made significant contributions to regional

counterterrorism measures through its law enforcement and intelligence agencies, Marawi suggests that appropriate, targeted military contributions will now be required.[6]

State fragility

The fourth driver was state fragility, including in our immediate neighbourhood. Certainly, the end of the Regional Assistance Mission to Solomon Islands on 30 June 2017 was a positive development. Nevertheless, the economic, environmental, health and governance challenges facing Pacific island nations haven't been overcome. The ADF will continue to be called upon (potentially more frequently, due to climate change) to undertake disaster relief missions in the near region to assist nations with limited capacity to help themselves.

Over the longer term, human development indices for Papua New Guinea have improved, but key indices for governance, law and order, and corruption are low, and the development of large energy projects in the highlands may exacerbate this problem. The finalisation of the maritime border between East Timor and Australia offers some prospect of greater resource-based income for East Timor, but the history of resource-rich developing nations frequently involves a path towards political inequality rather than broad prosperity.

Chinese aid to Pacific nations is a double-edged sword, at times increasing economic pressures by diverting limited public funds into paying off poorly conceived projects and creating 'debt traps' that may constrain sovereignty. Overall, while Australia's 2018–19 Budget focuses our foreign aid on the South Pacific, now doesn't appear to be a good time to be decreasing the foreign aid budget—reductions send a signal, and symbolism matters when we're trying to convince regional states that we can relied upon to be their security partner of choice.

The White Paper may have overestimated the stability of some of the near region's states. The increasingly authoritarian actions of Cambodia's long-term leader, Hun Sen, illustrate this point. Similarly, the endemic levels of corruption in Laos are eroding that nation's rule of law at an alarming rate. Myanmar's ungoverned spaces increasingly function as a global hub for the terrorist – organised crime nexus. The situation in all three countries is being made all the more complex by increased Chinese economic influence, which is diminishing the effectiveness of Australia's diplomatic policy levers. Overall, it seems that there's much more instability in the greater Mekong region than was previously assumed.

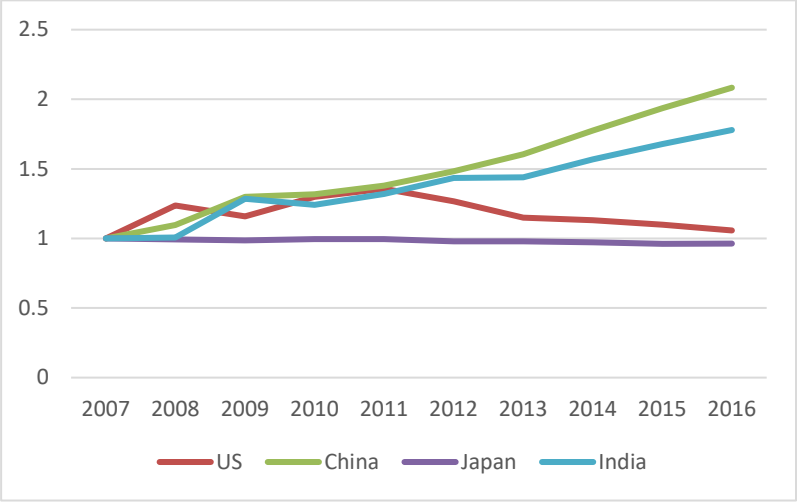
Further afield, the players in Afghanistan seem to have reached a stalemate. The US swings backwards and forwards between counterinsurgency (win the population over from the Taliban) and counterterrorism (kill the Taliban) strategies, yet neither approach appears able to achieve a stable Afghanistan that can survive without huge and ongoing international assistance.

Military modernisation

The fifth driver was the pace of military modernisation in the region, including the development of more capable ballistic missile forces. Analysts are unanimous that China is making great strides in the quality and quantity of its military equipment. As the International Institute for Strategic Studies has observed, we're seeing a 'democratisation of technology—the West no longer has a monopoly on world-leading defence innovation and technology'.[7] According to the institute, China is outbuilding Japan, South Korea and India combined in submarines, destroyers, frigates and corvettes. In the past four years, Chinese warship production has been greater than the entire French Navy's tonnage and now appears to be outstripping US production.

Figure 1.1 below shows that while US and Japanese defence spending has essentially remained static in real terms over the past decade, Chinese spending has doubled.

Figure 1.1: Real change in major Asian powers' defence spending, 2007-2016



Source: Defence Intelligence Organisation, 2017 Defence Economic Trends in the Asia-Pacific.

A key issue appears to be that China can complete the 'idea to real world capability' cycle faster than the West. And, while conventional Chinese military technology may remain inferior to the West's, even if it's rapidly gaining ground, there's less ground to make up in emergent military technologies (such as hypersonic missiles, rail guns, quantum technologies and artificial intelligence), and in some areas China may in fact be taking the lead. Military analysts and planners can make reasonably informed judgements about the outcome of conflict involving conventional technologies, but the impact of emergent technologies on warfare is difficult to predict.

Since the 2016 White Paper, North Korea's ballistic missile program, in particular, has quickened in pace and broadened in scope. Pyongyang has been intent upon extending the range of its missiles, testing both intermediate-range and intercontinental missiles, but it has also shown greater interest in mobile missile platforms, including submarines, and in the solid-fuel propellants usually associated with such systems. Uncertainties about 'deals' and the psychological chemistry of Donald Trump and Kim Jong-un aside, the strategic issues at stake in summitry involving the Korean Peninsula go far beyond the issue of North Korea *per se* and go to the heart of the US alliance structure in Asia and so to the foundations of US and Chinese strategic relations and the balance of power.

Non-geographic threats

The sixth driver was the emergence of new, complex, non-geographic threats, such those in the cybersphere and space. Increasingly, militaries have realised that space isn't a global commons but a contested environment. States such as China have the ability to deny access to space-based resources, such as GPS and satellite communications, that are essential to modern military operations and weapons systems. This requires the development of alternative, redundant technologies and the development of countermeasures.

Overall, Western states have become aware that states such as China and Russia, which don't adhere to Western distinctions between war and not-war and the tools that are appropriate for each, are particularly adept at hybrid warfare and are deliberately exploiting the West's traditionally high thresholds for retaliation. They're particularly skilled at using measures to pursue their interests that may be illegal but fall below Western thresholds for military response. And the cyber domain offers many avenues for hybrid warfare. While the White Paper acknowledged the existence of cyber threats, information operations have taken on a new prominence. In 2016, the scope of Russian meddling wasn't widely known or acknowledged. We now see that it has played out in

multiple jurisdictions and is only likely to increase with new technologies such as artificial intelligence and voice and image replication.

Overall

In summary, it's hard to assess that any of the six drivers that informed the 2016 White Paper have lessened in intensity, and some have clearly increased. What's striking is the sheer range of challenges and consequently the range of potential investment choices to address them.

1.2 The capability context: the White Paper's investment plan

It's a potent conventional force …

The White Paper continued the ADF's traditional approach of compensating for limited numbers through quality. The desire to preserve its technological superiority in the region pervades the force, creating the demand for, for example, fifth-generation fighters, regionally superior future submarines and a fully networked ADF. This, of course, drives cost. It also results in small numbers of intricate, highly complex manned platforms that, in conflict, may be too important to lose.

The force can also be described as fundamentally conventional, as the bulk of investment goes into traditional platforms such as fighters and their enablers (including early warning aircraft and tankers), frigates, submarines and armoured vehicles. It's a force designed to have the ability to counter a conventional, 'near-peer' adversary. That said, conventional military platforms, particularly when intelligently and imaginatively operated, have shown themselves to be capable of meeting a range of contingencies (even if they aren't necessarily the most cost-effective way to do it).

The White Paper also flagged investments to develop emerging technologies and to counter emerging threats, such as cyber threats, but those investments are relatively small. Ships, submarines, armoured vehicles and fighters are expensive and so consume the bulk of the investment and sustainment budgets.

The White Paper also emphasised remediating the 'glue' projects that hold everything together—the communications, command and control and battle management systems that provide 'situational awareness' and 'decision superiority' over the adversary. An emphasis on jointness—that is, all elements of the services and Defence Department working as a coordinated whole—now pervades Defence, although putting it all together is easier said than done.

… but it's getting stretched wider …

In many ways, the force presented in the White Paper is consistent with Australia's historical force design principles. Overall, it's balanced, with broadly similar levels of funding for air, land and sea capabilities. But 'balanced' is also a synonym for 'broad'. The ADF force structure is already broad, and it's getting broader. This is partly because the world is continually getting more complex, so technology does too. It's also because Defence is traditionally very averse to giving up capabilities—when a new capability not previously in the force structure comes in, very rarely does anything go out. But with finite resources, breadth comes at the cost of depth. Numbers aren't everything, but they matter.[8]

… and the well-named future force will take a long time to arrive

What's certain in this age of uncertainty is that key elements of the White Paper force are going to take a long time to arrive. The good news is that the RAAF is well into its transition to a 5th generation air force. Key platforms, such as Wedgetail early warning aircraft and Growler electronic attack aircraft, are already here, and

squadrons of joint strike fighters (JSFs) are due to commence operations from the end of 2020, which is almost overnight in Defence capability terms. But delivery of the Army's new armoured fighting vehicles won't start for several years and is likely to take over a decade. And the Navy's core war-fighting capabilities will take much longer. Based on the information available, the delivery of the future frigates won't start until the later 2020s and will last into the mid-2040s. The first future submarine won't enter service until the 2030s, and the 12th one won't arrive until the 2050s.

This ties up a lot of cash

Shipbuilding projects take a long time to deliver usable military capability. Designs have to be nearly complete before construction starts. The build can take seven years, and then test and evaluation and certification programs add more time before the first ship can be used; Defence calls this milestone 'initial operating capability' (IOC). Public information suggests that the first future frigate will reach IOC in the late 2020s and the first future submarine in the early to mid-2030s. We estimate that between the two programs Defence will have spent over $20 billion before it gets any useful capability.[9] That's a lot of money to have tied up before we have anything to show for it, while Australia's strategic circumstances deteriorate.

And, as we argue in Chapter 6, since shipbuilding is now an ongoing, continuous program, those capabilities will tie up a large part of Defence's investment budget forever, potentially $3.5–4.0 billion per year, reducing its ability to react to emerging challenges.

Is it still the right force for our strategic situation?

We note that the force presented in the 2016 White Paper is still largely the same as the one presented in the 2009 White Paper—and the world has definitely changed since then. The questions are: Is this force still the right one to respond to the uncertainties discussed above? Should the government and Defence stay on the same broad path that they've been on since at least 2009? Are alternative approaches being explored? In the light of our deteriorating strategic environment, ASPI has previously suggested that Defence should look at approaches that make a real capability difference sooner.

Should Australia invest even more in high-end conventional military capabilities in response to the emergence of a regional great power and the proliferation of advanced military technologies? If so, should the investment be in capabilities to conduct operations in our near region, where we would be expected to lead and provide the weight of combat power? Or in capabilities for operations further afield in support of our major ally, where we could provide niche contributions? Or, instead of acquiring more platforms, should we strengthen enablers to get more out of what we have already and provide greater resilience should global supply chains fail in a time of crisis—larger stocks of missiles and spares to sustain operations and more robust fuel reserves, for example?

Or, rather than doubling down on conventional capabilities, should we pursue asymmetric capabilities that make it difficult for a major power to project force against us? Should this include substantially greater investments in emerging technologies, such as space technologies, cyber technologies, hypersonics and artificial intelligence? Or at least in countermeasures and defences that allow us to operate the planned force effectively in this new operational environment? Or should we focus on stabilisation, disaster relief and counterterrorism capacity-building activities to promote security in the near region and leave it to our great-power ally to deal with the emerging great power?

All of the those options have been suggested, but, as the old saying goes, each dollar can only be spent once, so spending more on one means spending less on another. Without distinct force structure priorities that make a call about the importance of regional, direct and global demands, the White Paper framework doesn't help with decision-making on these issues.

1.3 How is the government adjusting?

Steady as she goes

While many commentators have noted the deteriorating strategic situation, some have also observed that the government doesn't seem to have a Plan B. Certainly, panic isn't a good response, but so far the government's public statements haven't indicated that it recognises a need to adjust the policy or capability settings in the *2016 Defence White Paper*. The November 2017 Foreign Policy White Paper refers to a 'contested world' and 'power shifts in the Indo-Pacific', but overall it's broadly more of the same as the Defence White Paper released 18 months earlier, reiterating that the government supports the existing world order, but not exploring what we would do if that world order falls apart.

The government could make two broad adjustments to policy settings for defence budgeting: changes to the size of the budget and changes to what it's spent on. So far, the government hasn't indicated that it will change either.

Prime Minister Turnbull has hinted that more might be necessary. For example, in an address to the US National Governor's Association's annual Winter Meeting in February 2018, he stated that 'our defence spending is on track to reach 2% of GDP by 2020. And in these uncertain times we should all be thinking about what more we might contribute.'[10] Whether the Prime Minister is thinking that going beyond 2% is necessary or he was telling his audience what they wanted to hear, the government hasn't made further statements about the need to further increase defence funding.

Is it time for a strategic update?

Regardless of whether you agree with the concept of having the defence budget target set as a percentage of GDP (and ASPI has questioned whether that's a good approach), 2% has to some degree become the norm for what serious governments should spend on defence. It's NATO's benchmark, for example, even though very few of its members meet it, or indeed even try to. So going beyond it will require compelling justification.

Previously, governments have issued strategic updates between White Papers.[11] This could confirm whether the government thinks the White Paper force structure priorities and plans remain the best approach to meeting our strategic circumstances, or whether it believes adjustments are needed. But there would be no point if it doesn't acknowledge that the strategic challenges outlined above have direct implications for Australia's security and create a case for change. The key question is whether the government wants to confront the deteriorating strategic circumstances forthrightly.

1.4 What's the economic context?

Regardless of whether the government wants defence spending now or in the future to go beyond 2% of GDP, reaching that number by 2020–21 is still an ambitious target. On its current plan, the government will get there (or close, depending on which GDP figures you use).

How does the deficit look?

A key element to remember is that the government has also made a commitment to get the federal budget back into surplus by 2020–21. Historically, governments haven't achieved reductions in the deficit as quickly as they predicted—or not at all. Table 1.2 shows that predicted surpluses for the forward estimates have a habit of not arriving (reading across the rows shows what was predicted, reading down the columns shows how predictions

were modified and ultimately what was achieved). For example, a 2012–13 predicted $2.0 billion surplus in the following year turned into a $48.5 billion deficit.

Table 1.2: Forecast versus actual underlying cash surplus/deficit, 2012–13 to 2018–19 federal budgets ($bn, nominal)

		2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
2012–13	$m cash	1.5	2.0	5.3	7.5						
	% GDP	0.1	0.1	0.3	0.4						
2013–14	$m cash	–19.4	–18.0	–10.9	0.8	6.6					
	% GDP	–1.3	–1.1	–0.6	0.0	0.4					
2014–15	$m cash	–18.8	–49.9	–29.8	–17.1	–10.6	–2.8				
	% GDP	–1.2	–3.1	–1.8	–1.0	–0.6	–0.2				
2015–16	$m cash		–48.5	–41.1	–35.1	–25.8	–14.4	–6.9			
	% GDP		–3.1	–2.6	–2.1	–1.5	–0.8	–0.4			
2016–17	$m cash			–37.9	–39.9	–37.1	–26.1	–15.4	–6.0		
	% GDP			–2.4	–2.4	–2.2	–1.4	–0.8	–0.3		
2017–18	$m cash				–39.6	–37.6	–29.4	–21.4	–2.5	7.4	
	% GDP				–2.4	–2.1	–1.6	–1.1	–0.1	0.4	
2018–19	$m cash					–33.2	–18.2	–14.5	2.2	11.0	16.6
	% GDP					–1.9	–1.0	–0.8	0.1	0.5	0.8

Budget year estimate	Forward estimates	Actual achievement

Source: Treasury Budget Paper no. 1.

However, the government has now managed to reverse that trend. For the first time in a long time, the government has done better than its prediction. Not only did it manage to reduce the size of the deficit in 2017–18, but it did so by even more than it predicted (a deficit of $18.2 billion rather than $29.4 billion), resulting in a $15.0 billion improvement from 2016–17. What appeared to be optimistic, even heroic, assumptions about getting into surplus by 2020–21 now seem feasible. In fact, the government's predictions now achieve a surplus a year earlier, in 2019–20.

If the government does reach a surplus by 2019–20, the national debt will still be around $344 billion, or 18.4% of GDP, at that point.[12] This is healthy by Organisation for Economic Development and Co-operation (OECD) standards, compared to high-taxing governments in Europe (or low-taxing but high-spending governments, such as the US Government). The government at that point will have options for the surplus, all of which it has flagged as more important than additional defence spending: tax cuts; paying down the debt; investing in in infrastructure, education, and health; and meeting the needs of an ageing population.

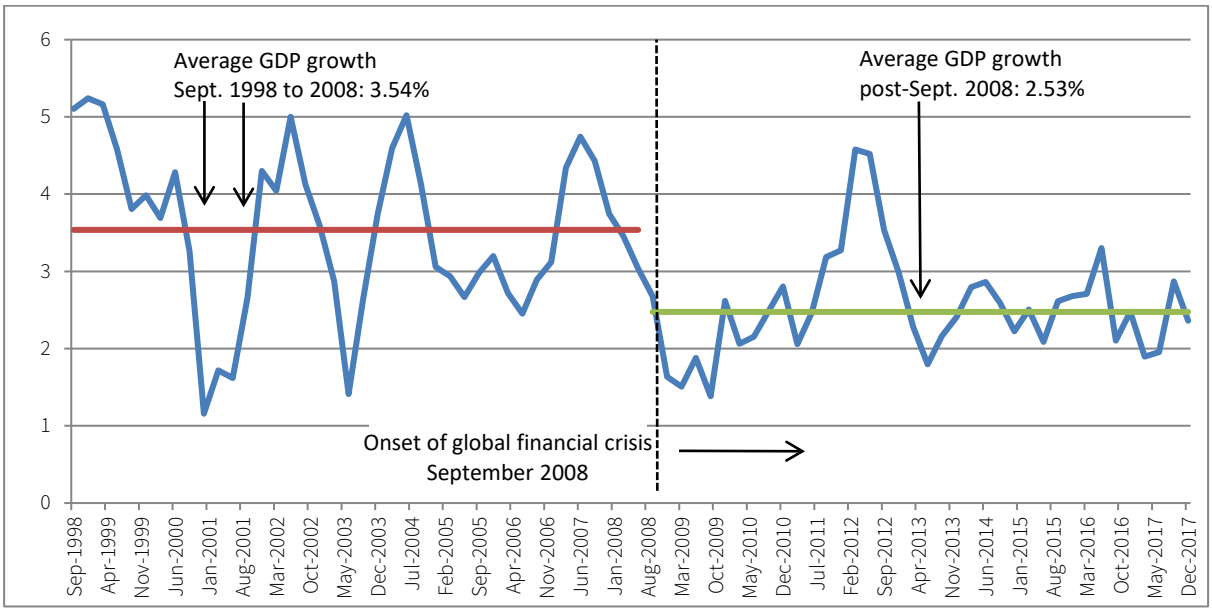
It's worth remembering that Australia is a low-taxing country compared to other OECD states. Australian public sector tax revenues are around 28% of GDP, about 6% below the OECD average of 34%.[13] Australia's deficit is currently down to about 1% of GDP. Theoretically, we could eliminate the deficit and make a further substantial increase to defence spending and still be below the OECD average. But there would need to be political will to create public support for increased taxation, particularly since it contradicts core planks of the government's economic strategy. In the absence of a clear and present danger, we can probably rule out increased taxation as an option that the current government is willing to consider.

What are the prospects for economic growth?

That leaves economic growth and a consequent increase in public revenue as the source of further increases to defence budget. There are signs of increased global economic growth, although that continues to be led by China and developing economies. Australia's prospects for economic growth are healthy by OECD standards,

and the budget forecasts real GDP growth of 3% for each year of the forward estimates. As we can see from Figure 1.2, that's higher than the average of around 2.5% over the decade since the global financial crisis, but not greatly more. Overall, the budget predicts healthy growth, but not a new boom.

Figure 1.2: GDP growth, 1998 to 2017 (%)



Source: Australian Bureau of Statistics (ABS).

But there are potential spoilers

That level of Australian economic growth is probably sufficient to support a defence budget of 2% of GDP. There are of course factors that could transform this picture. We would do well to remember that the 2008 global financial crisis hit without warning (or at least without warnings that the world's financial authorities were willing to listen to). The Australian Government of the day was unable to simultaneously make stimulus payments, provide the defence funding necessary to deliver the 2009 White Paper force, and meet its commitment to a budget surplus. So it compromised on defence spending, resulting in 2012–13 having the lowest defence budget as a percentage of GDP since 1938 (and it still missed achieving a surplus).

A reversal of the longstanding international movement towards economic liberalisation, whether through a creeping return to protectionist measures or an explicit trade war, could sharply limit Australia's expected GDP growth.[14] And a significant and sharp reduction in GDP growth wouldn't only limit the overall pie that defence's 2% is drawn from, but would introduce a number of compelling competitors for government funds, such as unemployment benefits for an increased number of unemployed Australians or for economic stimulus spending.

1.5 Would the Australian public support additional defence spending?

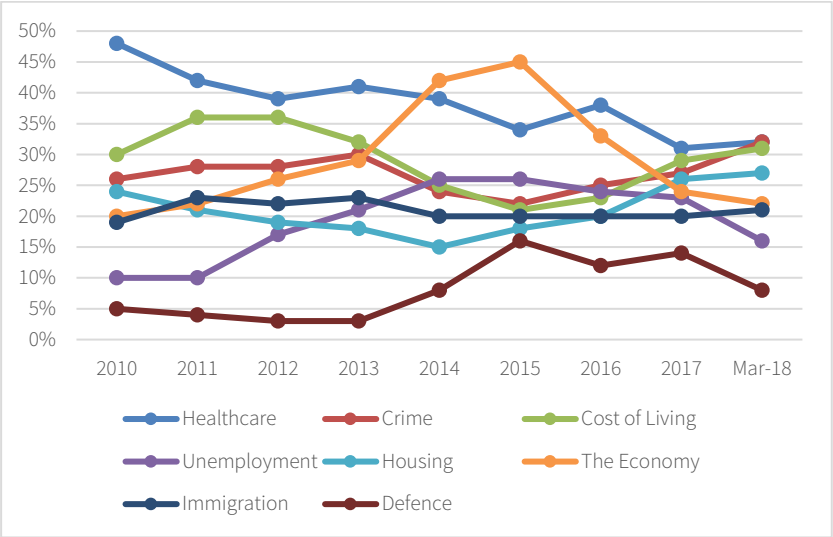
With the overall pie not growing dramatically, increases in defence spending would necessarily have to come from increased deficit spending, increased taxation or reductions in other areas of government spending. The first two would contradict the current government's policy. The third option would require public support. It's a good thing that the Australian public feels secure, but that provides little foundation of public support for additional defence spending, particularly at the cost of reducing other public services and benefits.

Security is historically not a key public concern …

Defence has consistently ranked low among the issues that Australians are most concerned about, and that trend continues.

Since 2010, the *Ipsos Issues Monitor* has asked Australians to select the three most important issues facing the nation. 'Defence and security' has never cracked the top eight. It peaked at 16% in 2015 and has declined since then, most recently to 8%.[15]

Figure 1.3: The top issues facing Australia, 2010 to 2018



Source: Ipsos Issues Monitor.

This view is confirmed by Roy Morgan research, which consistently finds that security issues such as war and terrorism rank well behind economic issues. In March 2018, only 3% of those surveyed saw 'Terrorism/War/Security/Safety' as the single most important problem facing Australia, compared to 32.3% who thought 'Economic issues' were the biggest problem. Interestingly, 18.5% saw 'Terrorism/War/Security/Safety' as the most important problem facing the world, suggesting that Australians saw themselves as to some degree quarantined from a major problem in the outside world.[16]

… and the public doesn't see China as a security threat (yet)

The reassessment that's occurring among Western policymakers and commentators away from terrorism and towards China as the greatest potential threat to stability isn't shared by the Australian people. In August 2017, 52% of Australians surveyed in the *Essential Report* saw terrorism as the biggest threat to global stability. Only 2% identified 'Chinese aggression', which was well behind 'terrorism', 'North Korean aggression' at 14%, and—perhaps surprisingly to policy elites—'US aggression' at 9%.[17]

In December 2017, 48% of surveyed Australians thought Australia had a good relationship with China and only 15% thought it had a poor one, although those proportions had changed from 65% and 7%, respectively, in the previous poll in August 2014. The assessment of Australia having a good relationship with the US had also fallen, from 88% to 65%.[18] The world in general seems less friendly.

In the Lowy Institute's June 2017 poll, Australians were almost equally split in assessing the importance of the US and China to Australia. However, we continued to support the alliance with the US. This may be related to the fact that 48% of respondents saw China as likely to be a military threat in the next 20 years. This doesn't appear

to be consistent with the *Essential Report* results quoted above, but maybe that's an issue of time frames or how the question was put to respondents.[19]

In an August 2015 survey, Australians' focus on economic issues domestically was reflected in our international concerns. At that point, 55% thought 'Global economic instability' was one of the two biggest threats to Australia. Interestingly, 'Chinese economic slowdown' at 36% far out-rated 'Tensions between China and its neighbours' at 9%. That survey predated better public information and discussion on China's land reclamation and militarisation activities in disputed areas of the South China Sea and, unfortunately, it hasn't been updated.[20]

The only poll that has consistently asked whether Australia should spend more on defence is the Australian Election Study, which hasn't been conducted since the most recent federal election in July 2016. The percentage of those surveyed who believed Australia should spend more on defence has consistently declined from a peak of 60.3% in 2001 (when the November election directly followed the September 11 attacks) to 23.8% in 2016. In the most recent survey, nearly half of those surveyed felt that Australia was spending about the right amount, while 27.4% supported less spending.

Therefore, with the public not believing that there's a clear threat in the region that significantly affects Australia's own security, the government would need to make a compelling case to the public for increased defence spending—something it hasn't yet shown any inclination to do.

1.6 In sum

In summary, despite many of the assumptions that underpinned the *2016 Defence White Paper* being challenged by events since then, the government hasn't flagged any changes to the policy settings presented in the White Paper, such as increasing the defence budget or changing the White Paper's force structure. There's little evidence to suggest that there will be sufficient economic growth to support additional defence spending without adjustments to other areas of public spending, and the Australian public appears to have higher priorities than defence and security.

On the other hand, the government hasn't indicated that it will step away from its commitment to increase the defence budget to 2% of GDP and, as the next chapter shows, the 2018–19 federal budget continues the trajectory towards 2%. The question we consider later in this brief is whether 2% of GDP will be enough to deliver the White Paper force, let alone any new or increased capabilities beyond it.

Chapter 2: How much money is it?

Key points

- This year's Defence appropriation (including the Australian Signal Directorate) is $36,356 million.
- This constitutes growth of 1.35% in real terms from last financial year.
- Based on GDP figures in the budget papers, Defence funding will reach 1.98% of GDP by 2020–21, just short of the government's 2% commitment, but will exceed it in 2021–22.
- Defence's capital budget continues to grow strongly in real terms, while personnel funding is relatively flat.

This chapter analyses the funding presented in the Defence Portfolio Budget Statements. We assume that everybody has entered the digital age and can access an online copy of the PBS from Defence's website, so as far as possible we'll try to avoid duplicating tables that are in the PBS. When we're referring to a PBS table (as opposed to one in this brief), we flag that with the prefix 'PBS'. We'll then briefly compare Defence's funding with other areas of government and with other countries.

2.1 Show me the money

The departure of the Australian Signals Directorate complicates matters

On 1 July 2018, the Australian Signals Directorate (ASD) becomes a statutory agency. It remains part of the Defence portfolio reporting to the Minister for Defence, but it's no longer part of the Department of Defence. It has its own budget presented in the Defence PBS (pages 159–174).

This creates a small problem for those tracking changes in the defence budget over time and against the government's White Paper commitment, as it removes $827 million from the Defence Department's funding as presented in PBS Table 1.

The government and Defence's position is that ASD's funding should be taken into account when assessing growth and achievement against the 2% target. This is reasonable, since ASD was part of Defence when the 2% commitment was made. If we don't take this into account, the defence budget would look like it has decreased in real terms this year and will fall short of 2% in 2020–21.

Consequently, we also include ASD's funding in our analysis of overall funding growth and assessments of how the government is tracking against the 2% target. However, when looking at particular elements of the defence budget (such as capital, personnel and operating costs), we analyse them against the Defence *Department's* funding, including the ADF (PBS Table 1), as that allows us to better analyse how Defence is performing.[21]

What's the total Defence appropriation?

The consolidated Defence appropriation for 2018–19 is $36,356 million (PBS Table 42). This represents an increase in real terms of 1.35% over 2017–18.

Table A.1 in 'Defence in 10 tables' presents a historical view of Defence's funding. It also projects it into the future. The Defence funding line is based on the PBS out to 2021–22 and beyond that on the funding line presented in the *2016 Defence White Paper*. The 2% of GDP line is based on the 2018–19 budget papers out to 2021–22 and 5.3% nominal growth beyond that, which is about 3% real growth. The columns represent Defence's total funding, consisting of two components: its baseline funding and operational supplementation. We should remember that nothing about future numbers is guaranteed.

Is it consistent with the 2% commitment?

The government's White Paper commitment was for the defence budget to reach 2% of GDP by 2020–21 and states that this will happen. However, using the budget papers' predictions for GDP, the consolidated defence budget will fall just short, at 1.98%. The government and Defence appear to be using a number for future GDP slightly different from those in the budget papers.[22] Overall, we can write the difference off as a rounding error in the grand scheme of things, although it's a rounding error worth about $400 million.

On its path to 2020–21, defence funding is fairly flat this year and next, followed by a substantial jump in real terms of nearly 6% from 2019–20 to 2020–21 (Table 2.1).

One of the biggest questions about the 2% commitment was whether the Defence budget would continue to grow as a percentage of GDP beyond 2020–21. The PBS shows significant growth in the last year of the forward estimates, in which the defence budget reaches 2.07% of GDP.

Table 2.1: Defence funding as a percentage of GDP, 2000–01 to 2025–26

2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25	2025–26
1.74	1.75	1.78	1.79	1.76	1.76	1.76	1.70	1.80	1.96	1.73	1.77	1.60	1.65	1.86	1.88	1.83	1.92	1.91	1.91	1.98	2.07	2.17	2.19	2.20	2.20

Sources: Defence Annual report (DAR), PBS; GDP to 2021–22 from budget papers; figures from 2022–23 based on White Paper funding model and projection of GDP growth.

Is it consistent with the other White Paper commitments?

Rising and falling GDP predictions make planning to a specific budget difficult and also make it hard to assess whether defence spending will reach 2% of GDP. As a result, the White Paper also decoupled future defence funding from GDP growth. In essence, the White Paper made two somewhat contradictory funding commitments. The first was to achieve expenditure of 2% of GDP by 2020–21. But the second explicitly decoupled the defence budget from GDP changes:

> To strengthen Defence's long-term budget and planning certainty, the government has decided that the 10-year funding model will be not be subject to any further adjustments as a result of changes in Australia's GDP growth estimates. This de-coupling from GDP forecasts will avoid the need to have to regularly adjust Defence's force structure plans in response to fluctuations in Australia's GDP.

This resulted in a 'fixed' funding line (that didn't include operational supplementation).[23]

Table A.1 in 'Defence in 10 tables' shows that fixed funding line from 2022–23 and shows that it increases rapidly, in fact at a much greater rate than even an optimistic prediction of GDP growth of around 3%. Consequently, it would significantly exceed 2% of GDP from 2022–23. It's likely to be difficult for the government to provide that level of funding, and there are no guarantees that it will eventuate.

In fact, the government hasn't delivered that funding to date. Table 2.2 compares the White Paper funding line with what Defence has achieved to date and with PBS predictions, once we remove operational supplementation (based again on the consolidated Defence/ASD numbers). The defence budget has fallen short, except for last year. Cumulatively, by 2021–22, the end of the current forward estimates, this shortfall will reach $5 billion. However, the government seems to regard its commitment to reach 2% by 2020–21 as the more important one.

Table 2.2: White Paper funding commitment versus actual/PBS funding ($m, nominal)

	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
2016 White Paper, excluding operations	32,232	34,180	36,769	39,086	42,385	45,788
Defence appropriation, excluding operations	31,489	34,264	35,606	37,973	41,249	44,951
Difference	–743	84	–1,163	–1,113	–1,136	–837

Source: 2016 Defence White Paper, PBS, Portfolio Additional Estimates Statements (PAES) with ASPI extrapolation to remove operational supplementation.

How much of an increase is 2% of GDP anyway?

Achieving 2% of GDP, or anything close to it, will definitely increase the defence budget. But it's useful to understand how big an increase that will be in relative terms. Table 2.3 shows that, from 2000–01 to 2014–15 (the point at which the current Coalition government began increasing the defence budget), the defence budget averaged around 1.75% of GDP. It fell to 1.6% of GDP under the previous Labor government in 2012–13. Overall, under the Labor government, however, the defence budget averaged 1.75%; that is, it was consistent with spending under all governments from 2001–02 until then.

In relative terms, achieving 2% of GDP is an increase of 14% over the longer term average (as 0.25 is 14% of 1.75). However, since Australia's GDP is growing in real terms, going from a long-term average of 1.75% of GDP to 2% of GDP is also a large increase in real terms.

Table 2.3: Real increase in the defence budget, 2011–12 to 2020–21

	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21
Real funding ($m, 2018–19 dollars)	26,381	24,437	26,132	30,023	31,151	32,329	35,168	36,356	38,070	41,329
Real increase (%)	5.5%	-9.4%	4.1%	13.0%	2.3%	2.0%	6.7%	1.3%	2.3%	5.9%

Source: DAR, PBS.

Over the decade from 2011–12 to 2020–21, the real increase will be 56.7%. That said, virtually everything else, including wages and, most importantly, the cost of military equipment, increases in real terms, so the defence budget needs to increase in real terms to keep up. The question is, is it increasing enough to keep up and afford the future force structure?

How much does the Department of Defence get?

From this point on, we look only at the Department of Defence's budget (that is, without ASD's funding) and guide the reader through the tables in the front of the PBS.

Defence's appropriation for this year is $35,532 million (PBS Table 1, serial 4). This is made up of two appropriations: the first matches the total cost of delivering Defence's programs (serial 1); the second is an equity injection (serial 2).[24] On paper, this looks like a decrease in real terms of 0.9%, but that's misleading, as the PBS's actual figures for 2017–18 still include ASD, so we're not comparing apples to apples. The real growth

figure is also distorted by a budget measure discussed below. The Defence Department's funding increases again in real terms next year and makes a substantial jump of around 6.1% into 2021–22.

2.2 Budget measures

Budget measures (PBS Table 2) are generally changes to the federal budget since the last PBS or PAES. Unlike for other departments, there usually aren't any big announcements in the Defence PBS, as they're generally included in White Papers. The PBS doesn't include a description of Defence's budget measures, but there's a description in Budget Paper no. 2.

Reprogramming of funding

Last year, one big change was in the savings that Defence had to make by reducing its use of contractors and consultants ($304.1 million over the forward estimates). There are no absorbed costs of that scale in this year's budget. However, there has been a reprogramming of Defence's funding that moves $500 million forward into 2017–18 and effectively 'pays it back' over the forward estimates. Overall, it's a zero-sum game for Defence. Most likely, Treasury asked Defence to do this to help balance the government's cash flow. With its big US projects, such as the JSF and P-8A Poseidon, Defence has the capacity to do this simply by moving a payment forward from July to June. Moving this funding forward does have the effect of reducing the apparent size of the budget increase from 2017–18 to 2018–19.

Exchange rate adjustments

Since Defence receives no-win, no-loss supplementation to maintain its buying power as the Australian dollar fluctuates, exchange rate adjustments are included in the budget measures. In last year's PBS, Defence lost $235.1 million for 2018–19, in the PAES it lost a further $141.5 million, but in this year's PBS it got $244.4 million. (One feels sorry for the people who have to track all of these changes as they flow down to individual projects and back up again to the PBS.)

Exchange rate adjustments are presented at the department level, so it isn't possible to determine the extent to which individual areas of the department, such as the capital program, are affected. However, exchange rate adjustments significantly affect project budgets, so they're scrupulously tracked. Adjustments for the biggest projects can be found in the *Major projects report* of the Australian National Audit Office (ANAO).

Operations

The other big category of funding under budget measures is operational supplementation.[25] Funding for operations this year is estimated at $750.1 million (PBS Table 2 is the adjustment to the last estimate in the PAES; PBS Table 3 is the current estimate for the coming year). This is a decrease of around $150 million from last year's funding. This decrease is mainly in Operation Okra (Iraq), presumably due to the Hornet detachment coming home. The small amount of funding for operations over the forward estimates doesn't mean that the government is planning to end those operations, only that operations funding is assessed from year to year.

The ADF has been conducting operations continuously since East Timor in 1999, and this year's $750.1 million brings the total cost of operations since then to almost $17 billion.

Figure A.7 in 'Defence in 10 tables' compares this year's operations funding with previous years. We discuss operations in Chapter 3.

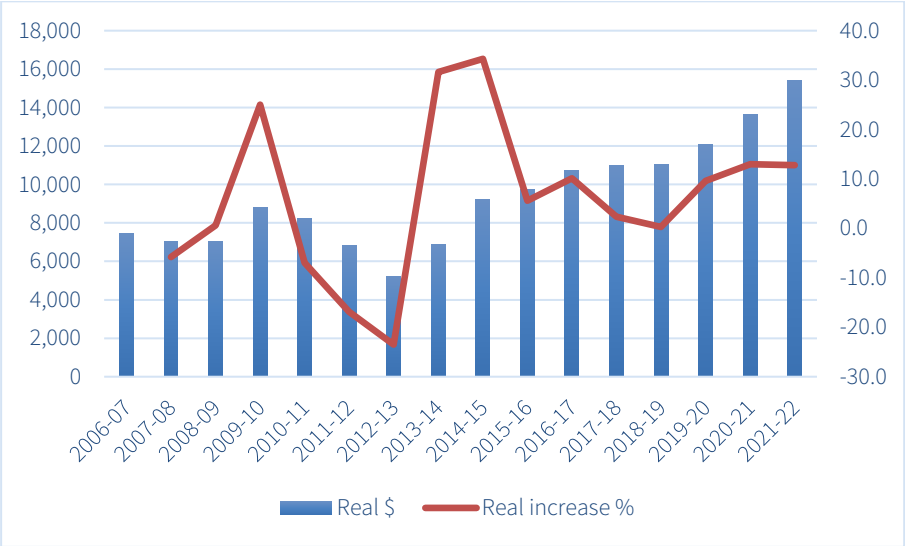
2.3 The Capital Investment Program

Section 1.4 of the PBS covers the Capital Investment Program, which is budgeted at $11,025.1 million this year. PBS Table 4 breaks it down into its main elements. The biggest is the Major Capital Investment Program (military equipment) at $8,426.5 million, followed by the Capital Facilities Program (infrastructure such as buildings, runways, wharves and so on) at $1,868.5 million. We discuss how these funds will be spent in more detail in Chapter 3. The ICT program is also considerable at $623.4 million.[26]

PBS Tables 4–6 don't present a line for the previous year (nor does the Defence *Annual report*), so it isn't possible to tell exactly how Defence went against last year's PBS prediction in its Capital Investment Program; however, the PAES does provide a mid-year update on expected achievement. The PAES estimate was $10,790.2 million against a PBS prediction of $11,601.7 million (that is, a $811.5 million underspend). We discuss this in more detail in Chapter 4.

In the Australian historical context, when the defence budget is under pressure, it's the capital budget that usually shrinks most (as was the case around 2012–13). Figure 2.1 shows the fluctuations in the capital budget. The intent of the White Paper was that the increase in defence funding should flow disproportionately into Defence's capital budget. Consequently, the capital budget is on a very healthy growth path and is increasing at a much greater rate than the rest of the Defence budget —but it needs to be, to come close to covering the cost of shipbuilding.

Figure 2.1: Trajectory of Defence's capital budget ($m, real 2018–19)



Source: DAR, PAES, PBS.

While the capital program is increasing, we note that all elements of the Capital Investment Program are *lower* than they were predicted to be in the PBS in 2016–17 and 2017–18. In fact, each year has seen a revision downwards (see Table 2.4). For example, in the 2016–17 PBS, the 2017–18 capital budget (not counting 'Other Investment') was predicted to be $10,701.5 million; but in the 2017–18 PAES, achievement was revised down to $9,732.6 million.

Over the years from 2016–17 to 2020–21, these shortfalls are cumulatively nearly $4.2 billion, or 9.0% of the original 2016–17 prediction. Around $2 billion of this is likely to be due to exchange rate adjustments.[27] That leaves another $2 billion or so unaccounted for. One reason could be related to the discussion above, which noted that the defence budget hasn't kept pace with the White Paper funding line.

Table 2.4: Defence Capital Program—predicted versus actual ($m)

	2016–17	2017–18	2018–19	2019–20	2016–17 Forward Estimates Total
2016–17	9,908.6	10,701.5	12,293.3	13,512.1	46,415.5
2017–18	9,151.5	10,416.0	11,742.6	13,071.7	44,381.8
2018–19	9,151.5	9,732.6	11,025.2	12,331.4	42,240.7
Shortfall	−757.1	−968.9	−1,268.1	−1,180.7	−4,174.8
Shortfall (%)	−7.6%	−9.1%	−10.3%	−8.7%	−9.0%

Budget year estimate	Forward estimates	Actual achievement

Sources: PBS for budget year and forward estimates, PAES for actual achievement. 'Other Investment' has been removed to allow for an apples-to-apples comparison.

Another potential reason is related to the sustainment budget. PBS Table 5 presents the Capability Sustainment Program. While the Capital Investment Program isn't broken down by service or group, the sustainment program is.[28]

While the investment program is less than predicted last year, virtually all elements of the sustainment program have increased from last year's prediction for 2018–19 (for example, the total for 2018–19 has gone from $9,931.9 million to $10,975 million). This, combined with the fact that capital budgets are lower than predicted, suggests that in the White Paper Defence may have underestimated the rate at which sustainment costs are rising and now needs to adjust budgets to meet them.

PBS Table 6 covers retained capital receipts. This is funding that Defence keeps from the sale of assets, primarily land and buildings. This year it's estimated at $94.9 million (which doesn't align with serial 10 in PBS Table 1, which is $104.9 million).

2.4 Personnel

The cost of Defence's people this year is estimated at $11,776 million (including ASD, it would be $12,023 million). Unlike Defence's capital budget, which is increasing, its personnel budget essentially flatlines, with real growth at or below 1% per year over the forward estimates.

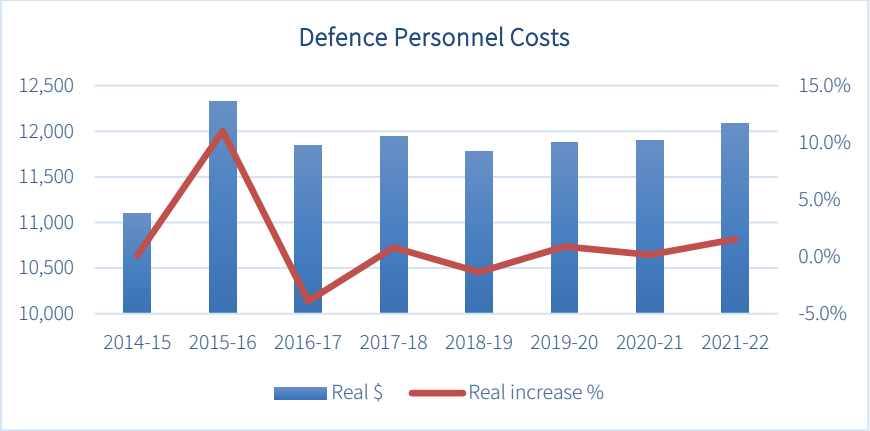
This would suggest that Defence has found the Holy Grail that all employers seek—increase workforce numbers and outputs without increasing wages and benefits above the Consumer Price Index (CPI). If Defence can pull this off, it will be quite an achievement for two reasons. The first is that ADF numbers are increasing by around 1% per year over the forward estimates (from 58,596 in 2017–18 to 61,027 in 2021–22, assuming Defence can actually recruit to those numbers).

So, with the number of people increasing, their individual cost would have to stay static in real terms to stay within the overall real increase. However, as ASPI has previously shown, Defence salaries have increased at a rate greater than the CPI (see Figure 2.5.11 in ASPI's *Cost of Defence budget brief 2017–18*). Granted, civilian salaries declined in real terms in recent years due to the inability of the government and Defence's civilian workforce to come to mutually acceptable terms over the Defence Australian Public Service (APS) certified agreement, resulting in a de facto wage freeze. That freeze should thaw a little now that an agreement has been reached. But the rate of growth of ADF salaries above the CPI has continued uninterrupted (Figure 2.2). Noting the public backlash the last time the government attempted to restrict ADF salary increases to the CPI or below, there's little reason to suspect that that will change.

In short, attempting to limit personnel cost growth to under 1% per year in real terms seems ambitious, and we may well see unplanned increases in Defence's personnel budget, just as we seem to be seeing in Defence's

sustainment budget. This will eat into the amount of capital funding that Defence has available to acquire the future force.

Figure 2.2: Real increases in Defence personnel costs



Sources: DAR, PAES, PBS.

2.5 What's the balance between personnel, capital and operating budgets?

Large organisations' budgets are commonly divided into three main buckets: personnel, operating, and capital. Some commentators suggest that for a defence organisation a rough division of the total budget into one-third each is a healthy mix. But there's no perfect, timeless mix. That said, if one of the three drops well below that, it suggests that there could be systemic problems. For example, if the operating budget is very low, the force probably isn't training and exercising enough to develop and preserve skills, and expensive assets are just sitting around. If the capital budget falls, the force probably isn't acquiring the new equipment needed to replace obsolete assets and meet emerging threats. Plus, using those three categories is a useful way to track broad changes in the composition of the defence budget.

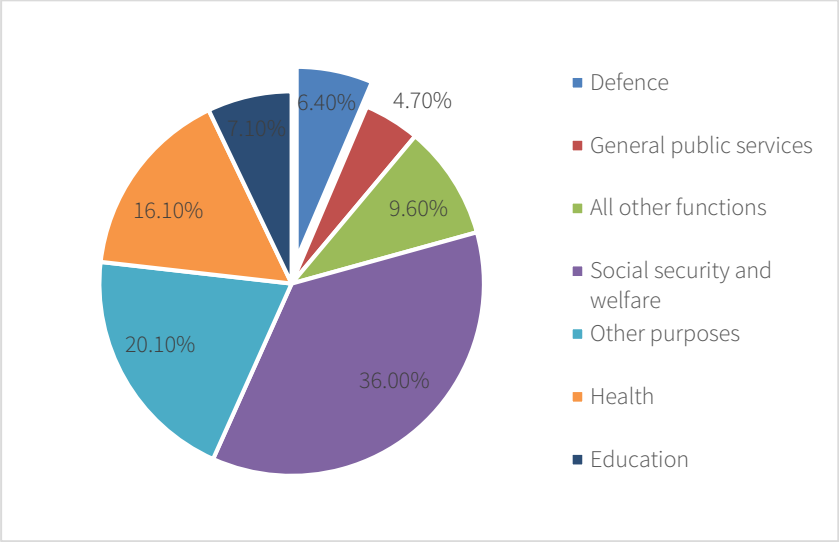
Table A.2 in 'Defence in 10 tables' shows the balance over the past decade. As we have discussed above, the capital budget is increasing disproportionately compared to the rest of the budget and has recovered significantly since a low point around 2012–13. This year, capital declines a little relative to the others, but by 2021–22 it's predicted to exceed them both for the first time. Personnel appears to be declining, but that's only in relative, not absolute, terms. It's essentially flat in real terms.

2.6 Comparisons

How does the defence budget compare with the broader federal budget?

The budget papers predict Australian Government payments to be $484,648 million, or 25.4% of GDP. The government wants to get payments below a self-imposed cap of 23.9% of GDP. This year, defence makes up 6.4% of Australian Government expenses (Figure 2.3). However, the Defence appropriation as a percentage of government payments is 7.5%.

Figure 2.3: Australian Government expenses, by function, 2018–19



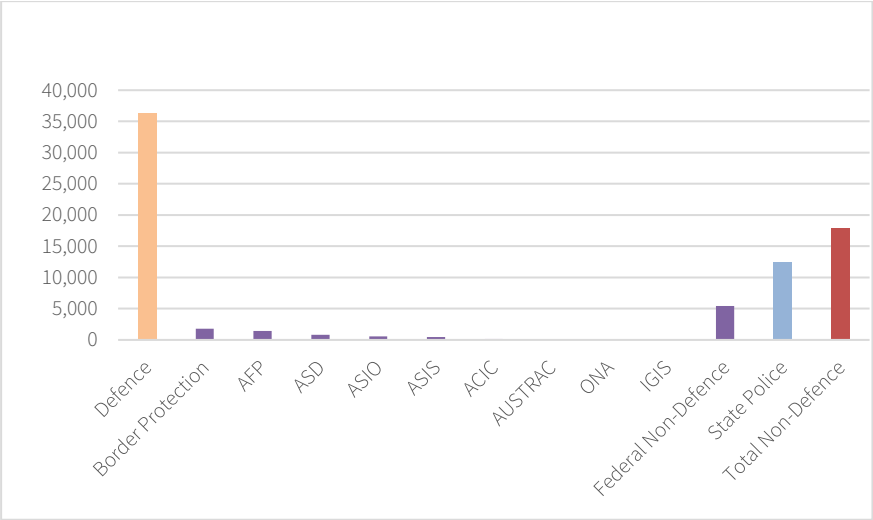
Source: Budget Paper no. 1, 2018–19, pages 6–9.

Defence has only two 'programs' in the Australian Government's Top 20 programs: the Air Force at 17 and the Army at 18.[29]

How does it compare with the broader national security budget?

Despite the growth of the intelligence agencies since 2001, Defence is still by far the biggest player in the national security space. Even including the border protection component of the Department of Home Affairs (Outcome 1), the Defence Department budget is still over five times bigger than those of all other federal security agencies combined. Even if we throw in all the state police forces (whose main task isn't national security, although they do play a counterterrorism role), Defence's budget is still twice the size of all other agencies.

Figure 2.4: National security spending, by agency ($m)



Source: Budget Paper No. 2 2018–19 and most recent state budget papers. The Border Protection figure is for Department of Home Affairs Outcome 1.

How does it compare with other countries?

Last year ASPI's Cost of defence budget brief considered international defence economics in considerable detail (Chapter 5). Since the patterns identified in that analysis have not changed significantly in the past year, we would refer interested readers to that work rather than repeating it this year in full.

Figure A.8a in 'Defence in 10 tables' shows that Australia still significantly outspends all Southeast Asian countries by a significant margin. Our spending is 10 times greater than New Zealand's.[30] However, despite the healthy growth in the defence budget in the past few years, we remain behind north and east Asian states.

Of course, those tables only give a snapshot in time, whereas the trajectory over time is just as important. The rate growth of China's defence spending is outstripping pretty much everybody else (Figure 1.1), including us, but we are doing a lot better than countries such as the United States and Japan whose defence spending has remained flat in real terms over the decade.

2.7 The defence appropriation versus ASPI net defence funding

The Minister for Defence's budget media release traditionally states how much funding the government is providing to Defence. This number is the departmental appropriation (serial 4 of PBS Table 1) and is used by the government and Defence as the 'headline' number. This is the number that the government assesses its 2% of GDP commitment against, for example.

ASPI has traditionally based its analysis on a number termed 'ASPI net defence funding' that takes several numbers other than the appropriation into account in order to determine how much Defence can spend. The main one is capital receipts, which are funds that Defence receives (and can keep and spend) through the sale of assets (PBS Table 6). This year, they're estimated at around $104.9 million. That's quite a lot of money for most people, but it's only 0.3% of the defence budget and doesn't generally affect analyses of trends in the defence budget. This year, for example, the consolidated appropriation rounds up to $36.4 billion, while the ASPI net defence funding figure rounds down to $36.4 billion.

Since the appropriation and the ASPI net defence funding figure are so close, for simplicity's sake we now use only the appropriation, which is a number readers can easily find in the PBS. We will continue to track the ASPI net defence funding number and if for some reason the two numbers diverge significantly our analysis will note that. In this year's brief, we use historical data based on the net defence funding number, but we use the appropriation for 2017–18 onwards.

Chapter 3: Where does the money go?

Key points

- In 2018–19, Defence plans spend $813 million to conduct operations.
- It plans to spend $11,776 million to employ its allocation of 59,794 full-time uniformed and 16,373 civilian personnel.
- It plans to invest $11,025 million in capital acquisitions, including $8,426 million in equipment.
- It plans to spend $10,975 million to sustain its current capabilities.

This chapter looks at what the average Australian taxpayer gets for their $1,477.96 per year.[31] In the broadest sense, the defence budget is meant to be the insurance policy that buys us peace of mind when it comes to external threats to our security. But many of us also have more than a passing interest in what exactly that money buys.

The bad news is that the PBS doesn't really tell us in any detail. The PBS is compiled by accountants in order to meet an accounting standard. It isn't a budget in the sense of a line-by-line breakdown of things Defence is spending its money on. So the PBS won't answer a lot of legitimate questions that many Australians may have (such as how much money Defence is budgeting to mitigate fire-fighting chemical contamination or how much it will be paying for base support services in the Townsville region). Whether the PBS (or another document, such as the Defence *Annual report*) should provide that information is another question. Other countries disclose more.

The Defence PBS doesn't generally list much in the way of new initiatives, such as major new equipment acquisitions. They're generally included in White Papers and supporting documents such as the IIP (which hasn't been publicly updated since the release of the most recent White Paper in February 2016), so the PBS needs to be read in conjunction with other documents. That said, we do our best here to outline where the money is meant to be going in 2018–19.

The discussion here is based on Department of Defence funding and therefore doesn't include ASD. Again, we assume that readers have access to the PBS online, so we avoid duplicating tables as much as possible.

3.1 How is the money divided up among groups and services?

Section 2 of the PBS presents outcomes that the government expects from Defence in return for the money (page 31). There are two outcomes. Outcome 1 is the conduct of operations, while Outcome 2 is having the ability to conduct them. Outcome 1 has three programs, which are essentially things to do. Outcome 2 has 17 programs, which are organisations within Defence (we won't consider programs 14–17, as they're administered programs that deal with such things as military superannuation and housing assistance and therefore aren't directly military capability). In classic APS-speak, the three services are 'programs'.

Each program has a very high level statement of objectives, a statement of how the objectives will be achieved, performance criteria and targets. 'High level' is hardly an exaggeration. For example, since the role of the service chiefs ('capability managers', in Defence-speak) is now only to raise, train and sustain forces that they provide to the Chief of Joint Operations to use on operations, each of the services has only one performance criterion

('Chief of the Defence Force preparedness levels meet Government requirements') and one target ('Chief of the Defence Force preparedness levels are achieved as agreed with Government'). Similarly, Joint Operations Command (Program 2.8) has only one performance criterion ('Operational outcomes meet the requirements of Government policy'). The annual report assesses whether these targets are achieved, which we discuss in Chapter 4. Again, whether this is sufficient to describe to the people of Australia what their defence force will be doing this year is a separate question.

The aggregated costs of all the programs equals the appropriation for departmental outcomes (that is serial 1 of PBS Table 1).

3.2 Outcome 1

Outcome 1 is 'Defend Australia and its national interests through the conduct of operations and provision of support for the Australian community and civilian authorities in accordance with Government direction.' The three programs that make up Outcome 1 are:

- Program 1.1: Operations Contributing to the Safety of the Immediate Neighbourhood.
- Program 1.2: Operations Supporting Wider Interests
- Program 1.3: Defence Contribution to National Support Tasks in Australia.

Government funding for Outcome 1 is $791.4 million, plus $21 million in the department's own-source revenue (PBS Table 11).[32] The resources for Outcome 1 don't exactly match the cost of operations in PBS Table 3 ($750.1 million), because not all operations are listed in PBS Table 3, only the ones for which Defence receives no-win, no-loss funding. Defence has to pay up to $10 million out of its own pocket for the smaller ones.

This is a good place to discuss funding for operations. Defence currently has 2,300 personnel deployed on operations.[33]

Table 3.1: Current Defence operations, 1 May 2018

Operation	Location	Nature of contribution	Personnel	2018–19 Budget ($m)
Accordion	Middle East	Sustainment of other ADF operations in the Middle East	500	235.8
Aslan	Sudan	Headquarters roles in the UN Mission in South Sudan	25	Not listed
Augury	Philippines	No information on Defence website, but consists of support to the Philippines Armed Forces to counter Islamist terrorism.	?	Not for publication
Manitou	Middle East	Maritime security operations in the Middle East. In addition to headquarters roles, the Navy has a vessel on permanent rotation to the Middle East and has totalled 66 rotations since 1990.	240	64.9
Mazurka	Egypt	Contribution to the Multinational Force and Observers overseeing peace agreements in the Sinai.	27	Not listed
Okra	Middle East and Iraq	Contribution to the international effect to defeat Daesh/ISIS. Comprises Air Task Group, Special Operations Task Group and a training element (Task Group Tajik).	600	306.5
Paladin	Israel/Lebanon	Contribution to the UN Truce Supervisor Organisation in Egypt, Israel, Jordan, Lebanon and Syria.	12	Not listed

Resolute	Australian Maritime Interests	Contribution to Maritime Border Command conducting civil maritime security operations. Can include maritime patrol aircraft, patrol boats and larger vessels with embarked security elements and regional force surveillance units on land.	600	53.2
Highroad	Afghanistan	Support to the NATO-led train, advise and assist mission called Resolute Support, including Afghan National Army Office Training Academy as well as embedded roles in Allied headquarters.	300	89.5

Source: PBS; Department of Defence, Global operations, no date, online.

Defence receives supplementation on a no-win, no-loss basis for operations. This means extra money to cover operating costs and rapid acquisition of any equipment specific to an operation. If Defence was going to buy equipment anyway (that is, it was already included in the IIP), then Defence generally doesn't receive supplementation for it.

3.3 Outcome 2

Outcome 2 is 'Protect and advance Australia's strategic interests through the provision of strategic policy, the development, delivery and sustainment of military, intelligence and enabling capabilities, and the promotion of regional and global security and stability as directed by Government.'

Outcome 2 contains the 13 programs that make up Defence's groups and services (not including the four administered programs). Government funding for the 13 programs is $31,680 million, plus $786.4 million of the department's own-source revenue. PBS Table 15 gives a high-level summary of the budget for each program. Pages 50–81 outline each program, giving a high-level cost summary (employees, suppliers, etc.).[34]

Because these cost summaries are so high level, they don't tell us much beyond what's probably intuitively obvious—large programs, such as the three services, have large budgets. Similarly intuitive is the fact that the Navy (Program 2.5) and the Air Force (Program 2.7), which are very platform focused, spend slightly more on equipment than on personnel, whereas the Army (Program 2.6), which is people intensive, spends a lot more on personnel than on equipment.

Another big spender is Estate and Infrastructure Group (Program 2.10), which under Defence's shared services model provides garrison services to the rest of Defence. One would expect Capability Acquisition and Sustainment Group (CASG; Program 2.9) to also have a large budget, since it acquires and sustains equipment on behalf of the services, but its program budget covers only its own people, not the equipment that it acquires and sustains for the rest of Defence. It's not clear why Estate and Infrastructure Group and CASG are treated differently. As one might have expected, Strategic Policy and Intelligence Group's budget has decreased since last year (Program 2.1), with ASD becoming a statutory agency.

Each of three service programs also provides estimated deliverables for its platforms for the previous and the budget year. The annual report reports actual achievement. These deliverables are presented in flying hours for aircraft fleets and unit availability days for ships (no deliverables are provided for vehicle fleets). While flying hours are broken down by aircraft type, naval assets are aggregated, so it isn't possible to distinguish between ships and submarines, or indeed between different classes of frigates and destroyers.

Readers who would like to get a sense of the operating cost per hour for a particular platform can divide the cost for the fleet in the 'Top 30 sustainment products' table (PBS Table 65) by the estimated number of flying hours in the deliverables tables. While this won't provide the complete cost of operating the platform (since the Top 30 table doesn't include the cost of uniformed people operating the platform), it does give a reasonable sense of

the relative cost of platforms. Also, comparing the planned hours in the PBS with the actual achieved hours in the annual report gives a sense of whether the platform is delivering to plan.

3.4 Personnel

The personnel budget for 2018–19 is $11,776 million (PBS Table 41). This allows Defence to employ the following workforce allocation, as shown in PBS Table 8 (see Table 3.2 below).

Table 3.2: Defence full-time average workforce allocation, 2018–19

Navy	Army	Air Force	ADF total	APS	Defence total
14,689	30,810	14,295	59,794	16,363	76,167

Source: PBS.

Australian Defence Force personnel

There are no changes to this year's total full-time ADF allocation from last year's forward estimate for 2018–19, only some very minor shifts between the services, so the main question is 'How is Defence going at achieving its allocation?' We look at that in the next chapter.

Defence also has an allocation for military reservists (PBS Table 9). This totals 971,000 days service spread among 19,850 reservists. If we assume that 220 days is roughly equivalent to a year's full-time service, that equates to around 4,413 full-time members. This is a decrease of 63,000 days from last year's forward estimates prediction for 2018–19 (which is around 286 full-time equivalents).

Australian Public Service personnel

Where there has been a big change is in Defence's APS allocation. At the end of 2017–18, Defence's APS workforce had reached around 17,500, about 470 short of the 2017–18 target of 17,970. In essence, Defence had overshot the target of its reductions that started in 2011 from just under 22,000 and hadn't built back up again. This year, Defence's APS workforce was meant to hit the steady state set out by the White Paper (18,170) and stay there.

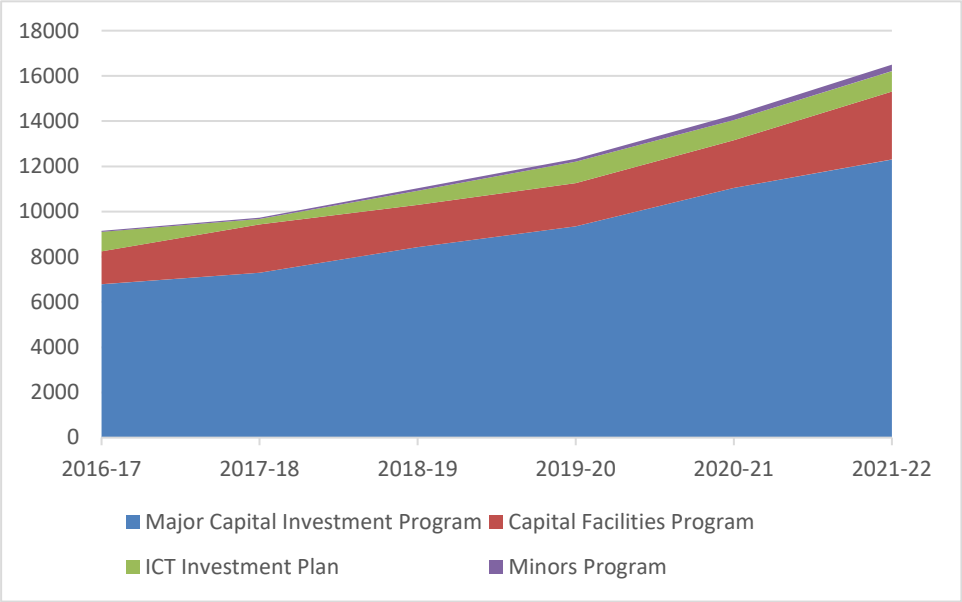
However, the trajectory over the forward estimates has been revised to 16,373 in 2018–19, decreasing to 16,147 by 2021–22. This is essentially a reduction of around 2,000. The PBS attributes this to machinery-of-government changes, the most prominent of which is ASD becoming a statutory agency and taking its people with it. Since ASD's staffing levels aren't made public, they aren't provided in the PBS or other budget papers. However, Defence has confirmed that all the adjustments are due to machinery-of-government changes and that there's no net change to Defence's White Paper APS staffing levels.

Last year, Defence stopped including contractors in the PBS workforce table because they're by definition only engaged for short periods (in theory at least), making it difficult to determine an average full-time level.

3.5 Capital costs

The capital budget is further divided into smaller (but still huge) programs (see PBS Table 4).[35] As discussed in Chapter 2, the capital program grows strongly over the forward estimates (Figure 3.1).

Figure 3.1: Increase in Integrated Investment Program funding, 2016–17 to 2021–22 ($m, nominal)



Sources: PAES, PBS.

Capital equipment

The largest capital program is the Major Capital Investment Program, which covers military equipment. PBS Table 64 lists the Top 30 capital equipment acquisition projects by 2018–19 forecast expenditure. The table includes only capital equipment projects, not ICT or facilities projects. Any project below the Top 30 (this year the cut-off is around $50 million) isn't covered and flies under the radar.

The table also has a useful summary of program cash flow. The 'Gross Plan' line states what Defence would need if all projects were delivered as planned on schedule. However, that won't happen. The 'Management Margin Slippage' line is what Defence thinks the shortfall will be, and Defence deducts that from the gross plan figure to come up with the amount of cash that it thinks it will spend on approved capital equipment projects—$7,703 million.[36]

Figure A.5 in 'Defence in 10 tables' shows the size of the largest projects by planned 2018–19 spend, illustrating their impact on the program.

The JSF, which is the first of four megaprojects coming down the pipeline, has now hit $2,047 million in annual cash flow between its $1,821 million equipment and $226.0 million facilities components (if it manages to spend that amount, it will be the first Defence project to exceed $2 billion in a year).[37] That means this project alone will consume 21.6% of Defence's capital equipment budget. Since the project has acquired only fewer than 10 of a total of 72 aircraft to date, it will probably need to stay at that level of expenditure for another 4–5 years before it tails off once all the aircraft have been delivered around 2023.[38]

Another big aircraft spender this year is the P-8A maritime patrol aircraft, at $592 million. Since the project is acquiring a total of 12 aircraft and seven have already been delivered and a further two are scheduled for delivery this year, its expenditure should start to tail off rapidly after this year.

A big Army spender is LAND 121 Phase 3B, which is acquiring around 2,700 trucks and 1,700 trailers. Its expected cash flow for this year is $628 million. Since it has already spent around $1,700 million of a total $3,363 million budget, its spend is likely to start to tail off over the next couple of years.

The Air Warfare Destroyer Program is still spending a lot ($376 million is expected this year) but is ramping down (from $520 million in 2017–18) and will tail off rapidly once the second of three vessels is delivered this year.

The two shipbuilding megaprojects (the future frigates and future submarines) are still in their infancy and are just starting their climb up the rankings, but they'll probably to reach the top two or three positions pretty fast, particularly once the JSF has delivered. The future submarine is budgeted to spend $418 million this year (up from $311 million last year) and future frigates $52 million (which is down from $143 million last year, so presumably the project will be seeking more funds for this year when the government considers the final tender selection around about the same time that this brief appears).

As we argue in Chapter 6, the key financial challenge facing Defence will be that, once the shipbuilding program reaches peak cash flow, it will need around $3.5–4.0 billion annually to keep ships coming off the production line. And, unlike current big spenders such as the JSF, P-8A, AWD, trucks and trailers, which will trail off at some point, the shipbuilding plan will stay at that level forever. If we add to that the cash flow required for LAND 400's armoured vehicles, which will reach over $1 billion a year and stay at that level for around a decade (since between its two phases its IIP provision is $15–20 billion and its delivery will last until the early 2030s), then Defence is going to have a major, potentially incurable, cash flow headache.

The PBS used to have an additional table on the current status of previously reported Top 30 projects, which added useful information on projects that were nearing completion and hence were no longer spending much. It disappeared from the 2016–17 PBS and appears to be gone for good. That's a shame, in part because it dispels the commonly held view that Defence projects consistently go over budget when in fact the vast majority deliver well within budget.

We have also provided a figure showing the Top 10 projects by total approved budget as opposed to 2018–19 cash flow (see Figure A.4 in 'Defence in 10 tables'). The JSF is the largest, followed by the AWD. LAND 400's combat reconnaissance vehicles appear, following their approval in March 2018. The future submarine's approved funding to date is far less than its total IIP provision of >$50 billion, but it's still $2.2 billion, even though Defence hasn't yet signed a design contract with Naval Group.

Facilities

PBS Appendix D covers the Facilities and Infrastructure Program. The planned spend for 2018–19 is $1,868.5 million, which continues the healthy recovery in spending over the past several years.[39] PBS Appendix D also outlines at a high level what work each project is conducting and the projects' total budget, spend to date and planned spend for 2018–19.

The three biggest spenders this year are JSF facilities at $226 million, P-8A facilities at $192.4 million, and HMAS *Stirling* redevelopment at $154.6 million.

Anybody who has built or renovated a house knows that infrastructure projects can suffer unplanned delays, but Defence's facilities projects are usually relatively straightforward compared to its capital equipment projects. Australian industry is quite capable of constructing buildings, wharves, runways, hangars, sewerage systems and so on. Granted, Defence sometimes wants to do it in remote and challenging places, such as the Cocos Islands, and consequently has pay a large premium for it compared to construction near Australian's major population and industrial centres. But the main challenge facing the facilities capital program often lies not so much in spending the money, but in making sure it isn't raided to meet other cash pressures in the portfolio or more broadly.

Facilities projects scheduled for government and Parliamentary Works Committee consideration in 2018–19 are listed in PBS Appendix E.

Information and communications technology projects

The estimated spend for ICT acquisition projects is $623.4 million. If you're wondering where ICT projects are listed in the PBS, they aren't. Despite the IIP indicating that some projects have budgets in the many hundreds of millions of dollars, and in future over a billion dollars, there's no coverage of them in the PBS, PAES, annual report or ANAO's *Major projects report*, despite all Defence platforms and operations being ICT enabled. We discuss this strange lack of transparency in Chapter 4.

Planned project approvals

Defence has customarily provided a table in the PBS that lists capital equipment projects scheduled for government consideration in the coming year. Last year, Defence provided a table that included all IIP projects (including ICT and facilities projects). This year, it hasn't provided a table at all (other than the facilities one mentioned above). We discuss this further in Chapter 4.

3.6 Operating and sustainment costs

Defence plans to spend $10,975 million to sustain its capabilities (PBS Table 5). This is an increase of around $1 billion compared to the prediction for 2018–19 in last year's PBS.

Top 30 sustainment products

The Top 30 sustainment 'products' are presented in PBS Table 65. The sustainment program isn't dominated by a small number of projects to quite the same extent as the Top 30 acquisition projects, but nonetheless there are a few standouts (we show the Top 10 in Figure A.6 in 'Defence in 10 tables'). The largest product is the Collins-class submarines, at $592 million. Anzac-class frigates were last year's second biggest, but have been bumped into third, at $374 million, by the Super Hornets/Growlers, which have jumped from $266 million to $414 million. The AWDs appear for the first time at $163 million. This seems like a lot, since only the first of three is in service (the second is to be commissioned this year), and it looks like the AWDs will cost a lot more to operate than the frigates (roughly $80 million compared to $47 million each).

The sustainment cost of both submarines and frigates will increase dramatically with their replacements, which will be bigger, more numerous and more complex, further increasing Defence's cash flow headaches (see our more detailed discussion in Chapter 6).

We should note that, while the public IIP provides (very approximate) acquisition costs for future capabilities, it provides no data at all for future sustainment costs, so it's impossible to know what Defence thinks its future capabilities will cost. Given that the First Principles Review and the new 'capability life cycle' that was developed as a result of it both emphasise the need to understand the true cost of ownership across platforms' life cycles, this lack of information is frustrating.

We have mentioned above that it's possible to get a sense of platforms' relative costs by dividing sustainment product budgets by, say, flying hours. You can also do it by dividing sustainment product budgets by the number of platforms in a particular fleet. The difference between Super Hornets and classic Hornets is quite striking. The 71-aircraft classic Hornet fleet is budgeted at $190 million ($2.7 million per aircraft), while the 36 aircraft Super Hornet and Growler fleet is budgeted at $414 million ($11.5 million per aircraft).[40] If this is indicative of a similar jump in sustainment costs from the classic Hornet to the JSF, it's a major cause for concern. The US Department of Defense is suggesting a 17% increase in operating costs from legacy fighters to the JSF but, if the disparity between the classic Hornet and the Super Hornet is closer to the mark, it will cause Defence (and all JSF

operators) problems.[41] Defence is making much greater use of simulators to keep costs down across its fleets and is investing heavily in them for the JSF, so there are some potential levers that it can use to manage costs.

Currently, the Army's vehicle fleets (other than the leased 'white' vehicle fleet) don't make the Top 30 cut. That will undoubtedly change dramatically as LAND 400 armoured vehicles enter service.

Exercise program

The ADF undertakes an intense program of exercises to ensure that the capability managers can provide the Chief of Joint Operations with forces appropriately prepared for the tasks they need to perform. Some of those exercises, such as Talisman Sabre and Indo-Pacific Endeavour, are very large and rival or exceed operations in their scale and complexity, if not their duration.

Once upon a time, the Defence PBS and annual reports provided a list of exercises. This is no longer Defence's practice, and Defence was unable to provide a list or description of major exercises planned for the coming year.

3.7 The Defence Cooperation Program

Appendix A of the PBS covers the Defence Cooperation Program, which is Defence's own regional aid program aimed at developing the capacity of and Defence's relationships with South Pacific and Southeast Asian militaries. Historically, the largest individual recipient has been Papua New Guinea, and this year is no exception. The overall program budget is increasing significantly this year by 28% (from $127.6 million to $163.5 million).

One of the key elements is the Pacific Patrol Boat Program, under which Defence provides 22 patrol boats to 12 Pacific nations as well as training and sustainment support for them, including Navy advisers. The existing boats have had a long career, and Austal in Western Australia has started construction of their larger and more capable replacements, which is the main driver for this year's increased program budget. The total whole-of-life cost of the Pacific Maritime Security Program, of which the Patrol Boat Program forms a key part, will be around $2 billion over 30 years, so this is a substantial form of regional aid.[42]

3.8 What does it all look like?

At various times, Defence has had a single, handy publication that outlined the structure of the ADF and described its platforms and their capabilities. It doesn't have anything that's current. Useful information can be found across the services websites. Here's a selection:

Navy

- *Organisation*, online
- *The fleet*, online

Army

- Organisation chart, online
- *Equipment of the Army*, online

Air Force

- *Air Command Headquarters*, online
- *Technology*, online

Chapter 4: How is Defence delivering?

Key points

- Defence assessed itself as largely meeting its key performance targets in 2016–17.
- Key acquisition projects are delivering capability, although transparency could be greatly improved, in particular by including the future frigate and future submarine projects in the ANAO's *Major projects report*.
- Due to the lack of reporting, it's impossible to know what IIP projects have been approved or (except for the very largest) how they're tracking.
- There isn't enough evidence to determine how the new, streamlined capability development and delivery processes are going.
- Despite the size of Defence's ICT program, there's no public reporting on it at all.

The PBS is only the start of a cycle. The Commonwealth Performance Framework that Defence adheres to is a cycle that begins in May with the PBS, which provides the portfolio's objectives along with a financial plan to achieve them and performance measures against which achievement can be assessed. Around August, Defence produces a high-level corporate plan, which also provides performance measures. The financial statements in the PBS are updated in the Portfolio Additional Estimates Statements (PAES) in February and then again in the subsequent PBS. Around October, the Defence *Annual report* provides an assessment against the performance measures and final financial statements.

Figure 4.1: The Defence reporting cycle

In this chapter, we give an overview of how Defence has performed against the 2016–17 PBS (and as much as possible against the 2017–18 PBS, since the annual report for this year isn't out yet) and the *2016 Defence White Paper*, and offer some suggestions on how Defence's public reporting could be enhanced to support better public understanding of and debate on Defence issues. This is a large subject, and much of the data needed to cover it comprehensively isn't in the public domain. Therefore, these observations are incomplete. Overall, the intent is to identify areas where greater scrutiny, both internal and external, may be warranted.

4.1 Defence's self-assessment

Defence's performance framework is confusing …

We strongly agree with the recent assessment of the Joint Committee of Public Accounts and Audit, which recommended that Defence improve its Corporate Plan, PBS, PAES and annual report to ensure a clear read of both financial and descriptive performance information.[43]

Cutting through the terminology in those publications to the underpinning logic is a task that would be likely to blunt Ockham's razor. For example, the PBS and the Corporate Plan unhelpfully use different terms. The former refers to two 'Outcomes' ('Defend Australia and its national interests' and 'Protect and advance Australia's strategic interests'), while the latter introduces two 'Purposes' next to the outcomes, although they seem to be identical. Neither the outcomes nor the purposes seem to be derived from the three Strategic Defence Interests/Objectives that provide the strategic framing for the White Paper (or vice versa).

The PBS's two outcomes are divided into 16 programs (not including the four administered programs, such as ADF superannuation). Three are things to do (that is, conduct operations, but again the three kinds of operations don't directly align with the Strategic Defence Objectives), and 13 are organisations within Defence. Delivery of the programs is to be assessed against a total of 33 performance criteria, each of which is linked to a program.

The Corporate Plan lists the programs, but then provides 11 performance measures that aren't linked to specific programs. The performance measures are then followed by 11 activities, each with an intended result, but they aren't linked to the Corporate Plan's 11 performance measures, but back to the PBS's programs.

Confused? We are. And most likely anyone in Defence who actually read this terminological soup would be, too. Why can't the Corporate Plan simply use the PBS performance assessment framework?

… but, overall, Defence thinks it's doing well …

Defence's assessment of its performance for 2017–18 won't come out until the next annual report in October, but the 2016–17 annual report has been published. The performance structure in 2016–17 was different again from what we have described above for 2017–18 (having three purposes/outcomes rather than two),[44] and still has the unhelpful difference between the PBS and Corporate Plan's performance structures.

Overall for 2016–17, between the PBS and the Corporate Plan there are 9 Defence performance measures, 13 activities / intended results and 39 performance criteria for a total of 61 assessable things. Defence assessed that it had achieved 50 of them and partially achieved 11.

… particularly in its core business

The good news is that Defence achieved all of the measures that most of us would assess as core business. For example, all three services achieved against 'Required preparedness levels are achieved and maintained'. This is good news for the service chiefs, particularly since that is their only performance criterion from 2017–18 onwards, reinforcing their role as capability managers whose job is to raise, train and sustain capability, not use it on operations. The preparedness levels set by the Chief of the Defence Force are classified, but generally are along the lines of 'Have X number of platforms ready at Y days' notice for Z days' operations.' However, the explanatory statement does qualify the assessment by saying that 'preparedness of available Defence elements improved from 76.3% to 80.8%.' While this wasn't perfect, Defence assessed that it was able 'to meet all tasking requirements from Government'.

One important example that illustrates the improvement in availability is the Collins-class submarines' dramatic turnaround, which resulted in ministers agreeing to remove Collins sustainment from the Projects of Concern list in October 2017, following the successful implementation of the recommendations of the 2016 Coles Report.[45] Unfortunately, the PBS and annual report don't distinguish unit availability days for submarines from those of other combatants, such as frigates, so it's impossible to tell how many days the improved Collins system is now achieving.

Other platforms continue to struggle. The Tiger armed reconnaissance helicopter and MRH-90 multirole helicopter still fall well short of required rates of effort, which is unfortunate since both are among Defence's 10 most expensive capabilities (achieved rates of effort against the PBS predictions for ships and aircraft are provided in the annual report, in Table 3.5 on page 40).

The annual report doesn't cover Defence's operations

Defence also achieved against 'Operational outcomes meet the requirements of Government policy.' Unfortunately, the only information in the 244-page annual report on the operations that the ADF has conducted is in the Chief of the Defence Force's two-page review and one paragraph on page 32.

Even though one of the primary reasons for having a Defence Department is to successfully conduct military operations, Defence provides no reporting of what its operations have achieved either on the ground or to further the government's Strategic Defence Objectives. The Chief of the Defence Force does make statements on operations at Senate estimates hearings; however, it would be useful for the annual report (or some other publication) to provide an explicit account of those achievements. After all, that's why we have a defence force.

Such reporting could cover Defence's important contribution to the defeat of Daesh in Iraq, and the 2017–18 report should cover its contribution to the defeat of extremists in the siege of Marawi in the Philippines. On the other hand, the cost of operations in Afghanistan now totals over $8.3 billion, with no near prospect of a stable Afghanistan in sight, so it would useful for the Australian public to be given an account of what has been achieved and what the way forward is.[46]

4.2 People

Recruitment and separation

According to the 2016–17 annual report, the ADF hit 97% of its recruitment targets, which is the best result for the past two decades (Table 4.1). Nevertheless, the annual report says the performance criteria of 'Achievement of ADF recruitment targets' was only partially achieved, which seems like a pretty harsh self-assessment.

Table 4.1: Percentage of recruitment targets met (%)

	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Navy	98	76	57	74	85	84	86	73	72	78	73	72	91	87	88	88	92	92	94	97
Army	94	78.5	83	79	100	79	84	81	89	86	76	76	90	90	87	85	94	85	89	97
Air Force	101	90.5	83	88	87	94	90	92	88	86	85	86	92	93	86	81	88	92	91	100
ADF	97	80	76	80	93	84	86	80	84	84	77	76	91	89	87	85	92	88	90	97

Source: DAR and Defence submissions to the Foreign Affairs, Defence and Trade Committee inquiry into ADF recruitment and retention, May 2001.

Retention rates are also good (Table 4.2). The 2016–17 separation rate of 9.0% was below the 20-year average of 10.2%. As with everything, the devil is in the detail, and in Defence there are always key trades that are difficult to fill. Since shortages in key trades have capability implications, Defence doesn't publish that data.

Table 4.2: ADF separation rates (%)

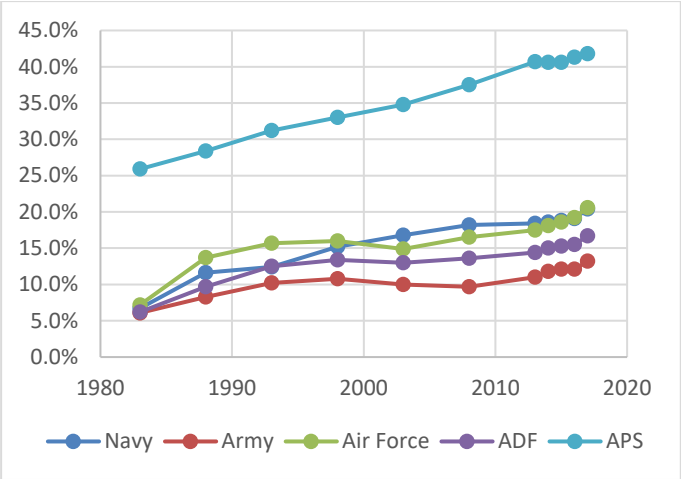
	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Navy	11.1	12.6	13.3	13.2	11.5	11.6	10.1	12.2	11.3	12.3	11.0	10.8	8.4	7.8	9.2	8.9	8.9	7.9	7.7	9.6
Army	10.9	12.9	13.0	13.2	11.5	9.8	11.0	12.7	12.4	11.9	10.6	10.3	7.4	8.8	11.7	12.3	12.3	11.3	10.0	10.2
Air Force	10.0	11.9	11.6	15.6	10.4	8.1	7.4	8.4	8.5	9.0	7.2	6.4	5.2	6.2	6.9	6.3	6.3	5.7	5.3	6.0
ADF	10.7	12.6	12.0	13.8	11.2	9.8	9.9	11.5	10.7	11.2	9.8	9.4	7.1	7.9	9.9	9.9	10.0	9.1	8.3	9.0

Source: DAR, Foreign Affairs, Defence and Trade Committee inquiry into ADF recruitment and retention, May 2001, and advice from Defence.

Women in Defence

The percentage of women in the ADF continues to rise, albeit at a slow pace, reaching 16.7% (Figure 4.2). That said, while the annual increase is small, the accumulated change over the past 30 years from a starting position of around 7% is significant. And women reached over 20% of a service for the first time in 2016–17 (20.4% of the Navy and 20.6% of the Air Force). The percentage of women in Defence's APS staff is higher, but considerably below the APS-wide level of 59%.

Figure 4.2: Percentage of women in Defence, 1980 to 2020



Source: DAR.

Recruitment challenges: ADF

However, it isn't all good news. Despite the good figures for recruitment and separation rates, Defence continues to have problems hitting its ADF personnel allocation. The White Paper put the ADF on a growth trajectory from around 58,000 to 62,400 personnel by the end of the decade (that is, by 2025–26)—an increase of 4,400.

The ADF isn't quite on track. From the data in Table 4.3, it will finish 2017–18 nearly 1,100 short of its original White Paper target for the year, and, even though the target was revised downwards in the 2017–18 PBS, it will still miss that target by 600. Put another way, by now it was meant to have grown by around 1,680 from its pre-

White Paper start point, but has grown only by about 600.[47] Still, being short by around 1,000 people is only around 1.7%. The situation is a little more serious in the Navy.

Table 4.3: ADF personnel—White Paper allocation versus achievement

	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
2015–16 PBS (starting point)	57,982	59,378	59,559	59,382			
2016–17 PBS (White Paper)	58,061	59,209	59,681	59,794	60,090		
2017–18 PBS		58,680	59,194	59,794	60,090	60,585	
2018–19 PBS			58,596	59,794	60,090	60,585	61,027
Shortfall against White Paper		–529	–1,085				

Budget year estimate	Forward estimates	Achievement

Source: DAR, PBS.

Recruitment challenges: Navy

Of the three services, the Navy is having the greatest difficulty in achieving its White Paper targets. Not only did it finish 2017–18 625 people short of that target, but it has gone backwards from the pre-White Paper starting point two years running; that is, while its allocation is going up, its numbers are going down. This means that it's now around 4% short of its White Paper target. Again, this is probably not catastrophic at this point if the shortages are spread evenly across the Navy, but if they're concentrated in areas that historically have difficulty recruiting and retaining people, such as submarines, it could be serious.

Since the White Paper target for 2018–19 has remained essentially unchanged, the Navy will have to turn around a 246 net decrease from 2016–17 to 2017–18 into a 858 net increase from 2017–18 to 2018–19 to achieve that target. That's a big number for a small service.

Table 4.4: Navy personnel—White Paper allocation versus achievement

	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
2015–15 PBS (starting point)	14,238	14,368	14,416	14,350			
2016–17 PBS (White Paper)	14,232	14,394	14,456	14,684	14,718		
2017–18 PBS		14,077	14,123	14,683	14,718	14,763	
2018–19 PBS			13,831	14,689	14,726	14,772	14,893
Shortfall against White Paper		–317	–625				

Source: DAR, PBS.

4.3 Delivering capability better

What the First Principles Review wanted

Much of the focus of the 2015 First Principles Review (FPR) was on delivering and sustaining capability better. Overall, the intent of the review was to reduce process to allow faster delivery. Following the FPR, Defence developed a new capability development and delivery process (the capability life cycle, CLC), the implementation of which began in April 2016. A key element of the CLC is that it's risk-based, as opposed to process-based: 'the default is the fastest and simplest decision making process.'[48] Overall, the CLC aimed at achieving shorter submission and approval times and reducing the size of policy manuals and mandatory procurement requirements.

A key element of the new approach is the FPR's Recommendation 2.14, which was to develop 'a Defence Investment Plan which would include all capital and related investments (such as materiel, estate and facilities, workforce and information and communications technology)' in place of the existing separate capital programs.

Is it working?

In its 2016–17 annual report, Defence assessed that it had achieved against the performance measure of 'The capability delivery process maintains the integrity of the Integrated Investment Program and delivers the required capability for the force-in-being' (page 33) and met the 'Integrated Investment Program is delivered as agreed with Government' target (page 36). Unfortunately, it's difficult to confirm that due to the lack of publicly available data. In fact, transparency around Defence's capital investment programs has sunk to an all-time low, as ASPI has previously noted.

That's unfortunate. ASPI has written previously that the challenge in the new CLC is in speeding up the capability development process while still developing the information necessary to plan, approve and deliver complex projects, in particular identifying and addressing key risks. As bitter experience and many ANAO reports show, when you don't understand and address risks, projects encounter delays, exceed budget, or fail to deliver the required capability.

Because of the timelines involved in developing and delivering Defence projects, it will take some time before it's possible to assess whether the new CLC is delivering better outcomes. And Defence will need to develop the right data. In particular, it will need to track changes in cost, schedule and capability over the entire CLC, from a project's initial entry in the IIP, through to project approval, subsequent delivery and then service life. Currently, it isn't clear whether Defence has that data. If it does, it doesn't make it public.

If a project is approved in a forest …

One metric that might suggest improvements in Defence's capability development process is project approvals. ASPI's *Cost of Defence budget brief* has previously attempted to track project approvals despite the decreasing amount of public information. That's now impossible, as there's no reliable reporting on them.

On 13 December 2017, Minister Pyne stated that 'in 2016–17 we issued 74 defence capability-related project approvals.'[49] The 2016–17 Defence *Annual report* is consistent with that statement, reporting that 'a total of 74 capability-related submissions were agreed by Government against an initial plan of 62 as outlined in the 2016 Defence White Paper. These approvals comprised 15 first-pass approvals, 31 second-pass approvals, 15 other types of IIP project approvals, and 13 capability-related submissions' (page 33).

At first blush, it would appear that Defence overachieved, as the 74 approvals exceeded expectations by 12. But since 13 of the 74 were 'capability-related submissions', it would appear that they aren't approvals *per se*. Nor is it possible to confirm whether the 62 'proper' approvals were originally planned in the White Paper. Unfortunately, the IIP is so vague that it's difficult to confirm what approvals were originally scheduled for 2016–17. The 2016–17 PBS listed only 36 projects planned for approval, but they were only major capital projects and didn't include ICT or infrastructure (Tables 68–70 on pages 128–129).

Quibbling about numbers aside, the main problem is that it's impossible to confirm what the 74 approvals were. The 2016–17 Defence *Annual report* has two separate lists of project approvals achieved: one lists 11, the other lists 15, and 3 appear on both, making a total of 23, which is far short of 74.[50] What were the other ones?

It could perhaps be possible to piece together other approvals by tracking ministerial media releases or by monitoring the AusTender database for notification of contract signature (assuming one can link an AusTender entry to a specific project). But doing so shouldn't be necessary. It's our view that by not releasing a single authoritative list of all project approvals, the government and Defence are falling far short of meeting a minimum duty of transparency and accountability.

Table 4.5: Integrated Investment Plan approvals achieved in 2016–17

?

Source: ?

In the same speech in December 2017, the minister stated that the government had already made 61 decisions in that financial year (2017–18). However, the Defence PAES released in February 2018 listed a total of five.

Table 4.6: Integrated Investment Plan approvals achieved in 2017–18

?

Source: ?

We don't know what approvals are coming up

There were some signs of improving transparency that indicated that Defence was meeting FPR Recommendation 2.14, to develop a single Defence Investment Plan. For example, for the first time, the 2017–18 PBS provided a single list of planned investment approvals that included ICT and estate projects as well as major capital projects. There were a total of 59, including 8 ICT and 9 estate projects (Tables 64–66 on pages 117–119). That was a positive development—but the table has disappeared from this year's PBS, so we've gone backwards. There isn't even an old-style list of major capital approvals.

Anecdotally, Defence is justifying this by saying that planned project approvals are 'Cabinet-in-Confidence'. This appears to be pushing the definition of cabinet-in-confidence to new ground. It is also reaching new extremes in denying industry information that it needs, despite the government having published 432 pages of industry policy since the White Paper stating how closely it wants to work with industry and how it would make as much information as possible available.

A cynic might say that what could be going on is that there have been changes to project schedules since the public IIP was published in early 2016, and including a list of planned approvals in the PBS would make that apparent. Who knows? But if the government is planning and achieving record numbers of approvals, why not put the evidence out there so the public can see what a good job the government and Defence are doing?

Table 4.7: Integrated Investment Plan approvals planned for 2018–19

?

Source: ?

Defence should collect and publish project performance data for accountability …

The other challenge in assessing whether the new CLC is delivering the future force is that there's minimal public reporting of basic project data. The PBS lists the 30 capital equipment projects with the biggest projected in-year spend (see Chapter 3), so eventually if a project is big enough it will make it into the PBS Top 30 list, even it doesn't appear in a PAES or annual report list of project approvals. But if it's below the Top 30 it will be invisible. Currently, the cut-off for the Top 30 is around $50 million. A project with an annual spend of $50 million is likely to have a total spend of at least several hundreds of millions, which is significant in most people's language. In fact, CASG projects totalling $37.8 billion don't appear in the PBS Top 30.[51]

The one exception to the general lack of public data is the excellent *Major projects report* (MPR) published annually by the ANAO, largely using data from Defence's CASG. It's an extremely valuable resource; it's the only publicly available reporting that gives insight into the coalface of Defence's projects. However, the MPR has limitations: it includes only projects delivered by CASG, and even then only the largest 25 or so. It doesn't include any pre-second-pass projects, any infrastructure projects or any ICT projects. And new approvals below $500 million are unlikely to make it into the MPR because they're simply not big enough to meet the bar for inclusion.

So it's entirely possible that a project worth hundreds of millions of dollars can be approved, be contracted, be delivered and be closed out with no public reporting on it. It could require a real cost increase of hundreds of millions of dollars or be years late but there would be no public record.

… and to confirm that the reforms are working

That's unfortunate, because the MPR's aggregated data tells us a lot about the performance of the portfolio. One of the things that the MPR suggests is that projects approved before the last big reform of the capability development process, the Kinnaird Procurement Review of 2003, suffered substantially greater schedule delays than those approved after it.[52] Recommendation 3 of the Kinnaird Review—which became the basis of the subsequent capability development process until the FPR—was that 'Government should mandate … a rigorous two-pass system for new acquisitions with government considerations dependent on comprehensive analyses of technology, cost (prime and whole-of-life) and schedule risks subjected to external verification.'[53] There's no doubt that there was a causal connection between that rigour and the resulting improved project performance.

This isn't to say that Defence should abandon the new risk-based CLC and return to a 'rigorous' and 'comprehensive' Kinnaird approach. Rather, it needs to collect the empirical, quantitative data that can demonstrate whether the benefits of the new approach outweigh its risks. This data should be externally validated and made publicly available.

Is Defence spending its capital equipment budget?

As discussed in Chapters 2 and 3, Defence's capital budget, including its capital equipment budget, is growing substantially (see Figure 3.1). But spending that budget can be difficult for a number of reasons. First, ramping up expenditure rapidly can be challenging, particularly in developmental projects. Second, Defence's planners and project managers are prone to falling for 'the conspiracy of optimism' and believing that they can deliver faster than is feasible, so they overestimate how much they can spend. Third, the capital program often functions as Defence's cash bank. When another part of the portfolio runs short of cash, or the government wants to redirect defence funding into another priority, Defence usually turns to the capital program to find the money.

So it's useful to see how Defence is spending against its total capital budget, both to see whether it's spending the funds necessary to deliver the White Paper force and to see whether the new CLC is helping it to deliver capability more quickly.

As with everything in this space, the available data doesn't present clear answers. While the PBS presents a high-level breakdown of the Capital Investment Program over the forward estimates, it doesn't provide actual figures for the previous year (although the PAES provides an updated estimate for the year). Nor does the annual report provide actual figures that relate directly back to the PBS's budget estimate. So we can't directly know whether Defence achieved its capital spend. We can attempt to piece an answer together from a number of sources, but it's inconclusive.

Defence isn't spending capital funds as predicted

As discussed in Chapter 2, Defence isn't spending capital funds as predicted. So far, achievement against the 2016–17 forward estimates prediction for the capital budget appears to be around $4.2 billion short, although around half of that is likely to be due to exchange rate adjustments (see Table 2.4).

As an illustration of this, we can look at the 2017–18 PAES, which presents a revised estimate of the capital investment spend for 2017–18. There was a substantial decrease between the PBS in May and the PAES in February (Table 4.8).

Table 4.8: Variation in the 2017–18 Capital Investment Program between PBS and PAES

	2017–18 PBS estimate	2017–18 PAES revised estimate	Variation
Major Capital Investment Program	7,426.4	7,288.7	–137.7
Capital Facilities Program	2,025.6	2,137.1	111.5
ICT Investment Plan	889.0	245.1	–643.9
Minors	75.0	61.7	13.3
Other investment	1,185.7	1,057.6	–128.1
Total Capital Investment Program	11,601.7	10,790.2	–811.5

Source: 2017–18 PAES, Table 8.

The expected capital spend came down by $811 million—with a remarkable 72% decrease in the ICT investment budget. The table is accompanied by a note saying that, since the 2017–18 PBS, Defence activities previously recorded within the operating budget have been reclassified as capital or sustainment activities, but unhelpfully doesn't state how much of the changes they constitute, and one would expect this to increase the capital spend, not decrease it.[54]

Meanwhile, sustainment budgets are going up. Overall, the sustainment program increased by $1,586.1 million between the 2017–18 PBS and the PAES (from $9,474.2 million to $11,060.4 million). That's a pretty substantial increase of 16.7%. And as we note in Chapter 2, the sustainment budget for this year is higher than predicted last year.

It seems reasonable to surmise that funds were reprogrammed from the capital investment budget into the sustainment budget. But it's always hard to know what was the cause and what was the effect. Was Defence forced to consciously slow down acquisitions in order to free up cash to support platforms that had been starved of sustainment funds? Or were acquisition programs, particularly ICT, underperforming anyway, which created an opportunity to redirect unspent funds? It's probably a combination of the two.

Analysis of slippage rates is inconclusive

Another place to look to see whether Defence is spending its capital equipment budget is the Top 30 projects table in the PBS (updated in the PAES). This table lists what Defence thinks it will spend on its capital equipment projects (it provides a total number that includes all projects, not just the Top 30). Since Defence is well aware that not all projects will deliver precisely to schedule, it builds in factors to account for the difference between all projects delivering as per schedule and what's likely to happen. This is called 'management margin' or 'slippage'. Theoretically, if all projects were running according to plan, this difference would be very small. So if Defence and industry's ability to deliver is improving, the slippage percentage should decrease.

ASPI has tracked slippage rates over time (see Table 2.8.2 in ASPI's 2017–18 budget brief). Unfortunately, there's no clear pattern, such as a reduction in slippage, that would suggest delivery is improving. Also, Defence is inconsistent in reporting actual achievement against the PBS estimate, so it's difficult to assess how good it is at predicting its spend and then achieving it.[55]

The *Major projects report* indicates that projects still underachieve

The third source of data on whether Defence is managing to spend its capital equipment budget is the ANAO's *Major projects report*. For the 27 capital equipment projects covered in the 2016–17 MPR, the predicted PBS spend was $4,803.7 million. The actual spend was $4,076 million, or a 15% underachievement, which is fairly consistent with historical rates of slippage. Not surprisingly, the ANAO stated that the main reasons for the reduced spend were 'changes to delivery and payment schedules'.

What stands out in the MPR data, however, is that two of the projects that overachieved were the JSF and the P-8 maritime patrol aircraft, both of which spent more than planned due to 'the acceleration of payments due to earlier aircraft production' (page 42). If you have a potential cash underspend in your capital program, accelerating the delivery of (or acquiring unplanned) aircraft off an established large production line in the US has always been a good way to deal with it, which is how Defence ended up with an extra four C-17A heavy airlifters.

Overall, we can't say whether the system is fundamentally better

Overall, it's too early and there's too little data to say whether the FPR and the new CLC have transformed Defence's capability development and acquisition processes for the better. The capital programs still seem to underperform compared to Defence's predictions. Such is the nature of the beast. The amount of money Defence is getting out the door for capability is definitely increasing, though, just not quite at the rate planned in the White Paper.

4.4 Key projects

We provide here a brief overview of progress on the largest individual projects in Defence's investment plan.

SEA 1000: Future submarines

IIP provision >$50 billion; approved budget to date $2,243 million

Even though imprecise language in the media suggests that Naval Group has won the contract to build the future submarine, we're still several years away from a construction contract. In fact, two years after the government announced that Naval Group had been selected as the preferred designer for the submarine, it hasn't yet signed a design contract with Naval Group. Despite this, the government has already approved $2,243 million in funding for the project. Initial design work by Naval Group to date has been progressed under an initial, theoretically interim, design and mobilisation contract. According to a media release, a $700 million contract has been signed with Lockheed Martin for design and procurement activities for the submarines' combat system.

Unfortunately, the MPR doesn't cover SEA 1000, as it's pre-second-pass, so authoritative information on the progress of the project is limited. We can glean that design work is progressing, that a joint Defence, Naval Group and Lockheed Martin facility has been established at Naval Group's shipyard in Cherbourg, and that design work has started for the construction of the Adelaide submarine shipyard. The main thing that's missing is the strategic partnering agreement, which serves as the head contract governing the entire project from design through to construction. It's important to get this right, and the extended negotiations suggest that there are significant sticking points between Defence and Naval Group.

We believe that the ANAO should cover SEA 1000 in the MPR, regardless of whether the program has received a formal second pass.

SEA 5000: Future frigates

Provision>$35 billion; approved budget to date $395 million[56]

Despite being the second biggest project in the IIP, SEA 5000 isn't covered by the ANAO in the MPR either, which means that authoritative information is scarce. To date, the project's approved budget is $395 million, but with an announcement on the successful design and prime contractor expected at any time that will increase substantially. It isn't clear whether the government will agree to design and construction costs or just design costs.

The government made a key announcement last year that the frigate's combat system would be based on the Aegis system used by the US Navy and Australia's AWDs, but with an Australian interface designed by SAAB allowing it to work with the excellent Australian-designed CEA radar used on the Anzac-class frigates. Work has commenced on the design and construction of the shipyard in Adelaide. The final down select should occur around about the same time that this brief appears.

Achieving the government's announced 2020 construction start date will be challenging and, in the absence of public data, we can't assess whether it's feasible. However, the PBS states that only $52 million of expenditure is planned for 2018–19. This seems underdone in the light of the amount of work that needs to be done to start construction (in comparison, the Future Submarine Project is spending $418 million this year, even though it starts construction two years later). Presumably the cabinet consideration planned for May or June this year to down select the preferred design will also agree to additional funds for the coming year.

As with SEA 1000, we believe that the ANAO should cover SEA 5000 in the MPR regardless of whether the project has received a formal second pass.

AIR 6000: F-35A Joint Strike Fighters

Approved budget $15,512 million

Despite all the years of bad press, the JSF program is progressing. The US has begun deploying the aircraft overseas. Australia has received aircraft, although none is yet based here, but the project is on track to have the first squadron operational by the end of 2020 and have all 72 aircraft delivered by 2023.

Risks remain, and are covered in detail in the MPR. They include uncertainties about the cost and performance of the sustainment system (media reporting suggests that the sustainment system in the US is struggling to provide sufficient spares) and the lack of a maritime strike weapon.

While the total budget is over $15.5 billion, by the end of 2017–18 the project will have spent only $2.7 billion of that figure. That means that the project will need to spend on average over $2 billion per year over the next five years (the spend for 2018–19 is $2.047 billion, split between equipment and facilities)—a huge call on Defence's capital cash flow, particularly as it simultaneously attempts to ramp up production of the future submarines, frigates and armoured vehicles.

LAND 400: Land combat vehicles

Approved $5.2 billion; unapproved $10–15 billion

The government has announced the winner of the first big chunk of the Army's land combat vehicle megaproject. Defence will acquire 211 of Rheinmetall's Boxer combat reconnaissance vehicles. As ASPI has noted, despite the no-holds-barred cage fight between Queensland and Victoria in support of their candidates, it appears that the government made the decision on capability grounds, which is a good thing.

That phase is a mere $5.2 billion appetiser.[57] The main course—the acquisition of infantry fighting vehicles—is still to come and is in the IIP with a budget range of $10–15 billion. While the solution for the next phase could be a different (potentially tracked) vehicle, Rheinmetall has a viable candidate for that, which shares the same turret with its combat reconnaissance vehicle. With its production line for the first phase up and running, it would have to be in the boxer seat to win (sorry).

The project misses the cut-off to get into the PBS's Top 30 projects, so its expenditure for 2018–19 will be less than $50 million, but that will have to ramp up quickly to hit schedule.

SEA 4000: Air warfare destroyers

Approved budget $9,089 million

Since the AWD project was rebaselined and the designer, Navantia, was brought in to play a more active management role, the AWD's get-well plan has gone well and it was removed from the Projects of Concern list early this year. In February, the PAES stated that the project would have a $162 million underspend in 2017–18. The reason for this is stated in jargony project management terms, but essentially the project is delivering within its (revised and increased) budget.

Most importantly, capability is now being delivered 10 years after second-pass approval. The first vessel, HMAS *Hobart*, was commissioned into the Navy in September last year. Because the ship is essentially a delivery system for the combat system, the project won't achieve IOC until *Hobart* completes its combat system qualification trials later this year. But the announcement that the ship's cooperative engagement capability, which integrates sensors and weapons across different ships and aircraft, has been successfully tested is excellent news and a huge leap forward for ADF capability.

This also means that sustainment spending is ramping up quickly. The AWD didn't make last year's Top 30 sustainment products, but this year has gone to number 8 with a bullet, at $163 million.

AIR 7000 Phase 2B: P-8 maritime patrol aircraft

Approved budget $5,211 million

This quiet achiever demonstrates the benefits of going off-the-shelf when the right thing is available on the global market. When you can buy a mature design off a US production line, things generally go well, and this project is no exception. The project is well within budget and declared IOC ahead of schedule.

In 2016, the government increased the original order for eight up to 12. This is a good thing, as the aircraft will undoubtedly be the workhorse of the ADF in a broad range of roles. As modern intelligence, surveillance and reconnaissance platforms, they'll be collecting huge amounts of data that will need to be moved around; whether the enabling systems will be in place to do that effectively and efficiently is difficult to say, as we discuss below in our section on Defence's ICT systems.

SEA 1180: Offshore patrol vessels

Approved budget $3,683 million

The offshore patrol vessel (OPV) project is a key plank of the Naval Shipbuilding Plan and displays the tensions at the heart of the plan. It looks like Defence got the capability it wanted—a mature design by the experienced German designer and builder, Lürssen, who planned to use Civmec and ASC Shipbuilding Ltd as its build partners. However, in announcing Lürssen as the winner, the government stated that Lürssen would also use the capabilities of Austal (who had been part of a losing bid) 'subject to the conclusion of commercial negotiations'. The other wrinkle is that the government wants the first OPVs to be built in Adelaide and the following 10 to be built in Perth, which can only increase cost and risk.

After months of unsuccessful negotiations, Lürssen announced in early May this year that it and Austal couldn't come to terms, and is proceeding just with its original partners: Civmec for the Perth build and ASC for Adelaide. It's hoped that, with the commercial issues now resolved, the Adelaide build can start on schedule by the end of this year. Once it's delivered, Defence should get an excellent ship that will be a huge step change in capability from the current patrol boats.

Other key project milestones

Defence projects can take a long time to deliver but, despite horror stories about delays, they generally get there. Key milestones for a selection of capability projects in the past year include:

- the arrival of the 10th and final C-27J battlefield airlifter, more than filling the gap left by the retirement of the Vietnam War-era Caribou aircraft in 2009
- the delivery of all 12 EA-18G Growler electronic attack aircraft, for which IOC is planned for July 2018 (Australia is the only country other than the US that has this capability)
- the approaching declaration of IOC for the Army's Battlespace Telecommunications Network, the glue that holds its battlefield communication and information systems together
- the commencement of deliveries of Rheinmetall trucks and locally made trailers under LAND 121 Phase 3B, starting the replacement of the Army's aged truck fleet

- the commencement of deliveries of the Air Force's new trainer, the Pilatus PC-21 (see it at a Roulettes aerobatics demonstration near you from 2019).

Projects of concern

With the removal of the AWS, Collins submarine sustainment and the OneSKY integrated air traffic control system, there are now only three projects on Defence's Projects of Concern list:[58]

- AIR 9000 Phases 2, 4 and 6 (MRH90 multi-role helicopters)
- JP 2008 Phase 3F (Australian defence satellite communication capability terrestrial enhancement)
- AIR 5431 Phase 1 (Deployable Defence air traffic management and control system)

The trials and tribulations of the MRH-90 helicopter project are covered in detail in the MPR and other ANAO reports.[59] In short, with $3,118 million spent and all 47 helicopters delivered, Defence is still not getting close to the flying hours it expected. It's also the fifth most expensive sustainment program in Defence, costing $215 million this year (around $25,500 per flying hour or around 50% more than for a classic Hornet fighter). The other two projects don't make the MPR or PBS Top 30, so there's little information to indicate what the problems are and whether they're close to being resolved.

4.5 Remediating key enablers

The challenge of sustained underinvestment

Defence's major platforms projects, such as those discussed above, gain the bulk of attention and investment. However, the capability they provide is limited without the right enabling functions.

The fundamental challenge that Defence has to address with its key enabling capabilities, such as information management systems, communications and facilities, is the accumulated impact of years of underinvestment. There's a consistent pattern in exercises such as White Papers. Defence recognises that consistent budget pressure has resulted in accumulated underinvestment in the key enablers that underpin military capability. Infrastructure in bases is run down, or services such as power and telecommunications haven't kept up with the increased demands of modern platforms. ICT hasn't been modernised, or has evolved as a hodgepodge of disconnected systems.[60] The key 'glue' projects, such as communications, that enable all the military platform to work together get sacrificed whenever funds are short.

At key moments, this has led to recognition of the 'hollowness' of the force. In 2009, for example, the then Secretary for Defence, Nick Warner, referred to this as Defence's 'broken backbone', and the 2009 White Paper set out to fix it. However, the 2016 White Paper found that the problem had still not been fixed.

Information management is a self-assessed shortcoming

Consequently, it isn't surprising that the First Principles Review also concluded that to support better decision-making in Defence improvements to enterprise planning, information management, performance monitoring and the information systems that support them were needed (see, in particular, recommendations 1 and 3 and their sub-recommendations).

However, if there's a 'hotspot' of partial achievement in the 2016–17 Defence *Annual report*'s performance assessment, it's centred on Defence's management and use of corporate information to support decision-making and on its development of information systems. The following intended results, performance measures, and targets were only partially achieved:

- Assured data is available to support the design of good performance measures.
- Appropriate risk appetite is actively exercised based on all available information.
- Managers across Defence have a view of performance within their work areas that's based on true information, enabling them to make more robust decisions.
- All performance information is supported by a reliable and validated data source.
- Business outcomes are improved as part of broader Defence reform.
- Defence develops organisational capability that ensures that it can achieve government directed outcomes.
- ICT services meet requirements.
- Effective development of next-generation ICT services occurs.

Unfortunately, there's a complete lack of reporting on the projects that are intended to remediate these shortcomings.

The mystery of ICT projects

As discussed in Chapter 2, Defence's ICT capital budget is increasing (see Figure 2.1). Defence is conducting or plans to conduct several very large ICT projects that are intended to address its information management issues. They include 'a consolidated Defence Enterprise Resource Planning system that will improve business functions, including for force preparedness planning'.[61]

And this is just one part of Defence's very large ICT enterprise. Table 4.9 is a list, extracted from the 2016 IIP, of projects currently underway or with impending approval dates (we note that there's been no public update to Defence's IIP since the White Paper was released in early 2016). The projects sum to around $10 billion.

Table 4.9: ICT projects in the 2016 Defence Integrated Investment Program

Project	Public IIP schedule	Public IIP budget
Terrestrial Communications	In delivery + 2016–20	? + $100–200 m
Next Generation Desktop project	In delivery + 2015–16	? + $400–500 m
Centralised Processing	In delivery	?
Enterprise Information Management	2016–21	$400–500 m
Satellite and Terrestrial Communications	2016–29	$2–3 bn
Defence Simulation and Collective Training	2016–28	$2–3 bn
Enterprise Resource Planning System/Service	2016–25	$1–2 bn

Source: 2016 IIP.

Despite the value of these projects and their importance for Defence achieving its outcomes, there's no public reporting on the projects run by Defence's Chief Information Officer Group.[62] A capital equipment project valued at $2 billion would eventually appear in the MPR or the PBS, but ICT projects don't appear in either. As discussed above, it isn't even possible to say reliably what has been approved and is in delivery.

If projects are being delivered, there's nothing that states what their approved budgets are. A review of contract notifications in the Defence contracts database on AusTender shows that the sums of money involved are substantial. For example, there are contracts with Lockheed Martin for centralised processing signed on 4 November 2014 for $159,188,856.20 (CN2657172) and one for $710,466,511.70 (CN2657592), both for 'Computer

Hardware Maintenance or Support'.[63] There are other contracts for centralised (or central) processing for $549,016,302.63 (CN3377790), $144,407,121.10 (CN3377788) and $52,759,820.42 (CN3377789), all to Abacus Innovations Australia for 'computer equipment and accessories' and 'measuring and observing and testing instruments'. There are also contracts totalling over $1 billion to Telstra for terrestrial communications. There are also entries for contracts for end user computing, which is another term for the Next Generation Desktop project.

But what was the approved budget for those projects? What was the required capability? Did they deliver it? On schedule? On budget? In short, there's no public visibility of and therefore accountability for their performance. Table 4.8 suggests that ICT projects substantially underdelivered in 2017–18 and achieved only less than one-third of their planned spend, which raises the question of how they can be delivering on schedule if they aren't spending.

Where there is data for specific projects, it isn't encouraging. The only Defence ICT project for which there's any detailed public information is Defence's Estate Management IT system, which was covered in a December 2016 ANAO report on Defence's base services contract. At that point, the project was five years behind schedule and had cost $39.8 million (32%) more than initially planned.[64] Needless to say, there's no more recent performance data.

If the projects in Table 4.9 exhibit similar performance, they'll collectively be around $3 billion over budget. But no-one outside Defence will know.

It appears ICT cost nearly as much as the Army to sustain last year

If that isn't enough to make one realise that Defence ICT is a huge cost, the 2017–18 PAES stated that the estimate for ICT sustainment had increased by $431.8 million since the PBS. That's a 44.5% increase.

The revised estimate for ICT sustainment ($1,402.9 million) suggests that Defence spent nearly as much on supporting its ICT systems as it did on supporting the Army ($1,581.5 million)! While ICT has suffered from a history of underinvestment, one wonders whether Defence has now gone to the other extreme. However, that balance has changed again in the 2018–19 PBS (PBS Table 5), in which ICT is back to $1,092 million and the Army is up to $1,643 million.

Restoring life to Defence's facilities

As with ICT, facilities are part of the longstanding 'broken backbone'. The FPR found a similar situation with facilities as with information management, noting that:

- 'There is insufficient funding to maintain the current footprint and the remaining useful life of the estate has reduced from 22 to 16 years since 2001 because of under-investment
- 'Defence is now caught in an unsustainable cycle of insufficient funding to maintain the current estate footprint . . . ; and
- 'Improvements in Defence management processes, sourcing and investment prioritisation have proved insufficient to break this cycle.'

The *2016 Defence White Paper* claimed that its investment plan would fix this problem. As discussed in Chapter 2, Defence's capital facilities budget has been increasing substantially since the 2016 White Paper. Since facilities projects are generally straightforward compared to ICT projects and the risks are well understood, spending this money shouldn't be too challenging. The 2017–18 PBS had a substantial increase capital facilities (from $1,451 million in 2016–17 to $2,026 million in 2017–18), and the PAES indicates that Defence will manage to

spend even more—$2,137.1 million (see Table 4.8). The estimate for this year in the 2018–19 PBS is down from that, at $1,908.7 million, but that's still a very healthy level of spending. So that's good news at the facilities program level.

At the individual project level, reporting is somewhat better than for the ICT program, as there's some information on facilities projects in the PBS. However, it's still not possible to assess whether projects are on track for budget and schedule. As for ICT projects, there's no coverage of facilities projects in the MPR.

Overall, the point of reporting on the facilities program should be to demonstrate whether Defence is breaking out of the vicious cycle identified by the FPR. There are ways to do this. Defence has tracked the useful life remaining in its infrastructure, and analysing that data over time would give an indication of whether the increased facilities spending means that Defence's infrastructure is on the path to recovery or is simply continuing to age. However, Defence has advised us that it doesn't have current data. It's collecting better data on the state of estate and expects that projects underway since the White Paper will result in a demonstrable improvement in the age and condition of facilities at key bases. It would be useful to share this once it's developed to illustrate progress in the rejuvenation of Defence's facilities.

How can reporting be improved?

Much can be done to improve Defence's reporting to allow the government, the parliament and the public to assess whether Defence is delivering against the PBS, the White Paper and the First Principles Review. It's likely that better data would also allow Defence to better assess its achievements and remaining challenges.

ASPI recognises that there would be a significant overhead for both the ANAO and Defence to expand the MPR to cover all Defence projects regardless of their value and delivery agency. However, we believe that it would be possible for Defence (potentially in cooperation with the ANAO) to produce an annual MPR 'lite' that would include all IIP projects above a certain value (for example, $100 million), including capital equipment, ICT and facilities projects. That report would include only core data on those projects, such as approved and expended budgets, forecast cash flows, planned schedule milestones and achievements against them, and a high-level project description. Defence already develops this information, so it would be a relatively straightforward exercise to collate and publish it. Exceptions could of course be made for highly classified projects. This data could be used to elevate projects to the 'full' MPR if they warrant further scrutiny (for example, if they are at risk of exceeding their budget or are substantially behind schedule).

As a bare minimum, the MPR must include the future frigate and future submarine projects, regardless of whether they have technically achieved second pass or not. For there to be any informed understanding of and public debate on the two biggest projects in Defence's history, which lie at the core of Australia's future military capability and defence industry, the discussion must be supported by real data.

Chapter 5: Industry, innovation and exports

Key points

- Ultimately, views on defence industry policy are shaped as much by identity and ideology as by data; consequently, the industry is an intensely politicised space.
- The government's implementation of its industry policy appears to prefer local builds where possible, although there's little objective evidence to demonstrate the value for money of doing so.
- The innovation programs are getting funding out the door and show promise, but it's still early days. Increasing investment in innovation could be a low-cost way to enhance existing capabilities.
- The Defence export strategy should focus on getting Australian industry integrated into global supply chains rather than on the export of complete platforms.

Since the previous *Cost of Defence budget brief*, the government has continued to develop and implement its defence industry policy. This chapter looks at those developments and how the implementation of the key planks of the policy is going. But first we offer some observations on why Australian defence industry policy is such a contested, and indeed emotional, space.

5.1 Three perspectives on industry policy

Ultimately, many debates aren't settled by evidence. Other factors, some explicit, some implicit, some emotional, some irrational, play a more important role. Defence industry policy is one of those debates. Positions on the Australian defence industry tend to be just as much expressions about the kind of Australia the proponent envisages as they are rigorously developed statements of economic policy. Consequently, they're expressions of identity, ideology or even national prestige, so it isn't surprising that people tend to argue past each other.

Don't mess up your insurance policy

Here's the economic rationalist view. Australia's GDP is around $1.8 trillion. Once we include the value of assets ranging from homes to mines to national treasures, that number gets a lot bigger. Household wealth is $8.9 trillion. When we include the value of people's lives, freedoms, happiness and security, that number becomes inestimably big. In an economic sense, Australia's $36.4 billion defence budget is our insurance policy to protect all that—a policy costing around 2% of GDP, and a tiny fraction of the overall value of Australia and Australians.[65]

Currently, between acquisition and sustainment, around $7.2 billion of Defence's annual materiel spend of $13.9 billion occurs in Australia, while $6.7 billion goes offshore (see Table 5.1 below). In the grand scheme of things, boosting Australian defence industry and exports won't make a major difference to the shape of the Australian economy. Granted, investing in Australia will make a difference to the companies and individuals who benefit (putting aside the economists' argument that there's an opportunity cost to other companies and individuals from spending public funds inefficiently). But even achieving a 50% increase in the local component of Defence's materiel spend (that is, around $3.6 billion) won't make a significant difference to the shape of our $1.8 trillion GDP (a number 500 times larger).

Table 5.1: The location of Defence's materiel spending, 2012 to 2018–19 ($bn)

	Total spend	Local spend	Total acquisition	Local acquisition	Total sustainment	Local sustainment
2012		$4.9		$1.4		$3.5
2013–14		$5.4		$1.8		$3.6
2014–15		$6.1		$1.9		$4.1
2015–16	$12.4	$6.4 (53%)	$6.4	$2.4 (37%)	$5.7	$4.0 (71%)
2016–17	$12.1	$6.3 (52%)	$6.5	$2.4 (37%)	$5.6	$3.9 (70%)
2017–18	$12.3	$6.7 (54%)	$6.6	$2.4 (36%)	$5.7	$4.3 (75%)
2018–19	$13.9	$7.2 (52%)	$7.6	$2.7 (35%)	$6.3	$4.5 (71%)

Sources: 2012 Defence Capability Plan and advice from Defence Materiel Organisation / CASG.

Pursuing a national innovation agenda to ween the country off an economy based on the export of primary products is probably a good thing, particularly if the world looks like it won't want all of those primary products (such as coal) in the future, but increasing defence exports by any realistically achievable level won't make a substantial difference to Australia's overall export profile. Last year, we exported $373.2 billion in goods and services. Of that, the total value of exports of manufactured goods was around one-tenth ($35.6 billion); of that, 'Engineering products' (that is, industrial manufactures) were worth around $12.2 billion, or about 3.3% of total exports.[66] We look at exports in more detail below, but Australia could increase its defence exports several times over and it wouldn't alter the overall shape of our export profile.

Drawing on the global market gives Australia access to the broadest choice of capability, cost and schedule and to the world's most advanced military capabilities. When so much is at stake and so little gain to be made, why would Australia put at risk the effectiveness of its insurance policy? Is the prospect of limited potential gain worth it, if it risks not having the right military capabilities when we need them? Would you choose your insurance policy just because the company that provided it was Australian owned, even though it didn't give you the coverage you needed at a price you were willing to pay?

This argument doesn't hold that Australia shouldn't invest in Australian defence industry or should automatically favour overseas producers. It's simply saying that proposals to build in Australia should be subject to the same scrutiny as any other business case. They still need to demonstrate value for money (which isn't the same thing as saying that we should buy the cheapest option). It may be that part of the value of building in Australia is that it provides the basis for a more sustainable, sovereign capability through life, but that must be demonstrated. Buy Australian when it provides benefits.

And those benefits must outweigh the cost. If it costs more to build in Australia (and it almost always will, even if not the 30–40% premium that the RAND Corporation suggested Australia has been paying for local shipbuilding), then Defence will have to acquire less, because the government never supplements Defence's funding to cover the local build premium. And the risks associated with acquiring less capability won't be borne directly by the businesses and workers who benefit from building the equipment, but by future governments that are responsible for providing security to the nation, and by the men and women who deploy with that equipment on operations to enforce the insurance policy.

A counter-view: countries such as Australia spend their defence dollars at home

The counter-view is supported by various justifications, ranging from those with some merit (such as that there's a need for some degree of sovereignty in some capabilities) to the rather parochial (such as that Australian steel is the best steel or that buying Australian is inherently better). But ultimately it comes back to the view that Australian defence dollars should be spent in Australia creating jobs for Australians.

And when we look at the numbers on the amount of Australian money being spent overseas, it's hard not to feel that perhaps we should do better at keeping more of it here. Data from the Stockholm International Peace Research Institute (SIPRI) Arms Transfers Database on the global arms trade is quite striking (Table 5.2).

Table 5.2: Largest defence importers, 2008–2017 (SIPRI trend indicator values)

Recipient	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Recipient total
India	1,845	1,863	2,909	3,596	4,395	5,322	3,227	2,845	3,296	3,358	32,657
Saudi Arabia	391	8,24	1,083	1,222	1,033	1,615	2,741	3,352	2,986	4,111	19,357
China	1,877	1,392	1,045	1,113	1,686	1,388	1,148	1,142	991	1,117	12,899
Algeria	1,529	1,075	834	1,126	807	302	438	883	2,887	905	10,786
Australia	445	775	1,509	1,567	876	244	927	1,529	1,053	1,806	10,730
Pakistan	1,071	1,186	2,189	1,093	979	1,080	767	784	806	710	10,666
United Arab Emirates	753	561	607	1,210	1,088	2,241	746	1,249	1,286	848	10,588
South Korea	1,683	796	1,282	1,574	1,078	184	721	272	1,144	918	9,653
Egypt	333	159	686	630	281	675	380	1,452	1,711	2,355	8,662
United States	951	968	1101	995	1196	787	572	528	496	547	8,141
Others	13,268	14,636	12,445	15,880	14,870	13,118	15,113	14,487	15,604	14,430	143,850
Annual total	24,145	24,234	25,691	30,006	28,289	26,954	26,780	28,522	32,262	31,106	277,988

Source: Stockholm International Peace Research Institute (SIPRI), Arms Transfers Database, online.

While SIPRI's numbers appear to be ultimately derived from US$ values of arms transfers, they don't directly represent sales prices. Also, SIPRI data is limited to 'actual deliveries of major conventional weapons'. It doesn't include repair or support services, support equipment, small arms, dual-purpose items or technology transfers, so CASG's data in Table 5.1 is a better guide for absolute numbers. Australia is spending $6.7 billion overseas in 2017–18 for acquisitions and sustainment activities, which is a lot more than SIPRI's number.

However, SIPRI's data is a useful guide on relative rankings and trends. While Australia has generally hovered around 12th overall in defence spending globally, over the past decade we've been the world's fifth largest arms importer. During that period, our position has ranged from 26th to 3rd (three times).

Given the countries that sit with us on the list, it's a strange mix. Since we've asserted that defence industry policy is also a statement of identity, it's useful to look at the countries that make up the Top 10. The US and China are great powers that are also top exporters. That leaves India, Saudi Arabia, Algeria, Pakistan, the United Arab Emirates and Egypt—not exactly the kinds of countries that Australia generally compares itself with, whether in terms of political systems, values, cultures or economic development. The exception may be South Korea, but it's also a growing arms exporter (we would need to vault South Korea to achieve the government's goal of becoming a Top 10 exporter), and it does face an existential threat on the other side of the 38th parallel.

So how do the countries to which Australia generally compares itself do? If we take a selection of industrialised democracies and look at their ratio of defence imports to exports (Table 5.3), we can see that they usually export more than they import (in some cases, a lot more). Canada, which is probably closest to Australia in the size of its defence force, its economy and its culture, has the export–import ratio closest to 1 in our sample. Even New Zealand has a higher export to import ratio than Australia. So it's easy to understand the desire to do 'better' and the view that 'If they can do it, why can't we?'

Table 5.3: Comparison of 'like' countries' ratios of defence exports to imports, 2008–17 (SIPRI trend indicator values)

	Exports	Imports	Ratio
France	17,332	583	29.73
Germany	18,293	1,599	11.44
United States	90,074	8,141	11.06
Spain	8,052	1,906	4.22
Sweden	2,863	792	3.61
Netherlands	5,822	1,723	3.38
United Kingdom	12,044	4,554	2.64
Italy	6,754	3,013	2.24
Israel	6,993	3,576	1.96
Canada	2,434	2,756	0.88
South Korea	2,863	9,653	0.30
New Zealand	92	373	0.25
Australia	876	10,730	0.08
Singapore	242	7,488	0.03
Japan	2	4,035	0.00

Source: Stockholm International Peace Research Institute (SIPRI), Arms Transfers Database, online.

Incidentally, when thinking about how the French might intuitively regard the roles of French and Australian industry in our future submarine program, it would be useful to keep in mind France's place at the top of the list, with a ratio of exports to imports of nearly 30:1. More on that below.

The counter-counter-view: the market is best placed to determine competitive advantage

Australia has generally adhered to the basic economic principle of competitive advantage; we focus on what we're good at. And that's served us pretty well. There are lots of things we're very good at, such as efficiently mining iron ore and coal and providing services such as education, allowing us to export those goods and services very competitively. In 2016–17, we exported $373 billion in goods and services. There are other things that we aren't so good at, such as building and exporting complex manufactured goods at competitive prices, so we buy them from people who can provide the most attractive balance of price and features that we want (what we would in military terms call capability). Australia also imports a lot of things. In 2016–17, we imported $362 billion in goods and services, so overall we had positive terms of trade.[67]

Table 5.4 lists Australia's Top 10 imports. In some of those areas, we also have substantial exports, but in most of them we have a balance of trade deficit that's larger than the size of what we could term our defence materiel deficit.

Table 5.4: Australia's Top 10 biggest imports (A$ million)

Merchandise/service	Import value	Export value	Deficit
Personal travel (excluding education) services	37,582	21,651	–15,931
Passenger motor vehicles	21,782	1,590	–20,192
Refined petroleum	17,392	2,347	–15,045
Telecom equipment & parts	11,967	1,750	–10,217
Crude petroleum	8,583	5,150	–3,433
Freight transportation services	8,430	296	–8,134
Goods vehicles	8,004	–	–8,004
Computers	7,855	773	–7,082
Medicaments	7,855	2,183	–5,672
Gold	7,240	18,979	11,739

Note: No figures are available for exports of goods vehicles, but the value may be greater than zero.

Source: Department of Foreign Affairs and Trade (DFAT), Composition of trade, Australia 2016–17.

Our largest import and second largest individual deficit is personal travel (excluding education) services (that is, overseas tourism), so if a main goal of the defence industry strategy is to spend Australian dollars in Australia to

create Australian jobs, then a faster way to achieve that could simply be to encourage Australians to spend their holidays at home.

Refined and crude petroleum are between them our second largest import and second largest deficit. If the goal of defence industry strategy is to reduce the number of dollars going overseas and increase national resilience and sovereignty by reducing our reliance on key imports, then perhaps the best way to do this would be to wean Australians off petroleum-powered cars.

And speaking of cars, our largest trade deficit is passenger motor vehicles, so perhaps the best thing to do to reduce trade deficits, create high-technology manufacturing jobs and increase self-reliance would be to create a motor vehicle industry here …

The analogy of the car industry is relevant in many ways. Despite years of direct and indirect subsidies for the local car industry (which, depending on whom you read, were simultaneously among the highest and the lowest globally, but seem to have been around $2,000 per vehicle), once direct tariffs on imported cars were substantially lowered, Australian consumers didn't want to buy Australian cars after they were provided with unfettered access to the vast range of alternatives provided by the global market.[68] In fact, even when Australian cars were essentially a free good, Australian consumers didn't want to buy them once they were provided with alternative options. For example, senior public servants used to get Australian-made cars as part of their remuneration packages. However, after the government replaced this with a cash benefit, they behaved like other Australians and generally bought overseas-made cars, or kept driving old cars and pocketed the cash.

In some ways, however, the analogy of the car industry isn't necessarily apt. Most people find that the global car industry can supply an off-the-shelf vehicle that suits their needs (albeit with some modifications, ranging from bull bars to fuzzy dice). However, due to a long series of takeovers and mergers in the global defence industry, there aren't a lot of options, particularly for large, complex platforms, so there will be times when Defence needs to buy something designed specifically for its needs. But that still doesn't mean that Australian industry would necessarily be best placed to do it.

The big difference between the defence industry and the car industry is that buyers of cars in general are people spending their own money on cars they're going to use to transport themselves and their families. They spend what they can afford on what's important to them, and jobs for Australians ranks fairly low among the criteria in their personal value-for-money analyses. In contrast, in the defence industry the people who are going to be using military equipment when it matters don't get to decide how the money is spent, and they don't get to say whether they would be happy to have 20% less equipment provided it was built in Australia.

We should also be aware that one of the risks of having a defence industry is that governments feel compelled to use it, regardless of what's available on the open market. The only countries that bought the Tiger armed reconnaissance helicopter, other than Australia, were France, Germany and Spain—the countries in the consortium of European countries that designed it. Every other country that had a choice bought an alternative, and most, including our neighbours Singapore and Indonesia, went for the US-made Apache. One could argue that Australia ended up with the persistently underperforming Tiger and MRH-90 helicopters because decision-makers were swayed by the prospect of local jobs in assembling the aircraft, with the result that years later the ADF still doesn't have the capability that it originally wanted.

The point is this. In many areas of life, we're quite happy to accept the fact that we buy overseas because the rest of the world can provide what we want at a price that's more appealing, even in areas that are essential to Australia's prosperity and security. Again, this isn't to say that we shouldn't build defence equipment in Australia, but decisions must be driven by the capability, and the cost and other risk premiums involved in building locally

must be made clear. The default setting shouldn't be 'Buy Australian', but it should be 'Buy Australian when it makes sense to do so and there's a compelling business case.'

So much for philosophy. Let's get back to the real world and see how the government's defence industry policy is going.

5.2 How is implementation of the defence industry policy going?

The government continues to prefer local builds whenever possible

The *2016 Defence White Paper* was accompanied by the release of the Defence Industry Policy Statement. Previous ASPI analysis has argued that, while the policy statement announced some new things, such as declaring industry to be a fundamental input to capability and putting some additional resources into promoting innovation, the statement was largely consistent with Australia's traditional approach to industry. That is, it affirmed that the overall goal of the industry policy was to deliver Defence the capability it needed to achieve the strategy set out in the White Paper. In practice, however, the government's policy took on a more active and explicit 'Buy Australian' aspect.[69]

We argue that this practice has intensified, and that the government has taken an almost 'If it can be done here, it will be done here' approach. Unfortunately, the cost and risk of decisions to build in Australia haven't been made public in any of these cases—if they're understood at all. As ANAO's recent report on the mobilisation of the shipbuilding program found, Defence has done no work to understand the Australian build premium for the offshore patrol vessels and future frigates.[70]

Analyses of the economic benefits of Australian builds of various projects inevitably fall into two camps. Those commissioned by states emphasise the benefit to the state economy, which isn't surprising, since the rest of Australia is essentially providing the funds for the projects. Meanwhile, analyses that look at the overall effect on the nation are much more moderate and generally assess that there's little net national economic benefit.[71] Despite some claims, there's little consistent evidence of multiplier effects.[72]

That said, it appears that the government's key investment decisions aren't being made solely on the basis of Australian content. Rather, once the government has made the initial decision that a capability will be built in Australia, the selection of the successful tenderer appears to have been made as much or more on capability grounds as on the amount of Australian industry content. That at least appears to have been the case with the future submarines, the offshore patrol vessels and the combat reconnaissance vehicles. We hope that it will also be the case with the future frigates.

A lot of the public discussion has obscured this key point. State governments' interventions have exhibited all the dignity of seagulls squabbling over a bucket of hot chips. At their worst, their claims have virtually suggested a God-given right to build certain capabilities, but they generally push the claim that the state whose industry partner is proposing the highest level of Australian industry content should win, and cost, capability and risk be damned. This is policymaking of the worst kind, in which local interests drive decisions that have national implications (not to mention implications for the lives of servicemen and women).

With decisions to build in Australia being made because of jobs and votes, regardless of the cost and risk of doing so, the question arises of whether we'll eventually have continuous domestic production of a broad range of capabilities beyond ships. It looks that way already for protected vehicles; for example, production of the Bushmaster was extended to enable a transition to the production of the Hawkei without a Bendigo 'valley of death'. And once LAND 400 delivers combat reconnaissance vehicles and infantry fighting vehicles, it will be a

brave government that turns off the nearly 1,500 jobs that the government has claimed will be associated with armoured vehicle production.

New (or recycled) developments: the SICPs

Certain elements of the government's industry policy have recently been announced with the launch in April 2018 of the Defence Industry Capability Plan (DICP), which essentially states how the Defence Industry Policy Statement will be implemented.[73] Again, the main goal is defence capability, but other explicit goals, such as 'maximising Australian industry involvement', will ensure that the defence industry remains an intensely politicised subject.

The DICP also includes the government's 10 sovereign industrial capabilities priorities (SICPs). SICPs are things that are so important that they have to be done here. Defence has had similar things before in various guises (such as the priority or sovereign industry capabilities that the SICPs replace). In essence, these are the things that the government was willing to pay some premium for to produce here in order preserve a sovereign capability. Consequently, they're inherently controversial and contested, as they offer the prospect of assured local participation.

The SICPs include a lot more than the priority industry capabilities that they replace, and whole sectors are now included: for example, Collins-class maintenance and upgrade, continuous shipbuilding (yes, all of it), and deeper aircraft maintenance. In fact, it appears at face value that more of the Australian defence industry is now in the SICPs than out of them. But perhaps the SICPs are to some degree irrelevant, as the government's default position seems to be that we'll do everything conceivably possible here anyway.

The DICP includes information describing future capabilities and projects that used to be in the predecessor of the IIP (the Defence Capability Plan) but were omitted from the IIP. It adds to the information already in the IIP, although neither document contains key information on the timing of investments and their value through time. This means that information on the government's future investment program is now unfortunately spread between two publications, which even combined don't provide the same level of information as the superseded public Defence Capability Plan. This doesn't seem to be making things easier and more streamlined (not to mention consistent with the First Principles Review).

Is the industry policy increasing local spend?

The most obvious metric to determine whether the industry policy is starting to bite would be increased percentages of materiel spend locally. Table 5.1 doesn't suggest any significant changes yet. The quantum of local spending is going up, but the proportion of local to overseas spending is, if anything, going down. But that's to be expected in the light of the time frames required for Defence projects to start up and deliver.

It will probably take a while to see a significantly increased level of spend in Australia at the macro level. The JSF spend is going from around $1 billion to $2 billion a year, and the bulk of that's going overseas. While the future frigates and future submarines will be built here, a lot of the early spend will be on components sourced largely from the foreign primes' existing overseas supply chains, such as motors, generators and combat system components. But by the early 2020s, with construction on the shipbuilding megaprojects commencing and big US foreign military sales projects such as Seahawk Romeo maritime combat helicopters and P-8 maritime patrol aircraft completed, we're likely to see the percentage of in-country acquisition spend increasing.

By all accounts, the industry primes have got the government's message that if they want to be competitive they need to produce robust Australian industry capability plans.[74] Public versions of the plans are available on the Defence website.[75] The campaign to win the future frigate project has featured a stream of announcements

about the primes' partnerships with local businesses, opportunities for participation in the primes' other enterprises (such as the construction of cruise ship blocks), and the establishment of R&D start-ups with local academia. That all seems pretty good, but victory shouldn't go to the one making the most announcements.

Is the local defence industry changing?

The DICP does suggest that the government doesn't just want to make the landscape bigger, but also wants to change it. It's well known that Australia has a unique defence industrial landscape involving a small number of large overseas-owned primes and a large number of local small enterprises. Australia's defence SMEs tend to be more in the S category than the M. However, the DICP states that the government wants to see the creation of 'more medium-sized Australian defence business'.

The DICP also updates the definition of Australian defence industry 'to emphasise that having a domestic capability and investment is important to be considered part of our defence industry … we expect them to invest in our country and our industrial capability.' Clearly, the government wants to see foreign primes put more of their own skin in the game in return for the money they receive from us. This is probably aimed at increased equity and R&D investment here. If that eventuates and is sustained, it has the potential to change the landscape.

Over time, *Australian Defence Magazine*'s list of the Top 40 defence suppliers could indicate whether there's a shift in balance between the big primes and small Australian-owned companies, resulting in the emergence of a local 'middle class'.

Again, it's early days, so it's not surprising that the magazine's list this year looks a lot like previous years' lists (Table 5.5).

Table 5.5: *Australian Defence Magazine*'s Top 40 defence contractors, 2017

Rank	Previous rank	Company	Turnover ($m)	Defence-related employees	Main focus
1	2	Raytheon Australia	950.0	1,300	Military equipment
2	9	Lendlease	923.0	401	Facilities construction
3	1	BAE Systems Australia	919.9	3,500	Military equipment
4	3	Thales Australia Limited	907.9	2,511	Military equipment
5	4	Boeing Defence Australia	800.0	n.d.	Military equipment
6	6	Airbus Australia Pacific	645.3	1,164	Military equipment
7	7	Broadspectrum Limited (BRS)	536.0	1,963	Sustainment services
8	5	ASC Pty Ltd	499.0	2,400	Military equipment
9	10	Spotless Group Limited	360.0	n.d.	Base services
10	11	Babcock Australasia	303.0	321	Sustainment services
11	13	Leidos Australia	295.0	989	ICT
12	8	Lockheed Martin Australia	293.8	800	Military equipment
13	14	Northrop Grumman Australia Pty Ltd	250.1	n.d.	Military equipment
14	–	Downer EDI Limited	200.0	200	Facilities construction
15	18	Saab Australia Pty Ltd	153.0	354	Electronic systems
16	27	DXC Technology Pty Ltd	150.0	400	ICT
17	20	CEA Technologies Pty Ltd	147.0	374	Electronic systems
18	12	Serco Australia Pty Ltd	135.0	504	Sustainment
19	44	L3 Technologies	134.0	n.d.	Electronic systems
20	22	Australian Defence Apparel Pty Ltd	121.0	161	Clothing
21	25	Accenture	109.0	n.d.	ICT
22	21	UGL Defence	107.0	74	Sustainment
23	23	ESS Support Services Worldwide	105.0	n.d.	Base services
24	–	ManpowerGroup	92.5	330	Recruitment/HR
25	32	QinetiQ Pty Ltd (QinetiQ Australia)	88.0	350	Project management
26	19	Safran	86.0	n.d.	Electronic systems
27	26	Nova Systems	83.6	330	Engineering
28	24	Cubic Defence Australia and New Zealand	79.6	272	Simulation/training

Rank	Previous rank	Company	Turnover ($m)	Defence-related employees	Main focus
29	16	Austal	72.8	450	Shipbuilding
30	31	AECOM Australia Pty Ltd	69.7	n.d.	Facilities construction management
31	30	Aurecon Australia Pty Ltd	68.8	250	Facilities construction management
32	15	Aspen Medical	67.1	n.d.	Health services
33	36	Chemring Australia	64.0	85	Pyrotechnics
34	–	NIOA	63.0	20	Military equipment
35	35	Marand	60.9	124	JSF components
36	28	CAE Australia Pty Ltd	58.0	175	Simulation/training
37	42	Hawker Pacific Pty Ltd	52.0	144	Aircraft
38	39	KBR (Kellogg Brown & Root Pty Ltd)	51.0	290	Project management
39	33	Quickstep Technologies Pty Ltd	49.3	n.d.	JSF components
40	–	Laing O'Rourke	47.4	107	Facilities construction
		Total	10,197.6	20,343	

Source: Australian Defence Magazine, December 2017 – January 2018. n.d.=no data provided.

There's been some jostling for position at the very top, but five of the top six are still subsidiaries of overseas primes. The exception is Lendlease, which mainly does infrastructure construction. The fact that it has gone from 9th to 2nd indicates the scale of defence facilities work going on (see our discussion in Chapter 4). The other thing that makes Lendlease an exception is that it (and base services provider Spotless at 9th) are Australian-owned and listed on the Australian Stock Exchange.

Aside from ASC, which is government owned, and the ICT company DXC, we get down to CEA Technologies (which manufactures highly capable and successfully exported phased-array radars) at 17th before we find an Australian-owned military equipment company. Even the Western Australian shipbuilder Austal, which along with CEA Technologies is probably Australia's best known homegrown success story, is only 29th.

The big question is whether the megaprojects that dominate the IIP will cement the dominance of foreign-owned primes, or allow smaller, local players to emerge and grow, albeit as subcontractors to the primes. The answer may depend on how the primes open up opportunities for local SMEs in their global supply chains.

Local industry capability plans

The fact that Lendlease and Spotless are at 2nd and 9th among *Australian Defence Magazine*'s Top 40 indicates that buying Australian doesn't necessarily mean buying from SMEs. Some of the biggest Defence contractors on the list are managing or conducting major construction projects. The dominance of a few big companies has led to complaints from local SMEs that they're excluded from construction projects in their own backyards.

In response, the government has announced a pilot for a 'local industry capability plan' requirement under which prime tenderers for construction projects would have to show in their tender response how they have engaged with geographically local industry in their proposed solution and how they propose to involve local industry in the delivery. Formal policy guidelines are still to come.

5.3 Innovation

The broader innovation challenge

One of the achievements of the government's innovation strategy so far has been a surge in the publication of studies on Australian innovation and R&D.[76] ASPI will do its part to boost production this year and will publish an update to its 2015 study of defence sector science and innovation.[77]

Common themes in these (and previous) studies are as follows:

- Australia overall doesn't spend as much on innovation as our OECD peers, and Australian industry in particular spends less.
- Cooperation across the government, industry and academic sectors is essential.
- Generally, there's more value to be had through sharing knowledge and information than protecting it (a sentiment that Defence might do well to take on board more generally).
- Innovation needs to be focused on where it can make a difference.
- Australia generally has a poor success rate in converting good ideas into products.

The current state of defence industry R&D investment seems consistent with the broader Australian picture, particularly the lack of investment by industry. The DICP reports that almost 35% of defence industry companies that responded to a survey indicated that they didn't invest in R&D, and nearly 75% reinvested less than 4% of their revenues in R&D. The data provided doesn't distinguish between locally owned companies and foreign primes, so it isn't possible to say where the primes sit.

The innovation programs

The *2016 Defence White Paper* consolidated Defence's innovation efforts into two programs. An examination of them suggests they have been designed with these lessons in mind.

The first element is the new Defence Innovation Hub, which the White Paper funded at $640 million over the decade to 2025–26 to undertake collaborative innovation activities from initial concept, through prototyping and test, to introduction into service. It isn't clear how much of that funding is for grants, but it seems most of it is. A lot of it was already programmed in the defence budget for that purpose before the White Paper, but the Innovation Hub brought it together into a single, rebadged and reconceptualised program.

The second is the Next Generation Technologies Fund, which the White Paper funded at $730 million over the decade to invest in 'strategic technologies that have the potential to deliver game-changing capabilities'. The fund is administered by Defence Science and Technology Group. Also within the scope of the fund are 'grand challenges', the first one being countering improvised threats, and Defence cooperative research centres (CRSs), the first being for trusted autonomous systems.

How are they going?

So how are Defence's innovation programs going? First of all, we should acknowledge that they're not a national R&D program. Most studies agree that Australia is a fairly low spender among OECD nations on R&D in relative terms, and at least another 1% of GDP of investment would be needed to get us up among the leaders. That's around $18 billion per year. So the Innovation Hub and the Next Generation Technologies Fund aren't going to make Australia the smart country all by themselves; however, if the goal is to ween Australia off its over-reliance on primary industries, every bit helps.

To help us in our assessment, the government has helpfully published a progress report on the defence industry and innovation programs.[78] It's not clear why the government is comfortable providing information on approvals for $500,000 innovation grants but not for $500 million capability projects. But the report does show the government and Defence are capable of being transparent and releasing actual data.

To date, the Innovation Hub has awarded $53.5 million in grants, and the report lists the contracts, ranging from around $100,000 to around $8 million, with a focus on intelligence, surveillance reconnaissance and electronic

warfare as well as space and cyber.[79] The report also lists $36 million in Next Generation Technologies Fund activities, including $19 million for the first grand challenge (countering improvised threats). Encouragingly, the report suggests that industry and university partners will providing funding matching 85% of Defence's contribution. The DICP stated there will be a $50 million investment in the first Cooperative Research Centre, which will research trusted autonomous systems, but it is not quite clear from the report how much funding has been awarded so far.

So the programs may not have been able to get as funding out the door as hoped for by this stage. But hopefully the teething stage is behind them and with processes now bedded down further funding will flow more freely.

How do we assess success?

The guidelines for both innovation programs state that Defence's Investment Committee will set the priorities for the two funds. Since the committee is chaired by the Vice Chief of the Defence Force and the three service chiefs are members, this should ensure that the needs of the war-fighter are prioritised, and the grants awarded so far seem consistent with the priorities that the Investment Committee has set.[80]

Pragmatic Defence leaders are fond of saying that they aren't interested in science experiments, but many of the most important military technologies have been the (sometimes unintended) consequences of science experiments. Therefore, the division between the Innovation Hub funding and the Next Generation Technologies Fund seems to be an appropriate balance between the need to find solutions to current problems and the need to explore emergent technologies down the track.

One of the common themes in studies of Australian R&D is that there's generally a poor rate of transformation of good ideas into actual products, so the Innovation Hub's goal of taking concepts all the way through to introduction to service is good, but there don't seem to be any standard benchmarks on what's a good conversion rate. This could make it hard to assess success in future.

A recent study that attempted to assess the economic value of Defence Science and Technology Group put a dollar value on contributions such as providing evidence to avoid wasted cost. In one example, the group's analysis showed that Defence needed to conduct only 10 centre barrel replacements rather than the 49 planned to extend the life of the Hornet fleet, for a saving of $390 million. Other examples include Defence Science and Technology Group improving existing capabilities so that further acquisitions are unnecessary, for example by improving the performance of existing Jindalee over-the-horizon radar so that additional sites weren't needed, saving $1,500 million).[81]

One can argue about the validity of this sort of methodology (would Defence have built additional radar sites if the capability enhancements hadn't happened?), but the examples do suggest that simple sales aren't the only metric of success for science and technology programs.

The Industry and Innovation update report provides good news stories, and anecdotally it appears the funding is making difference to local SMEs. But it will be a little while until we can assess how the innovation funds are delivering. One metric will certainly be the conversion rate from concept to capability, but we should be wary of assessing success merely in terms of sales and exports.

Why not do more?

The Naval Shipbuilding Plan ties up large amounts of investment funding and doesn't improve capability for a decade, even though we're facing a deteriorating strategic situation right now. In comparison to shipbuilding, Defence's innovation programs don't cost much (about 0.5% of the defence budget). If the government is serious about doing something to enhance our existing capabilities now as well as furthering its innovation agenda, why

not increase the funding in the innovation programs? Doubling or even tripling it would make little difference to the overall budget, but could potentially have large pay-offs in the near term. Of course, Defence would need to overcome its anti-intellectual scepticism about scientists and their science experiments.

5.4 Defence exports

The Defence Export Strategy

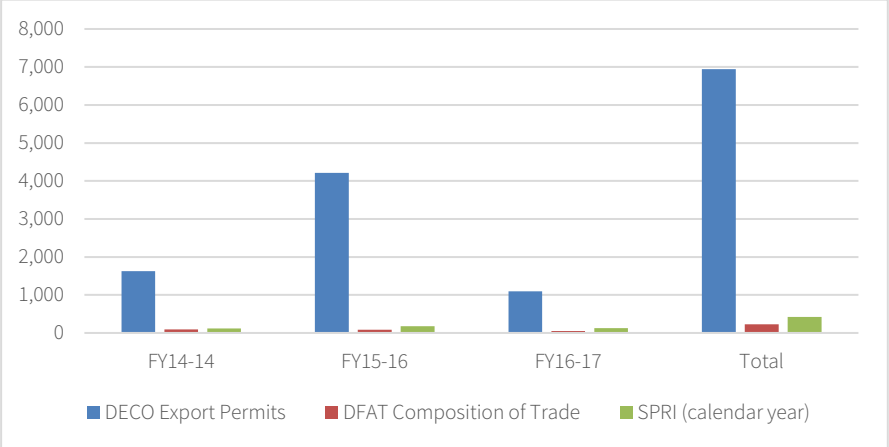
Since ASPI's last budget brief, the government has released its Defence Export Strategy. As with its overall defence industry policy, the stated goal at least is better capability for the ADF. It seeks to 'Achieve greater export success to build a strong, more sustainable and more globally competitive Australian defence industry to support Australia's Defence capability needs.' But there's also a headline goal of making Australia a Top 10 defence exporter, which sits uneasily with the first goal.

Like the defence industry strategy, the export strategy is a mix of moderate investment (around $13–14 million per year) and new or reshaped institutions (the Defence Export Controls Office and Defence Export Advocate) to serve as focal points for Australian industry's engagement with Defence and Australia's engagement with the world.[82] The first Export Advocate (former Defence Minister David Johnston) was announced in April 2018, and the Defence Export Controls Office was launched in the same month.

Where are we starting from?

Measuring export success will be difficult, particularly if Defence remains reticent about disclosing information. Part of the problem is that it's very hard to know what baseline we're starting from, and it's likely that Defence itself doesn't know. It's difficult to find good data on Australian defence exports. What data there is is extremely inconsistent, suggesting that people aren't comparing apples with apples, and perhaps not even apples with orangutans. It's summarised in Figure 5.1.

Figure 5.1: Comparison of different methodologies for calculating Australian defence exports (A$m)



Source: Department of Defence, DEC (defence export controls) statistics, online; DFAT, Composition of trade; SIPRI, Arms Transfers Database, online (converted to A$ on the debatable assumption that 1 SIPRI trend indicator value = US$1.00).

The January 2018 Defence Export Strategy stated that 'in 2016, Defence issued export permits for military goods valued at approximately $1.5 billion' and further stated that indicators 'suggest that Australia's defence industry is currently achieving in the order of $1.5 billion to $2.5 billion in defence exports a year.'

However, the dollar value of export applications to Defence's Export Controls Office isn't a good indicator. First, the issuing of a permit doesn't necessarily result in an export. Second, the office doesn't track actual exports.

Third, a lot of export control applications are made because the items potentially have dual use (that is, they're civilian items that could potentially be used in military programs or the production of weapons of mass destruction). The fact that they're granted export permits means that they aren't intended for military purposes, so it's hard to call them defence exports. Finally, the value of permits issued is for total value, not the annual value spread over the life of any export deal.

At the other end of the spectrum is trade data from the Department of Foreign Affairs and Trade (DFAT), which states that Australia exported $47 million worth of 'Armoured fighting vehicles, arms of war etc & parts' in 2016–17.

In between is SIPRI, although its number is much closer to DFAT's than the number in the Defence Export Strategy (Table 5.6). As discussed above, SIPRI's numbers aren't dollar values *per se* but 'trend indicator values', although they're ultimately derived from a dollar value.[83] SIPRI tracks only conventional arms, not services. Over the past decade, Australia has ranged between 18th and 32nd in global arms exports, generally hovering in the low 20s. We improved our performance between 2016 and 2017 from 20th to 18th, even though the value of our exports decreased by 28%.

Table 5.6: Arms exports from Australia, 2008 to 2017 (SIPRI trend indicator values)

Recipient	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Recipient total
India	17	17	17	17							66
Indonesia						18	19	37	22	34	131
Jamaica								1	1		2
Japan							1				1
Netherlands	4	7							1	4	15
New Zealand		56	44				8	7			115
Oman									40		40
Papua New Guinea							3				3
Philippines								6	10		16
Singapore			30	30	15	6					81
Sri Lanka							5				5
Tonga								5			5
Trinidad and Tobago			24								24
United Kingdom	5										5
United States				96	30	30	60	30	60	60	366
Annual total	**25**	**80**	**115**	**143**	**45**	**54**	**97**	**87**	**134**	**97**	**876**

Source: Stockholm International Peace Research Institute (SIPRI), Arms Transfers Database, online.

The good news is that Defence advises that it's working with industry to develop a more robust methodology and ultimately more reliable defence export data.

The real export opportunity: global supply chains

SIPRI and DFAT data doesn't seem to include a key area of Australian defence exports: components fed into global supply chains. However, this is potentially the area with the greatest opportunities for Australian industry. In short, rather than manufacturing small numbers of complete systems either for the ADF or for export, it can be more attractive for Australian industry to make components for global production runs of hundreds or thousands, particularly if that contribution continues past the manufacturing phase into through-life sustainment.

Much has been made of how membership of the JSF consortium has opened doors for Australian industry to supply components to the 3,100-aircraft program. And if achievement to date hasn't quite matched early hopes, the contributions have been real: two of the Top 40 listed in Table 5.5, Marand and Quickstep Technologies,

supply JSF components. Quickstep also produces wing flaps for Lockheed Martin's C-130J production line. There have been other cases in which membership of a multinational consortium has led to export opportunities for subcomponents, such as the Evolved Sea Sparrow Missile, for which industry share is meant to be proportional to the number of missiles each member is acquiring.

Defence does have a Global Supply Chain Program managed by the Centre for Defence Industry Capability. Seven primes are currently participating in the program—but Naval Group, the future submarine designer/builder, isn't one of them. The centre advertises that 'since 2007, the participating global supply chain contractors have awarded close to $1 billion of work to predominantly small-to-medium sized enterprises in Australia.'[84] But that's relatively small beer compared to the opportunities provided by Defence's megaprojects—if $89 billion in shipbuilding doesn't provide the leverage to access global supply chains, nothing will.

Where Australia is the largest member of an international 'fleet', our expectations for contributions to global supply chains can legitimately be even greater. With 12 future submarines, Australia will be the largest operator of the French Naval Group's submarines. Similarly, depending on who wins the future frigate competition, Australia's fleet may be larger than that of the parent navy in the designer's home country. With 211 Boxer vehicles Australia, won't be the largest operator, but will be a major one.

Prospects look either very good or very bad here, depending on how active Australian Government ministers and Defence officials are in using Australian buying power to get outcomes. As an example, we saw in Table 5.3 that French defence exports exceed imports by a factor of nearly 30 to 1. This probably shows two things: that the French Government is both ruthless and successful in promoting defence sales overseas and protecting its local supply chains, and that there's a very large potential for Australian exports if they can access French defence supply chains because they're so big.

No doubt some will protest that the SIPRI data is incomplete and therefore misleading. The point, however, is that debates on Australian industry content in the future submarine program—or other local builds, such as LAND 400's armoured vehicles—often seem to be based on the argument that it isn't economic for Australia to build just 12 main motors, generators, periscopes and so on, so we should of course buy them offshore, and that the real opportunity for local industry is for minor components such as filters, valves and switches.

A more ambitious perspective is broader than that and takes the JSF program as a guide. It looks like this. The >$50 billion future submarine program is the biggest contract in the French government-owned Naval Group's history. Naval Group designs and builds submarines not just for our Navy, but also for the French and other navies around the world. As the likely largest operator and foreign funder of Naval Group submarines, the Australian Government is in a unique position of leverage. It can insist that Naval Group, and perhaps other French government-owned companies, open up opportunities in their global supply chains for Australian firms, so that they win business in all of Naval Group's future submarine and surface ship sales, not just the 12 that it's building for Australia. Over time, it might even be economic for Australian firms to make major components.

The goal in submarine development and production would be an integrated French and Australian industrial base, rather than two separate systems, in which Australia's part of the base is considerably smaller and still dependent on the French for most major components.

It will be vital for the Australian Government and Defence to ensure that, as part of demonstrating that they have skin in the game, the global primes see Australian companies as legitimate suppliers into their home operations in the US, France and Germany as much as they see Australia as a market. Those opportunities are likely to far exceed exports of Australian-made platforms such as Bushmaster in their value and impact on the Australian defence industry.

What does export strategy success look like?

A number of commentators, including ASPI, have responded to the export strategy, in particular the headline goal of making Australia a Top 10 defence exporter.[85] That goal seems a stretch: according to SIPRI data, we would have to leapfrog a burgeoning industrial behemoth such as South Korea to get there. But there's room to do better, even if we don't get close to the Top 10. And if the goal is to make Australian defence industry more robust and better able meet the ADF's needs by providing greater economies of scale and by smoothing peaks and troughs between domestic orders, it's essentially meaningless whether that occurs with Australia being 10th or 100th.

There are of course ethical issues, and we're up against a lot of unscrupulous players. Even nations that attempt to set a high ethical bar haven't managed to avoid the stain that comes from dealing with countries where dubious payments are part of the price of doing business. The fact that Defence repeatedly (at Senate Estimates hearings, for example) refuses to answer questions about what Australian companies are exporting to whom on the grounds of commercial confidentiality doesn't engender trust among the Australian public and provides no assurance that the kinds of issues that have bedevilled other Western nations' arms exports won't occur here. Better disclosure will be necessary.[86]

What does failure look like?

If we get to the point that the government is making capability choices because of the potential for exports rather than based on the ability of the equipment to meet the ADF's requirements, the policy will have failed. Similarly, if production for the ADF is delayed in order to satisfy export orders, the policy will have failed. If Defence has to buy more than it needs to keep production lines going to meet possible future export orders, the policy will have failed.

5.5 Progress of the Naval Shipbuilding Plan

Last year's *Cost of Defence budget brief* discussed the workforce in the shipbuilding industry in great detail. This year's brief doesn't revisit that topic. However, later this year ASPI will publish a report on progress to date in the implementation of the Naval Shipbuilding Plan and remaining risks. Instead, in Chapter 6 of this brief we examine the affordability of the shipbuilding enterprise, particularly the cash flow pressure that it will put on Defence's capital budget.

Chapter 6: How affordable is the Naval Shipbuilding Plan?

Key points

- ASPI estimates that the annual cash flow required for the three streams of the Naval Shipbuilding Plan (NSP) when they're mature will be around $3.5–4 billion per year.
- Because the NSP locks in a production 'drumbeat' of one frigate and one submarine every two years, Defence will have little ability to adjust cash flow or deliver capability earlier.
- As the Navy doubles in tonnage, sustainment budgets will also rise significantly.
- The combined effect of these pressures is likely to affect Defence's ability to acquire other capabilities in the future force structure or to respond to emerging threats.

The Naval Shipbuilding Plan (NSP) is at the centre of the Australian Government's intent to increase defence capability and develop the Australian defence industry. It aims to implement three continuous shipbuilding programs: submarines, surface combatants and minor war vessels. The key word is 'continuous'; as one project in each stream winds down, a new one ramps up to ensure continuous delivery and avoid the infamous 'valley of death' associated with the end of the Air Warfare Destroyer Project.[87]

Putting aside securing votes in a particular state, one of the government's main selling points for continuous naval shipbuilding is that it would avoid the stop–start nature of Australian naval shipbuilding and bring down the local build premiums that the RAND Corporation estimated were as high as 30–40% compared to other shipbuilding nations.[88]

The NSP is meant to be a key part of a larger, achievable capability plan. The Minister for Defence stated that the 2016 White Paper was the 'first Defence White Paper to be fully costed' and that it 'matched strategy and capability with appropriate resources.'[89] This, according to the IIP, was supported by 'a comprehensive program of external cost assurance'.[90] The entire program is to be paid for by the government's commitment to increase the defence budget to 2% of GDP by 2020–21.

As discussed in Chapter 2, not only is moving to 2% of GDP a substantial increase in real terms from the longer term average of 1.75% of GDP, but the increase is meant to flow disproportionately to the capital budget. So with more money, a cheaper way to deliver ships and a plan that takes into account everything Defence needs, one might think that the plan to build a much larger, more capable Navy is affordable. There are a number reasons, however, that might make one exercise some caution before reaching that conclusion.

6.1 How much cash flow will be required to pay for shipbuilding?

If you're trying to understand whether something will be affordable, it's helpful to have some understanding of what it will cost. In the case of the NSP, that isn't easy. The first thing to do when trying to understand the cost of shipbuilding is to ignore all numbers mentioned by politicians and the media, particularly the frequently stated $89 billion figure.

The first, and less important, reason for this is that those numbers are derived from the public IIP and are 'round', to say the very least: >$50 billion for the future submarines, >$35 billion for the future frigates, and $3–4 billion for the offshore patrol vessels.[91] How much more than $50 billion does Defence actually think the cost of the

submarines will be? Incidentally, in the 2009 public Defence Capability Plan, the budget for 12 future submarines was given as >$1,500 million before increasing to >$10 billion in the 2012 public Defence Capability Plan. Either the price had gone up 3,000% or the public numbers are essentially meaningless.

The second, and much more important, reason is that, if we're seeking to understand affordability, total project cost is irrelevant in a world of continuous shipbuilding. As one project winds down another ramps up to take its place and keep shipbuilders employed; there's no beginning and end. The $89 billion is open ended. So the only thing that matters is annual cash flow.

Cash is king

The first rule of defence budget management is that cash is king. Defence isn't a business, so it can't use the tools that businesses use to manage cash flow pressures. If Defence is short of cash in one year, it can't borrow from the bank. It can't sell shares to raise cash. It can sell some assets, but that's slow (decontaminating land is laborious), doesn't raise much (used military equipment fetches only a fraction of the new version's price), or the money doesn't necessarily flow back to Defence anyway. If Defence has too much cash one year, it can't bank it for later; it basically loses the cash. So managing Defence finances is about managing cash flow. Defence planners try to use everything the government appropriates each year—and not a dollar more or less.

The second rule is that the budget is full. It's always full. In fact, it's more than full, because Defence over-programs; that is, it puts more things in the plan than it has money for. This is done on the very reasonable assumption that some areas won't achieve their budget—some acquisition projects will always be late; that's the nature of the beast, whether in the public or the private sector.[92] But the bottom line is that there aren't huge pots of cash sitting around in the defence budget with no purpose assigned to them. If any cash does sit around, the departments of Treasury and Finance soon find it and apply it to other government priorities, such as paying down the deficit, providing services such as health and education, paying social security benefits, or funding tax cuts. So, if something needs more cash than Defence had planned for, the department needs to take it from something else that it was planning to do.

Defence has a number of tools to manage cash flow, but not all of them are very agile. It's hard to adjust large cash flows quickly by reducing the number of people in Defence, as that takes time, and reducing numbers of uniformed people in particular brings bad headlines. Reducing sustainment budgets is also difficult, as big long-term support contracts are locked in; plus, there's no point having the ADF if you're not using it.

So, when a new pressure emerges that hasn't been anticipated, or Treasury and the Department of Finance are looking for funds to balance other pressures across the government, the money very often comes from the capital program; that is, the projects to acquire new things. Defence turns in particular to its 'unapproved' capital program (planned projects not yet in acquisition), as the approved program is generally locked into delivery contracts with industry that are difficult to adjust. Also, the unapproved program floats under the radar, so delays there are almost invisible to parliament, industry and the public and there are no bad headlines.

The levers that Defence can use to free up cash flow in its capital program include:

- cancelling projects (which is very seldom done unless a project has gone completely off the rails, such as Super Seasprite helicopters)
- delaying projects to free up early cash, which simply pushes the cash flow requirement to later years, but is nonetheless a standard tool that Defence uses frequently
- stretching out a project so Defence is spending less cash each year, although this generally results in higher overall cost over the longer term and later delivery of capability

- reducing the scope of projects by acquiring fewer or less capable things (also known as 'salami slicing')
- retiring capabilities without replacing them (such as the aircraft carrier back in the 1980s), which is very rarely done.[93]

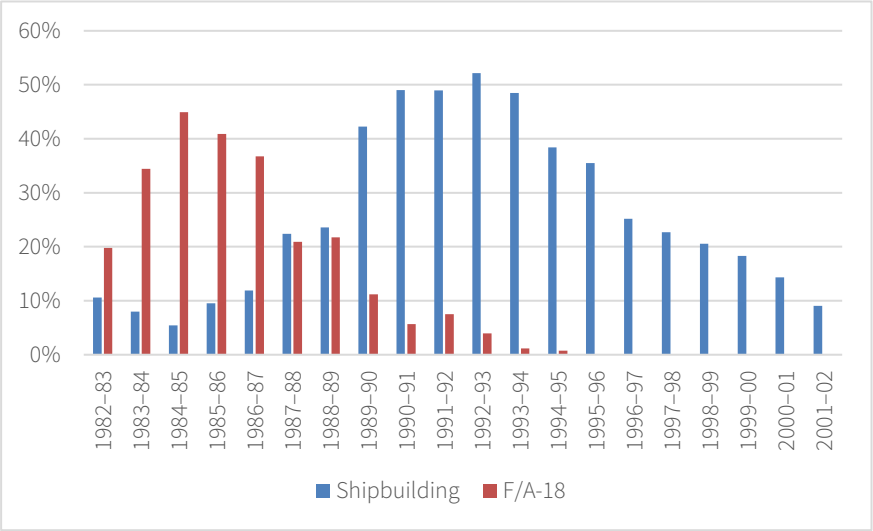
As we show below, the challenge in a world of continuous naval shipbuilding is that none of these tools will be available. You certainly can't cancel the future submarine project and claim that you're building submarines. The NSP locks production into a constant drumbeat, which is the rate at which vessels come off the production line. If we delay, stretch or reduce production, we alter the drumbeat and affect the viability of the plan (more on this below). So Defence will be locked into a particular level of cash flow for its largest areas of capital spending, limiting its ability to deal with new threats.

How much has Defence been spending on shipbuilding?

The fundamental question is 'How much of Defence's capital cash flow is locked into the three continuous build programs for submarines, surface combatants and minor war vessels?'

If we look at this to get some historical perspective, there have been times when Defence has spent a very large proportion of its capital budget on domestic shipbuilding. During the Collins-class submarine and Anzac-class frigate projects (with some overlap with the local build of the last two Adelaide-class frigates), shipbuilding reached a peak of around 50% of the capital budget. But the key thing is that that was a peak; as these weren't continuous builds, the percentage rose and then fell, as is the case with virtually all Defence projects. As we can see from Figure 6.1, that rise and fall creates room for other large projects, in this case the acquisition of the original F/A-18 Hornets—a project that itself ramped up to 45% of the capital budget (much less than the JSF's share of the capital budget, incidentally).

Figure 6.1: Domestic shipbuilding as a percentage of capital equipment budget, 1982–83 to 2001–02



Source: DAR.

More recently, domestic shipbuilding's share of the capital budget has been much lower. Over the past five years, shipbuilding has averaged only around 13% of the capital equipment program annually.[94] That's partly because only one big shipbuilding project, the AWD, has been running and partly because there are now a lot more projects in the capital program than back when Anzac and Collins were being built.

According to the 2017–18 PBS, in 2017–18 the cash flow for the main strands of the domestic shipbuilding program was almost $1 billion (Table 6.1). That will top $1 billion in 2018–19. The AWD project is ramping down,

while early spending for the future submarines and frigates is ramping up. So that's around $1 billion out of a capital equipment budget of $7.3 billion last year and $8.4 billion this year, or around 13%.

Table 6.1: Naval shipbuilding cash flow ($m, nominal)

	08–09 MPR	09–10 MPR	10–11 MPR	11–12 MPR	12–13 MPR	13–14 MPR	14–15 DAR	15–16 DAR	16–17 DAR	17–18 PAES	18–19 PBS
Surface combatants											
SEA 4000: AWD	734	918	945	801	725	659	734	683	575	520	376
SEA 5000: FF							–	–	–	143	52
Submarines											
SEA 1000: FSM				–	–	–	64	70	102	311	418
Minor war vessels											
SEA 1180: OPV							–	–	–	–	274
Total	734	918	945	801	725	659	798	753	677	974	1,120

Note: A dash indicates that there was probably some expenditure, but because it's below the threshold for the Top 30 projects in the PBS/PAES or for the MPR, there's no public data. The PBS/PAES threshold is around $40–50 million.

Source: ANAO Major projects reports (MPR); DAR; PAES.

From Figure 3.1 in Chapter 2, by 2020–21 the capital equipment budget grows to $11.0 billion. That's certainly a very healthy rate of growth. But the cash required to cover Defence's capability plan and in particular the NSP will also grow. The question is, by how much?

Surface combatant cash flow

One way to answer that question would be to develop detailed cost estimates for the three strands of the NSP. However, that would require teams of estimators as well as access to data that isn't publicly available. But since we're only trying to get a sense of annual cash flow rather than total project costs, we can use another method; we can take the annual spend of previous shipbuilding projects and adjust for cost escalation over time and the size of the project (that is, how many vessels will be in build at one time).[95]

For major surface combatants, the AWD is a good place to start. All three contenders for the future frigate project are a similar size to the AWD builder (Navantia's future frigate design is the same platform as the AWD) and, while there will be some technological developments between the AWD and the final future frigate design, it isn't a generational jump in capability. A number of different variables are relevant, so we'll get a different answer depending on:

- whether we use the AWD project's peak spend ($945 million in 2010–11) or an average over a period (say, $773 million per year between 2008–09 and 2015–16)
- the rate of escalation (which will be more than inflation, but how much more?)
- adjustments for the size of the project (the AWD had a maximum of only three ships in build at any one time, and fewer for much of the time, whereas a mature continuous build program supporting a fleet of 12 surface combatants will always have at least three in build once it's up and running).

Our estimates for the annual cash flow required for the surface combatant strand of the NSP range between $1.15 and $2.25 billion, but taking roughly the mid-point for each variable gives a number of at least $1.5 billion.

Submarine cash flow

Submarines are harder. The design for the Collins class was essentially complete in the early 1990s, and key technologies had matured before then. The future submarine design will mature 30 years later, by the early to mid-2020s, so the future submarine will a generational leap in technology and capability. Also, Collins is around

3,300 tonnes, but the future submarine will be 40–50% bigger. As we discuss in more detail in Chapter 7, which looks at how military equipment is costed, jumps in technology and in size drive significant increases in cost.

The RAND Corporation estimated the cost escalation for attack submarines between 1950 and 2000 at 9.8% per year.[96] If we apply that rate of escalation to the Collins project's cash flow (which peaked at $704 million in 1992–93, but we'll use an average of $445 million from 1987–88 to 1995–95), we get into the territory of Augustine's Law Number XVI within the life of the future submarine project; that is, Defence will spend more each year on that project alone than there is in the entire defence budget.[97] Some other sources of data suggest lower rates of escalation (but still substantially higher than inflation). If we take a lower rate of escalation as well as average rather than peak cash flow and adjust for factors such as Collins being built very quickly (a drumbeat of well under 18 months, as opposed to two years for the future submarine), we still have a range of scenarios in which the mature future submarine project will require over $2 billion per year in 2020–21 dollars.

Shipbuilding could consume around one-third of Defence's equipment budget in perpetuity

It's hard to derive a figure for the OPVs, since they're such a leap in size over the Armidale-class patrol boats. A quick and dirty method is to take the total approved budget of $3,683 million provided in the 2018–19 PBS and divide it by the project length of around 12 years, which gives a sum of around $300 million per year.

So, totalling the three shipbuilding stream gets us to an annual cash flow approaching $4 billion per year in 2020–21 dollars. That's around a third of the capital equipment budget, which the PBS projects at $11 billion in 2020–21. In short, we're going from a situation where Defence is spending around 13% of its capital equipment budget on domestic shipbuilding to one where it's spending at least 30%, even taking into account the increase in the capital budget that 2% of GDP provides. There will no doubt be fluctuations from year to year, but essentially this spend is forever—Minister Pyne has described this as a 100-year enterprise. The next question is, how is that spend manageable?

6.2 'Fully costed' is a myth

One might assume that Defence has built this increased cash flow requirement into the financial plans that underpin the 2016 White Paper, the IIP and the NSP. After all, the White Paper says that they're fully costed. Yet we would do well to apply some scepticism to that statement. All Defence White Papers make this claim in some form, yet, after each of these rigorously costed exercises, Defence has consistently been forced to delay or reduce projects to meet funding pressures. In fact, 'fully costed' is a myth—it's impossible to fully cost what Defence does 10 or 20 years into the future. What 'fully costed' actually means is that:

- Defence has done its best to identify all the capabilities that it needs to meet the government's strategic direction
- Defence has tried to cost those capabilities
- the government has stated a commitment to provide Defence with sufficient funds to acquire and operate those capabilities.

Each one of those statements is problematic. Let's consider why that's the case.

We don't know what we'll need

It's impossible to identify all the capabilities needed to meet the government's strategic direction. Defence can try to predict what capabilities it will need in the future, but the world's an unpredictable place. Because threats emerge or current assets fail to provide the capability required, the investment program may need to change.

Recent history shows that some key acquisitions that now form essential elements of the current force structure were never in key defence planning documents, such as White Papers or the predecessor of the IIP, the Defence Capability Plan. They include:

- C-17A heavy airlifters: rapidly acquired at government direction to fill a gap in supporting Middle East operations and now one of the ADF's most valuable capabilities
- F/A-18F Super Hornets: acquired because the government was concerned about an air combat gap emerging due to delays in the delivery of the JSF; were originally to be an interim measure but are now a permanent part of the force structure
- EA-18G Growler electronic attack aircraft: weren't part of the 2009 White Paper force structure, but the government decided to acquire them in 2012 anyway
- HMAS *Choules*: an amphibious ship acquired initially as an interim measure when Defence was unable to provide the government with an amphibious ship in the cyclone season, but now a permanent part of the force structure.

Challenges that cost a lot to remediate can emerge at short notice. For example, Defence decided to move its data out of a private data centre in Sydney after a Chinese consortium bought a 49% stake in the centre. The media suggest a cost of $200 million.[98] This wasn't identified as a requirement in the 2016 White Paper and IIP produced only a year earlier.

Considering the number of times that the government has referred to the uncertainty of the current strategic environment, it would remarkable if Defence didn't have to modify its investment program to meet changing strategic circumstances.

We don't know what things will cost

It's difficult to determine with certainty what things will cost, particularly military equipment. Cost growth is a frequent feature of Defence acquisition programs, both here and around the world, particularly exponential increases in cost between generations of military technology. As discussed above and in Chapter 7, it's difficult for planners to apply the right cost escalation indices to cost estimates, and the further into the future they project, the greater the impact of getting them wrong.

Cost can also increase over the lifespan of a project. Contrary to popular stereotype, Defence generally has a good record of delivering on budget after second-pass approval, because the budget that the government approves at that point is based on a tendered offer from industry.[99] But only the smallest of the current shipbuilding projects, the OPV, has reached second pass. Based on what we know of projects globally, a lot of cost growth occurs early in a project's life, before government approval to acquire. Early on, the solution to the capability gap might not be known, the relevant technologies might not exist, and quantities and schedule are based on gross assumptions.

In the Australian context, this is the point at which a project is entered in the IIP with a budget (in Defence terms, a 'provision'). But a lot can happen between then and second pass and ultimately the successful delivery of the project. So the original IIP provision might not be correct, or even close.[100] The vast bulk of Defence's capital

investment plan is pre-second pass. Therefore, the costs are by definition fuzzy. Three of Defence's megaprojects are pre-second pass and potentially subject to future cost growth.

Furthermore, if what you're going to buy isn't similar to what you're operating now, it's hard to estimate what it will cost to operate it (as is the case with the JSF, for example), so estimates of future sustainment costs are even fuzzier.

While the project budgets in the 2016 White Paper were externally cost-assured by industry, if getting costing right were simply a matter of paying consultants to do better estimates, then defence departments around the world would have done that. But cost estimates are in large part driven by assumptions. External cost consultants are reliant on Defence to provide them with its assumptions about size, capability, and schedule. If Defence's assumptions change, then the cost estimate will too, regardless of who developed it. And, in an uncertain world, many assumptions can change.

Not all commitments to Defence funding are delivered

There's no reason at this point to question the current government's commitment to achieving defence spending of 2% of GDP; however, there are no guarantees. Governments' priorities can change; previous editions of *The Cost of Defence* have discussed how the funding commitments made in the 2009 Defence White Paper lasted all of eight days.[101] Particular pressure on Defence's budget can emerge when governments are attempting to meet commitments to get back into surplus, which the current government is now seeking to do by 2019–20. Also, economic crises can hit, resulting in a much smaller GDP overall, in which case the 2% slice wouldn't be a significant real increase.

6.3 There's more money, but it has to cover more

As discussed in previous chapters, the defence budget is increasing, and the increase is meant to flow disproportionately into the capital equipment budget (compared to the other two main components of the budget—people and operating expenses). But is it safe to assume that that will occur? A number of other things are competing for the money.

Remediating degraded enablers

We've already noted that there's a consistent pattern in exercises such as White Papers when Defence and governments recognise that consistent budget pressure has resulted in accumulated underinvestment in the key enablers that underpin military capability. The 2009 White Paper set out to fix it.

But after the 2009 White Paper, defence funding remained at (or even below) the same level of around 1.75% of GDP as in the years that got Defence into that situation in the first place (while funds were diverted into acquiring a number of unplanned new capabilities, such as those listed above). So it isn't surprising that the 2016 White Paper again identified this as a problem still needing to be fixed:

> In the past, the capability investment planning process has been too heavily focused on individual military platforms such as ships, aircraft and vehicles. This has often been at the expense of funding the vital enabling and integrating systems that allow the ADF to bring capability elements together to deliver more potent and lethal joint combat effects.[102]

Again, the White Paper claimed that its investment plan would fix it:

> The Government's decisions in this Defence White Paper recognise the importance of balanced investment in modern advanced technology warfighting systems and the enablers needed to operate and sustain them.[103]

But to do that means Defence will have to spend a lot more than it has done on those enablers. And the amount of 'glue' required is increasing. For example, if we consider the use of satellite communications on new ADF platforms such as maritime surveillance aircraft and the JSF in order to share the data that they're collecting, Defence will have to pay dramatically more for satellite bandwidth and the systems that provide it.

Therefore, if additional funding is needed to deliver shipbuilding, it's unlikely that it can come from enabling capabilities without incurring hollowness again, or essentially undoing the capability enhancements that the new platforms bring.

The future cost of sustainment

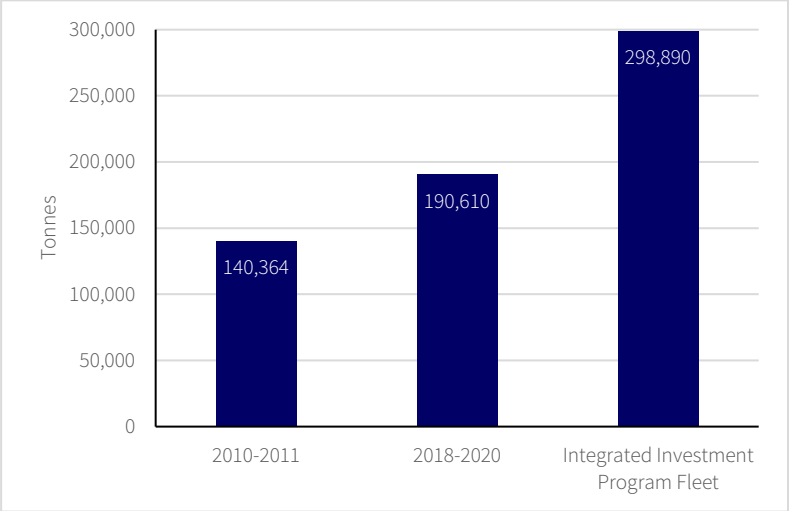
Another thing competing for a share of Defence's increased budget is sustainment. Just as the increasing size and complexity of military equipment leads to greater acquisition costs, it also leads to greater sustainment costs. And key projects are delivering platforms that are a leap of several generations in both size and capability. This isn't the case with just ships; for armoured fighting vehicles, the 35-tonne Boxer is replacing the 13-tonne ASLAV reconnaissance vehicle, and something potentially even bigger will replace the 18-tonne M113 armoured personnel carrier. The new vehicles will also come with more weapons, sensors and communications systems than the vehicles they're replacing. This greater complexity has an impact on acquisition costs, but it also has an impact on sustainment costs.

While the public IIP gives only very round numbers for the acquisition costs of future capabilities, it gives no numbers at all for future sustainment costs. The NSP does state that 70% of the whole-of-life cost of a capability is for sustainment. So, if we're spending a lot more on acquisition costs, we're likely to need to spend even more on future sustainment. By that metric, if the acquisition cost of the future submarine is >$50 billion, then the sustainment cost will be >$117 billion, and the sustainment cost of all three capabilities will be >$208 billion (assuming that the acquisition costs in the IIP are close to reality).

A bigger, more complex fleet will need a lot more sustainment funding

A lot more sustainment funding will be needed for the expanded fleet. With ships, size is a reasonably good metric for cost. While it isn't the only driver of increased cost, and the correlation isn't necessarily arithmetical, history shows that increased ship size means increased cost. Over the past decade, the Navy's fleet has increased in size from around 140,000 tonnes to around 190,000—an increase of 36%. Delivery of the fleet contained in the White Paper's IIP will further increase that to almost 300,000 tonnes—a further increase of 58% and more than a doubling from a decade ago (Figure 6.2).

Figure 6.2: Increase in Navy tonnage



Source: Navy website, Wikipedia.

And virtually all of those vessels will be more complex, with more systems and subsystems than their current equivalents. Granted, the White Paper fleet will take a long time to be delivered, so that additional funding isn't required tomorrow (the 12th future submarine won't be operational until after 2050 on the current production drumbeat), but we're trying to understand the long-term pressures on the Defence budget.

To provide another perspective, the Collins and Anzac classes currently have two of the three biggest sustainment budgets in Defence by a long way (Collins is at $592 million, Anzac is at $374 million, and Super Hornet/Growler is in between at $414 million). But these sustainment costs will at least double in real terms.

Submarine sustainment

Let's consider the increases sustainment cost for submarines. The sustainment budget for Collins is $592 million this year. While there may be some savings from economies of scale in moving from six to 12 boats, the future submarines will be around 40% bigger and more complex. So the sustainment cost is likely to be over twice the current cost, or potentially $1.5 billion per year in current dollars.

That figure doesn't include crews. A Collins boat requires a crew of over 50, and the future submarine is unlikely to need fewer, so that's more than 600 submariners just on the boats. However, reviews into the ongoing problem of retaining sufficient submariners have highlighted the need to have a much larger workforce to enable crew members to have shore postings, training opportunities and broader career development so they aren't constantly going to sea and burning out.[104] The larger pool could potentially be double the size needed on the boats at any one time.

According to ASPI's 2017–18 *Cost of Defence budget brief*, the average cost of ADF personnel was $160,000 each in 2015–16. But submariners are among the most well-paid ADF personnel, with various allowances to compensate for being confined in a small space underwater away from fresh air and loved ones for lengthy periods, such as the submarine capability assurance payment of between $15,000 and $50,000 per year, depending on length of submarine service.[105] So let's put personnel costs at an average of at least $200,000 per person per year, which produces an overall annual cost of $250 million for the submariners.

Those numbers don't include the costs of maintaining the infrastructure for the submarines (wharves, offices, accommodation). Since it's unlikely that basing all 12 submarines on the west coast will allow the Navy to recruit and retain sufficient submariners, an east coast base may well be required, further increasing costs.

So, taking sustainment and personnel costs together, the cost of operating the mature future submarine capability looks like a minimum of $1.5–2 billion per year, on top of the $2 billion annual acquisition costs.[106]

Ship sustainment

We won't repeat the calculations for future frigates and OPVs, but since the frigates are increasing from around 3,600 tonnes to around 7,000 tonnes and the OPVs at around 1,700 tonnes are replacing 300-tonne patrol boats, there will also be step change in operating costs in both of those classes. To illustrate: two AWDs (comparable vessels to the future frigate) will cost $163 million to sustain this year ($81.5 million each) compared to $374 million for eight Anzac frigates ($46.7 million each).

One should also note that the larger size and capability has a flow-on effect to other acquisitions. The Anzac class has eight vertical launch cells to hold missiles. The contenders for the nine future frigates have 32–48 each. That's potentially 288–432 cells compared to the Anzac class's 64. Four Evolved Sea Sparrow missiles can fit into one cell, and each missile costs over $1 million. There's an IIP project to acquire new Evolved Sea Sparrow missiles for the current fleet for $1–2 billion. It seems reasonable to assume that a lot more than that will be needed to arm the future frigates.

And, unlike the Anzacs, the future frigate will be capable of operating the longer range, more expensive SM-2 missile (which is why it needs the Aegis combat system)—and potentially in future the even more capable and expensive SM-6, if the government wants to develop its ballistic missile defence capability—so there will be several billion in additional costs to arm the frigates. Defence could take the fitted-for-but-not-with approach and not fill the cells with missiles, but in a more dangerous region that seems a short-sighted approach to the employment of a $35 billion plus investment.

6.4 Does continuous build save money?

One might accept that there will be a number of increased cost pressures on Defence, but didn't the RAND Corporation say that Australia is paying a 30–40% premium in domestic shipbuilding and that continuous naval shipbuilding could bring that down to more acceptable levels? That is, won't continuous naval shipbuilding save money in the long term? It may well be true that Australia is paying a premium due stop–start build programs and that continuous build programs will reduce the start-up costs that causes. However, there are other costs associated with continuous build.

Shorter service life imposes a cost premium

Both the submarine and major surface combatant continuous build programs are built around fleets of 12 vessels (in the case of surface combatants, this is the nine future frigates and the three AWDs and their successors). The NSP indicates that the drumbeat for both programs will be around two years, so that means the production cycle will be around 24 years before the first ship is replaced by the first ship of the follow-on program.

However, the design life for modern warships is around 30–35 years, so the Navy's ships will be retired around 6–11 years before they reach the end of their useful lives. In effect, continuous build adds a 20–30% premium through lost return on investment.

Even with a 24-year life, future vessels will still need investment in upgrades

It could be argued that retiring ships early has minimal cost impact because it potentially avoids both the need to do costly upgrades and the infamous 'bathtub curve' that platforms enter towards the end of their lives, when sustainment costs rise sharply as systems fail. Again, some scepticism about those claims is called for. First,

virtually all new capabilities cost more to operate than the capabilities that they're replacing due to the step change in size and complexity that we've discussed. That's why the defence budget includes funding for the additional sustainment cost of future capabilities.[107]

And with current rates of capability change, platforms need system refreshes more frequently than every 24 years to stay relevant. Defence is already starting preparations for a multibillion-dollar upgrade of the AWD's combat system and radar even before the second and third ships in the class enter service.

Also, with a build process of over 30 years from the start of the design process to completion of the last vessel, it will be necessary to improve the design of the future frigates and submarines to stay current. For example, in time, as the technology matures, the future submarine may incorporate lithium ion batteries, which offer enhanced performance over lead-acid batteries. It will be highly likely that such improvements will be retrofitted into earlier-build vessels to realise the capability benefits and retain commonality across the class, so it's unlikely that a shorter service life will eliminate the need for upgrade projects.

A two-year drumbeat isn't necessarily the most efficient build rate

To reach a service life of around 24 years with a fleet of 12 vessels, the NSP will need a production drumbeat of around two years; that is, a new ship will be delivered every two years. But two years isn't necessarily the most efficient build rate. Traditionally, Defence projects have sought to deliver as quickly as possible, not only so that the new capability is delivered as soon as possible but to avoid the inefficiencies and additional costs associated with longer schedules. Both the Collins submarines and the Anzac frigates had a drumbeat of a little over a year.[108]

If you're learning as you go and coming down the learning curve, the schedule should reflect greater efficiency, one manifestation of which is less time to build. And the government has emphasised that it wants efficiency dividends from continuous naval shipbuilding—but locking in a drumbeat and workforce makes it hard to realise those dividends.

There's no carved-in-stone optimal drumbeat, but the NSP imposes one whether it's optimal or not, potentially introducing another cost premium.

A two-year drumbeat isn't good, and there are no good alternatives

There aren't good options for an alternative drumbeat. If Defence builds slower, it introduces even greater inefficiencies. If it builds faster, and delivers the last vessel sooner, it will need to start construction in the next phase of the continuous shipbuilding program sooner in order to avoid a future valley of death. This will mean replacing the first ships built even earlier, further reducing the return on investment. If Defence tries to ramp production up more slowly to save early cash, it will exacerbate the valley-of-death problem for the existing shipbuilding workforce. That will also require the ageing Collins submarines and Anzac frigates to stay in service longer. If Defence stretches out delivery by slowing down the drumbeat to reduce the annual cash flow requirement, that will keep the Collins and Anzac classes in service even longer, as well as worsen what's already probably an inefficient drumbeat and result in laying off shipbuilders, defeating the initial goal of the plan.

Continuous build means that we'll always have the overhead of split classes

Whether it's ships, aircraft or vehicles, Defence tries to avoid running two different classes in the same role—'split fleets', in Defence's parlance—because that means it has two sets of overheads for training, maintenance, engineering and so on. It makes crewing vessels more difficult, as personnel with different skills and training don't necessarily transfer readily from one ship class to the other. This is one on the reasons Defence traditionally tries to acquire new capabilities and complete the transition from old to new as quickly as possible.

There will be an overlap of only around three years between the AWD and the Adelaide-class frigates that they're replacing, for example. However, the NSP drumbeat will result in Defence operating split submarine fleets and surface vessel fleets almost continuously.

There are two reasons for this. First, the locked-in two-year drumbeat means that Defence will need to operate its current classes longer, with consequent extended overlap between the new and old. Second, as we've seen, with a continuous steady drumbeat, once vessel 12 of the new program is delivered, it's time to retire vessel 1 of the old and replace it with the first ship of the next fleet. Therefore, there will be almost continuous overlap between classes. It's difficult to put a cost on this overhead, and the cost is as much in flexibility as in money, but it will be an enduring overhead built into the NSP.

It's difficult to adjust the scope of shipbuilding projects to reduce cash flow

Another lever Defence has to reduce costs and cash flow is to reduce capability, but that will be difficult for the first round of projects in the NSP. Around 90% of the cost of the future submarines is already locked in now that the size, particularly the diameter, has been settled.[109] The size and capability of the major components have also been determined, and there are limited savings to be made by choosing smaller components. Moreover, to do so would challenge the viability of the design—a big submarine with a small motor might not be survivable >$50 billion investment.

To reduce cost meaningfully, Defence would essentially need to go back and start the design process over again, for example by substantially shortening the design or by adopting a smaller diameter hull. That would essentially invalidate the design provided by Naval Group in the competitive evaluation process and put the program back to square one.

The government could build fewer submarines, but that leads to the costs we've discussed already—either you stretch out the build of a smaller number of submarines, with resultant inefficiencies in work rate and hence additional cost, or you end up having to replace the first boats earlier to avoid a shipbuilding valley of death, which has the same cash flow requirements anyway.

Similarly, the vast bulk of the cost of the future frigates is locked in now that the government has short-listed the designs; reducing costs significantly would require fundamental redesign, and the entire premise of the competitive evaluation process was that only mature designs would be considered. Furthermore, the government has already agreed on key elements, such as the combat management system (the US Navy's Aegis with a locally developed Saab interface) and radar (an evolution of CEA's excellent CEAFAR). The only option is to fiddle around the edges, potentially by adopting a 'fitted for, not with' approach and not installing sensors or weapons, which has previously resulted in 'floating targets' that couldn't be deployed and would need to be upgraded or retrofitted anyway.

So the cash flow is locked in but doesn't give Defence capability when it needs it

The result is that the key levers that Defence traditionally uses to manage cash flow aren't viable in a world of continuous naval shipbuilding.

From a capability perspective, the main benefit of having a standing, in-country shipbuilding capability is that when you need to increase your military capability rapidly (as we need to now), it's better to do it from a competent, functioning industrial base than from scratch. But if you tie yourself to a particular drumbeat because that best suits your industry plan, you're not reaping the military capability benefit of having the industrial capability.

Put another way, the need for 12 future submarines was first identified in the 2009 Defence White Paper. Under the NSP, the Navy won't reach 12 submarines until the 2050s, around 45 years later. The last Collins-class submarines will be in service until they're around 35 years old, if they're retired when the sixth future submarine enters service. But, if Defence's plan is to keep the Collins longer in order to get to a total of 12 submarines sooner in a mixed Collins – future submarine fleet, then they'll be over 40 years old.

Or, to look at it another way, the NSP is constructed as a very expensive piece of clockwork that ticks over at just the right rate to keep Australian industry in work, delivering ships and submarines every two years, regardless of the cost premium and whether that meets the capability requirements of Australia's emerging strategic circumstances.

6.5 What does this mean for Defence's force structure?

In summary, the NSP potentially locks Defence into a level of cash flow that could consume around a third of its capital equipment budget, even taking the increase in the defence budget to 2% of GDP into account. The tools that Defence has traditionally used to manage cash flow may have little ability to solve this, and the end result is that Defence doesn't get improved capability for a long time.

Shipbuilding may be only one case among many. Due to the government's increasing focus on local jobs as the key driver for defence investment decisions, we're seeing a move to continuous production in other areas of capability. This has occurred already in the protected vehicle sector, where the government kept buying Bushmaster protected vehicles until the design for the Hawkei light protected vehicle had matured sufficiently for the Bushmaster production line in Bendigo to transition to the Hawkei. And, with around 1,500 jobs involved in the production of LAND 400's armoured vehicles, it will be a brave government that ends the production of armoured fighting vehicles once that project has delivered. LAND 400's cash flow is likely to be over $1 billion per year—will that now be locked in in perpetuity, like shipbuilding's cash flow?

In an uncertain world, the only certainty seems to be that Defence will be locked into a shipbuilding drumbeat that requires a potentially unsustainable portion of the defence budget. We're already seeing evidence that shipbuilding is sucking cash away from the rest of the capital program: the ANAO has reported that 'in August 2017, Defence was aware that there may be a need to adjust the funding profile for the Future Submarine Program by approximately $6.9 billion to cover the period between 2019–20 and 2031–32, before the first submarine was completed.'[110]

In other words, there's potentially a shortage of $6.9 billion in funds needed to start up the Future Submarine Program. There's only one place that funding can come from: elsewhere in the defence budget. If history is anything to go by, it will come from other capital projects.

Since the cash flow required for shipbuilding consumes so much of the capital equipment budget, should funding be needed to meet emerging priorities in an uncertain world, the government will either need to find more money for defence or make some hard choices about the future force structure.

Potentially, it will be challenging to sustain a balanced force structure, which has been the goal of successive Defence White Papers. Without additional funding beyond 2% of GDP, Defence may be forced to move towards a 'maritime heavy' structure with a smaller land force (albeit one with a lot of heavy armoured vehicles) if it adheres to the NSP. Or, as has happened in the past, Defence will have to neglect its enablers, with the result that at the crucial moment we'll once again see that the backbone holding all the ships, submarines and armoured fighting vehicles together is broken.

Chapter 7: How Defence costs military equipment—or how $1 billion becomes $3.488 billion

One of the greatest areas of confusion in the cost of defence is the price of military equipment. The Defence organisation doesn't necessarily help the broader public's understanding: it nowhere provides information on the price it's paying for a particular item, but only high-level project costs, which include a wide range of elements beyond the equipment itself. For unapproved projects (those for which the government hasn't yet granted second-pass approval, allowing Defence to start acquiring the equipment), Defence provides only very broad project budgets in the public IIP (and before that in the Defence Capability Plan). Defence does provide more precise numbers for the biggest approved projects in the *Major projects report* published annually by the ANAO.

Both of those sets of numbers tend to differ substantially from those that commentators and the media suggest equipment will cost. Even when commentators draw on authoritative sources of information, such as US budget papers (which provide substantially more information than anything in the Australian system), they approach the issue in a fundamentally different way from Defence. This results in commentators making claims such as that the US's latest nuclear attack submarine would cost substantially less than Australia's future submarine, or that US Navy destroyers cost a fraction of the price of Australia's future frigates, or that Australia is being taken for a ride, and so on.

To explain this divergence, we provide a hypothetical example to explain how military acquisition projects are costed. This hypothetical case is designed to illustrate key principles. Professional cost estimators will no doubt take issue with particular assumptions, but that's our point: defence capability is always a very assumption-rich topic.

7.1 Meet the BEAST

Let's assume that the Army wants to buy a semi-autonomous vehicle that can accompany dismounted troops, carrying their equipment and extra ammunition as well providing power to recharge the batteries that operate the soldiers' communications equipment and sensors. *In extremis*, it can autonomously evacuate wounded soldiers from the battlefield. Equipping every section of 8 soldiers in the Army with one would require 250 of them.

In our hypothetical example, the US Army already has such a vehicle, the Biologically Emulating Army Systems Transport (the BEAST), manufactured by Big American Prime Inc (BAP). According to the US Department of Defense's *Justification books* (which provide extremely detailed information on real equipment), the last BEASTs were produced in 2014 and cost US$3 million each.[111]

Exchange rate

Since the defence budget is developed in Australian dollars, we'll need an exchange rate. The Department of Finance provides official exchange rates for budgeting purposes that are regularly updated. This results in changes to the costs throughout the life of project, which can be significant if the value of the Australian dollar fluctuates greatly. However, we'll assume a steady exchange rate of A$1.00 = US$0.75.[112] Therefore, each BEAST costs A$4 million, and the total cost of 250 BEASTs is a nice round 1 billion Aussie dollars (Table 7.1).

Table 7.1: Optimal delivery of the BEAST ($m, constant dollars)

18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
0.0	200.0	400.0	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1000.0

Out-turning

Unfortunately, it's not that simple. The first big discrepancy between Defence's numbers and those in general public discussion arises because Defence and the broader government use out-turned numbers, which take inflation into account. Essentially, that's the number of dollars you'll need over the future as payments occur. Due to inflation, one future dollar doesn't have the same buying power as one present-day dollar, which makes it hard to compare dollars with dollars.

To develop a cost estimate using out-turned numbers, we need to know the project schedule: the longer the schedule, the more out-turning takes effect. We also need to decide what out-turning indices we're going to use.

The standard out-turning index used in Defence costing is non-farm GDP, which is essentially the rate of inflation across all industries except agriculture. For simplicity in our example, we assume a constant non-farm GDP rate of 2.5%. But we need a schedule to apply our out-turning to. Generally, shorter schedules are better—we want the improved, new capability as soon as possible and we want to avoid the overhead of operating a split fleet of two different kinds of platforms. And, as we shall see, long projects lead to additional costs.

A traditional model would look something like this if Defence were buying the current model of BEASTs directly from BAP (or via the US Government's Foreign Military Sales Office) off a production line that's up and running. Defence gets the first BEAST in two years' time and the rest within the following two years. That means the out-turning has little chance to escalate, and our $1 billion becomes only $1,082 million (Table 7.2).

Table 7.2: Optimal delivery of the BEAST ($m, out-turned dollars)

18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
0.0	210.1	430.8	441.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,082.4

But let's assume that the government wants to get into the business of continuously building autonomous military vehicles here in Australia. First, even if the BEASTs are going to be manufactured by BAP's local subsidiary (AUSBAP), it's going to take a little longer to set up a production line. Also, we need to keep the production line going until it's time to start producing either the successor to the BEAST or some other vehicle to keep the production line going (yes, that does sound circular). Also, Defence always has cash flow pressures, and a typical way to deal with them is to delay projects or stretch them out over time (even though this generally has the result of increasing overall costs).

Let's assume that to set up local build and address cash flow pressures we start production a year later and the project runs for 10 years, producing 25 vehicles per year. This means that the out-turning has a greater effect, for a total of $1,207 million (Table 7.3).

Table 7.3: Continuous BEAST build program ($m, out-turned dollars)

18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
0.0	0.0	107.7	110.4	113.1	116.0	118.9	121.8	124.9	128.0	131.2	134.5	1206.5

Labour and materials growth

Military equipment generally increases in price at a greater rate than other products in the broader economy. It can require skills or special materials that are in short supply. To address this, we'll add an additional 1.5% escalation per year, resulting in a total of $1,351 million. The unit price of a BEAST at the end of our production run is now $6.4 million.

Cost growth

But we still haven't accounted for one of the key factors in the price of military equipment, which is that it increases in capability from one generation to the next due to increases in complexity, size and performance—all of which result in cost growth. Compare the performance of a JSF with that of a F/A-18 Hornet designed in the late 1970s and procured in the mid-1980s. That performance increase comes with a huge increase in cost. Also, meeting contemporary work health and safety standards has a cost. Over time, these increases are massive. For example, warships produced in the early 20th century cost a few million each; warships produced today cost a few billion each.[113]

In our hypothetical example, the last BEAST produced in 2014 was the first generation. Things move fast in the exciting world of autonomous systems, and the US Army and BAP are now developing the next-generation BEAST. But the step change we want in the BEAST's artificial intelligence requires investment. Also, lithium ion batteries have matured to the point that they can be used in the BEAST; that means more power per kilogram than traditional lead-acid batteries and therefore more capability, but unfortunately more cost. Plus, lithium ion batteries have a tendency to catch fire, so the BEAST needs a fire suppression system (more cost). And it's making greater use of composites to reduce weight and increase its air-transportability (more cost). Plus, to protect the troops it will have a system that can detect the origin of sniper fire and jam improvised explosive devices and incoming missiles (more cost).

To account for this change between generations of BEAST, we will apply a 5% annual cost growth factor between the end of the first generation in 2014 and the completion of design of the second generation in 2020. Taken together, these three forms of escalation (out-turning, labour and materials and cost growth) mean that the first BEAST delivered in 2021 will now cost $6 million and the final one in 2030 will cost $8.5 million. Our total is now $1,810 million (Table 7.4).

Table 7.4: Continuous BEAST build program, including cost growth ($m, out-turned dollars)

18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
0.0	0.0	150.7	156.8	163.0	169.6	176.3	183.4	190.7	198.4	206.3	214.6	1,809.8

Cost estimators and analysts put a lot of time, research and thought into developing and applying the appropriate indices. There's no universally agreed approach. Different metrics are used for different kinds of equipment, and different organisations disagree on how to apply them. Historical data is crucial, but it's in short supply in the Australian context, particularly in the public domain, so we draw heavily on US data.

Australian premium

Another controversial area of cost estimation is how much of a premium should be applied to an Australian build. The RAND Corporation's analysis of the Australian shipbuilding industry concluded that there was a 30–40% premium associated with a local build compared to building in somewhere like the US, due to the stop–start nature of Australian shipbuilding programs as well as Australian wage rates. It may be possible to reduce

local premiums, but structural elements of the Australian economy mean that it's unlikely that premiums can be reduced to zero—after all, Australia had a continuous car-building industry for over 50 years and Australian consumers still didn't think that Australian cars were competitively priced.

We've applied a 10% local build premium to the BEAST project, which gets us to $1,991 million.

Design and non-recurrent engineering

We haven't yet included any costs to design the BEAST and set up our production line. If we were building something unique for the ADF, we'd have to pay all the design costs ourselves. Fortunately, in this case we're acquiring something that BAP is developing for the US Army, so we'll pay only a share of those costs. We also need to cover the costs of setting up the local production line. We include $250 million to cover both, which out-turns to $258 million. Note that we should have started that work last year if we want to commence delivery in 2020–21; Defence projects can take a long time to get up and running.

The cost of our BEASTs is now $2,248 million (Table 7.5). We're a long way from our original $1 billion round number estimate, but this is just for the platform itself, or the 'mission system', to use Defence's terminology.

Table 7.5: Total cost of BEAST mission system ($m, out-turned dollars)

17–18	18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
50.0	102.5	105.1	165.8	172.4	179.3	186.5	194.0	201.7	209.8	218.2	226.9	236.0	2,248.4

Other costs: fundamental inputs to capability

Another reason why there are large discrepancies in cited costs of equipment is that commentators generally focus on the equipment itself (the mission system), whereas Defence projects have to cost and deliver everything needed to operate the capability. In Defence jargon, these are the fundamental inputs to capability (FICs). This is also known as the support system.

Facilities are an important and expensive FIC. Our BEASTs need garages and workshops. Various metrics are used to estimate facilities costs, but around 3–5% of the mission system cost is standard. However, if we're delivering a step change in capability, or acquiring a new capability that has no existing facilities, the facilities cost can be a lot higher (for example, if we need wharves for a new, bigger class of ship). In the case of the BEAST, the garages it will be going into were largely built during World War II—which means demolition and costly asbestos remediation. Also, the fuel tanks are over 50 years old and have leaked into the watertable, requiring more remediation. Plus, construction costs in Darwin and Townsville tend to be higher than in major metropolitan centres. We'll go with a 5% metric. That gets us to $2,339 million.

The project also has to acquire an initial tranche of spares; conduct tests and evaluations to ensure that the BEAST meets our requirements; set up a training system with simulators, manuals, training rooms and ranges; acquire intellectual property and technical documentation so that we can maintain and modify the BEAST as necessary; and buy trailers so that we can transport the BEAST out to the field. Again, a lot of effort is put into estimating FIC costs. Here, we'll go with a metric of 30% of the capital cost in our hypothetical.

Between the mission system and the support system, our cost is now $2,882 million.

Project management costs

Project office costs aren't trivial. In addition to project managers, the project needs systems engineers to define how it all fits together and will work with the rest of the ADF's systems, cost estimators, and people to write contracts, provide legal advice, manage the accounts and so on. Since the big reductions in Defence's APS personnel, which have hit Capability Acquisition and Sustainment Group particularly hard, Defence has turned increasingly to contractors, either to fill individual positions in project teams or to run entire projects. Contractors generally cost more than public servants.

We've included $10 million per year, out-turned of course. This gets our total acquisition cost to $3,033 million. In Defence terms, this is the cash budget.

Table 7.6: Total cost of BEAST mission system and support system, including project office costs ($m, out-turned dollars)

17–18	18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Total
60.0	112.8	115.6	229.3	238.4	247.7	257.5	267.6	278.1	289.1	300.4	312.3	324.6	3,033.2

Contingency

All projects involve uncertainty. Because Defence projects often involve new technologies, they can face greater uncertainty than projects in other sectors. Defence project teams account for those uncertainties (or 'risks', to use the Defence terminology) by considering what could go wrong in each area of the project and estimating the cost necessary to address that risk should it occur. This cost is called 'contingency'. The rate of contingency is lower in areas that are well understood. Highly developmental projects require more contingency, as do IT-heavy projects.

Our BEAST project is largely a military-off-the-shelf project, but there are still some developmental technologies involved in the new capabilities going into the second-generation BEAST. Also, we need to set up an Australian production line, which involves some risks, and the BEAST uses a number of exotic materials, the price of which tends to fluctuate dramatically. A well-run project will assess contingency for each cost element individually, but for our hypothetical we'll apply 15% contingency overall to the cash budget, or $455 million. This brings us to a total of $3,488 million.

The government approves a total budget for a project, including contingency. Defence is then authorised to spend up to that amount. If it can't deliver the capability within that budget, it must inform the government so that the government can decide whether it wants to increase the budget or decrease the capability to be delivered. If a project needs to spend all of its cash budget *and* all of its contingency, something has gone seriously wrong.

However, Defence holds the cash budget only in its financial plan. There's no pot of money holding the contingency. If risks are realised and the project needs to draw on the contingency, Defence needs to find those funds somewhere, usually from cash freed up by unplanned delays in other projects. Critics might call this a Ponzi scheme that would collapse if all Defence projects delivered on schedule, but it's worked pretty well so far.[114]

Table 7.7 shows our final acquisition estimate.

Table 7.7: Total cost of the BEAST ($m, out-turned dollars)

17–18	18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29	29–30	Cash	Cont.	Total
60.0	112.8	115.6	229.3	238.4	247.7	257.5	267.6	278.1	289.1	300.4	312.3	324.6	3,033.2	455.0	3,488.2

Operating costs

Another way confusion is created is when acquisition costs are compared with whole-of-life costs. The latter include the cost of operating the capability as well as acquiring it. Military equipment is generally designed to operate for a long time, and the cost of operating it for 25–30 years is usually substantially more than the original acquisition cost.[115]

We won't go through a full cost exercise again. Suffice it to say that the operating cost includes a range of things: the uniformed personnel operating it and conducting daily maintenance; contractors conducting deeper maintenance; Defence civilians running the supporting program office; spares; fuel; and facilities maintenance. Since virtually all systems are now software driven, the cost of regular software updates has to be taken into account.

Defence is required to develop cost estimates that include both acquisition and operating costs for a total life cycle cost. Historically, operating costs haven't received as much attention as acquisition costs, and it's hard to estimate the cost of operating something you don't yet have and that might not yet exist, but Defence is working to do better.

7.2 We have to compare apples with apples

This was a hypothetical exercise to illustrate a point. The methodology is broadly similar to what Defence would use early in a project's life to determine how much funding it should hold for the project in the IIP. This isn't how Defence would develop an estimate for second-pass approval. By second pass, Defence would have had extensive engagement with industry, usually involving a formal tender process, and the final cost estimate would be based on the tender response and subsequent negotiations. But that final cost almost certainly will reflect the factors set out above.

In summary, any discussion of the cost of military equipment that doesn't take into account appropriate escalation indices and doesn't include all the elements necessary to operate the equipment and deliver a military effect will significantly underestimate the true cost of acquiring and operating military capability and will be a poor basis for public debate and decision-making.

Notes

[1] The White House, National Security Strategy of the United States of America, December 2017, 2, online.

[2] For an overview of the growth in Chinese military capability, see Office of the Secretary of Defense, *Annual report to Congress: military and security developments involving the People's Republic of China,* May 2017, online.

[3] For example, 'China is no longer a rising power but an arrived great power and peer competitor to the United States in the region.' Admiral Philip Davidson (nominee for Commander, US Pacific Command), responses to US Senate questions, US Department of Defense, 15 May 2017, online.

[4] Congressional Budget Office, *An analysis of the Navy's fiscal year 2017 Shipbuilding Plan,* February 2017, online; Congressional Budget Office, *Costs of building a 355-Ship Navy,* April 2017, online.

[5] Congressional Budget Office, *The budget and economic outlook: 2018 to 2028,* April 2018, online.

[6] See Isaac Kfir's ASPI Special Report, *Terrorism in the Indo-Pacific: Glocalism come of age,* May 2018, online.

[7] International Institute for Strategic Studies, *The military balance 2018,* online.

[8] The main exception is of course the submarine fleet, which is going from 6 to (eventually) 12 boats.

[9] There are a number of ways to estimate this figure. A quick and dirty way is as follows. Since both programs assume a two-year drumbeat between deliveries, when vessel 1 is complete, vessel 2 will be at around 75% complete, vessel 3 at 50% and vessel 4 at 25%. That's the equivalent of five whole vessels between the two programs. Assuming each vessel costs $3 billion, that makes $15 billion. Add design costs at a conservative $4 billion between the two (the future submarine already has $2.2 billion in approved design funding *before* the government has approved and funded the main design contract with Naval Group). Defence has stated the shipyard construction costs are over $1 billion. That gets us to $20 billion, without taking any out-turning or escalation into account. This is reasonably consistent with the Air Warfare Destroyer Program, which has spent $7.6 billion before achieving IOC. Also, the ANAO's recent report into the mobilisation of Defence's shipbuilding programs (report no. 39 2017–18) stated that Defence may need to find an additional $6.9 billion to fund the construction of the future submarines before the first submarine is completed (para. 4.39), indicating that the total cost to that point is significantly more than that. Admittedly, that estimate could be off the mark, but if Defence has a better one, we'd be very happy for it to share it with the Australian public.

[10] Malcolm Turnbull, keynote address to the National Governor's Association Winter Meeting, 25 February 2018, online.

[11] For example, *Australia's national security: a defence update 2007,* online.

[12] Budget Paper no. 1 2018–19, online.

[13] Organisation for Economic Co-operation and Development (OECD), *Revenue statistics 2017: tax revenue trends in the OECD*, 2017, online. These figures include all sectors of government, not just the federal government.

[14] See, for example, Brendan Rynne, *The re-emergence of protectionism: potential consequences for the Australian economy*, KPMG, April 2018, online. Rynne examines a range of scenarios that could reduce Australia's projected annual GDP growth to 0.3–1.4%.

[15] 'The top issues facing Australia', *IPSOS Issues Monitor*, December 2017, online.

[16] Roy Morgan, *Economic issues dominate Australian's problems in 2018*, 6 March 2018, online.

[17] 'Threats to global stability', *Essential Report*, 22 August 2017.

[18] 'Relationships with other countries', *Essential Report*, 19 December 2017.

[19] Alex Oliver, *The Lowy Institute Poll 2017: understanding Australian attitudes to the world,* The Lowy Institute, Sydney, June 2017, online.

[20] 'Biggest threats to Australia', *Essential Report*, 4 August 2015, online.

[21] The PBS describes the Department of Defence and the ADF as separate bodies but states (page 3) 'in practice, these bodies work together closely and are broadly regarded as one organisation known simply as Defence.'

[22] Readers may be somewhat surprised to learn that the budget papers don't directly include a forecast for GDP. However, Table 1 of Budget Paper Number 1 provides a figure for receipts and the percentage of GDP that this comprises, as well as a figure for payments and a percentage of GDP. By multiplying these out (and averaging them, because they produce slightly different numbers) we derive a predicted GDP of $2,084 billion for 2020–21. Defence advises that it has used a GDP estimate provided by Treasury to conclude that the Defence budget will reach 2% of GDP by 2020–21. Treasury's estimate of GDP would therefore need to be $2,066 billion (i.e. a slightly lower one than that provided in the budget papers).

[23] Defence White Paper 2016, paragraph 8.10, online.

[24] On the off chance that you're wondering why Defence gets additional funding beyond what it needs to deliver program outcomes, here's the reason. The Department of Finance requires program costs to be presented on an accrual basis. The program costs include the cost of delivering services and so include people and operating costs as well as the depreciation of assets. The department also invests to acquire new assets. While the cost of programs is presented on an accrual basis, the department needs actual cash to run. It doesn't need cash to cover depreciation, but it does need cash to acquire new assets (which generally cost more than the depreciating old assets). The equity injection essentially covers the difference between depreciation of the old assets and the cost of acquiring new ones.

[25] Although, technically, funds for continuing as opposed to new operations are now budget adjustments as opposed to budget measures.

[26] This year's PBS for the first time aligns Table 4 with the IIP. This is a good thing, as it means capital funding and capability funding are essentially the same thing. Over $1 billion in 'Other capital' has been removed from Table 4. This covered things that from an accounting perspective are categorised as capital, but aren't new capability, such as 'the capital component of repairable items'. Overall, this is good, but it does mean that it puts an artificial blip in the growth trajectory of the capital program.

[27] This is reached by summing the exchange rate variations in budget documents after the 2016–17 PBS and then assuming that an average of 73% of the total variation applies to the capital program. The 73% figure is the proportion of Defence's overseas capability spend that is acquisition—that is, capital (derived from Table 5.1).

[28] Aficionados of Defence budgeting policy may have noticed that the 'Future Sustainment Costs' line of Table 5 has disappeared. This, you may recall, was what was previously termed 'Net Personnel and Operating Costs', or NPOC. The First Principles Review, for better or worse, recommended that this concept no longer be used and it appears Defence has followed through with implementation. The funding under that line of the sustainment program has now been assigned to the relevant capability managers (i.e. funding for future land projects is now held under Army sustainment).

[29] As we discuss in Chapter 4, in APS-speak, the major organisational components of Defence, including the services, are 'programs'.

[30] See Chapter 9 of *The cost of Defence: ASPI defence budget brief 2017–18* for a detailed discussion of New Zealand defence economics.

[31] The 2018–19 Defence appropriation divided by 24,598,900, the ABS's June 2017 figure for Australia's population.

[32] Own-source revenue is essentially reimbursement to the department from customers for goods and services provided, whether it be fuel to allies visiting for exercises or meals and accommodation to ADF members.

[33] We deliberately state Defence rather than ADF, as the contribution of Defence civilians on operations is often overlooked. Defence civilians serve in a number of roles on operations including intelligence analysts and policy advisers.

[34] It should be noted that service personnel costs are attributed to their parent service rather than the group where they're posted, so this means the personnel costs of groups that have a large number of embedded service personnel (e.g. Strategic Policy and Intelligence, Joint Operations Command, and CASG) are understated.

[35] From a capability perspective, as opposed to an accounting perspective, you could argue that a large part of 'Other Capital' isn't really capital in the sense of additional capability as it is the 'capital component of repairable items; that is, Defence is buying parts to fix something that it already has.

[36] Technically, this number only includes projects that have reached second pass at this point in time. So the number isn't that same as the Major Capital Investment line in PBS Table 4 ($8,426.5 million), as that number also includes the 2018–19 spend on projects that aren't yet approved but will be approved over the course of the year. Some years' PBS includes that in the Top 30 table's cash flow; this year's doesn't.

[37] Although in real terms the original Hornet project hit that mark back over 30 years ago in 1985–86 ($752.7 million nominal, $2,105.8 million in real 2018–19 terms).

[38] That seems like a lot, but it is actually a smaller share of the budget than last time Defence bought a new fighter fleet in the 1980s.

[39] The total in PBS Table 66 is $1,748.2 million, which differs from Table 4 at $1,868.5 million.

[40] Granted, these numbers may be distorted due to the fundamentally different role that the Growler electronic attack aircraft has compared to a classic Hornet. But if we go back two years to before Defence had Growlers, there was still a significant disparity with classic Hornets at $2.7 million per aircraft and Super Hornets at $8.0 million.

[41] US Department of Defence, *Selected acquisition report: F-35 Lightning II Joint Strike Fighter (JSF) Program (F-35),* December 2016, p. 96, online.

[42] According to a 2014 ministerial media release, online.

[43] Joint Committee of Public Accounts and Audit, *Defence sustainment expenditure*, report no. 470, March, 2018, Recommendation 1, online.

[44] This change is discussed in ASPI's 2017–18 Budget Brief.

[45] The turnaround in Collins sustainment is an impressive success story. See John Coles et al., *Study into the business of sustaining Australia's strategic Collins class submarine capability: beyond benchmark*, March 2016, online.

[46] This consists of $7,312 million for Operation Slipper, which has ended, $540 million for enhanced force protection in Afghanistan, and $445 million for Operation Highroad, the current contribution to Afghanistan.

[47] Defence missed the 2016–17 ADF target by 500. While the annual report states that 'workforce continued to grow in line with the White Paper', Defence only gave itself a 'partially achieved', which seems about right (page 38).

[48] The executive summary of the Capability Life Cycle Detailed Design is online.

[49] Christopher Pyne, 'Christopher Pyne on Australia's defence industry', address to the Lowy Institute, Sydney, 13 December 2017, online.

[50] Department of Defence, *Annual report 2016–17*, Tables B.6 and B.10, online.

[51] Many of these projects would have appeared in previous Top 30s, but another element of the disappearing data phenomenon is that since 2017–18 the PBS has no longer included the table presenting the current status of previously reported top projects. While those projects no longer had large in year spends, the table was a very useful source of data on mature projects that were reaching completion.

[52] MPR 2016–17, pp. 46–47.

[53] *Defence Procurement Review* (the Kinnaird Review), 3003, Recommendation 3, online.

[54] Some of the decrease could be due to foreign exchange adjustments, but since the total exchange adjustment across the portfolio between the PBS and PAES was only $89.9 million, it can't account for more than around 10% of the decrease in the capital program.

[55] Incidentally, the 2017–18 PAES Top 30 table predicted that the capital equipment program would overachieve by $338 million compared to the PBS, although this doesn't seem consistent with the data in our Table 4.8, which indicates that the major capital investment program will underachieve against the PBS prediction by $137.7 million. This is one of the many small mysteries in Defence's reporting.

[56] >$30 billion in the IIP, but given as $35 billion in the Naval Shipbuilding Plan (p. 80).

[57] The PBS Top 30 project by forecast expenditure (Table 64) doesn't include LAND 400 Phase 2, and its second-pass approval was so recent that it hasn't made it into the MPR, so we don't have an exact figure for its approved total budget. However, media releases and public statements made by ministers at the time of its approval in March 2018 refer to a $5.2 billion budget.

[58] We've suggested previously that it may have been premature to remove OneSKY since it was already two years behind schedule (online). Information since then that indicates that the government agreed to a real cost increase of $243 million for the Defence share of OneSKY while also giving up $250 million in project scope doesn't increase our confidence.

[59] ANAO, *Multi-Role Helicopter Program*, June 2014, online.

[60] Defence's desktop computers were still operating Windows 2003 well in to 2017.

[61] IIP, p. 56.

[62] Although Defence advises us that it provides reporting every two months on the performance of its major ICT projects to the Digital Transformation Agency.

[63] Senate Order page on AusTender, online.

[64] ANAO, *Design and implementation of Defence's bases services contracts*, December 2016, 44–48, online.

[65] This view is put perhaps most coherently by former ASPI analyst and program director Andrew Davies in 'Can Australia fight alone?', *Australian Foreign Affairs, Issue 2—Trump in Asia*, February 2018, online.

[66] Department of Foreign Affairs and Trade, *Composition of trade: Australia 2016–17,* January 2018, online.

[67] For those with a zero-sum-game view of the world, positive terms of trade mean you're winning, while negative terms are grounds for declaring a trade war.

[68] Technically, both views are right. Because we didn't make a lot of cars, the subsidy worked out to be quite high per car, but also quite low per Australian.

[69] For example, in Chapter 7 of ASPI's 2017–18 budget brief.

[70] ANAO, *Naval construction programs—mobilisation,* report no. 39 2017–18, May 2018.

[71] See Rob Bourke's excellent pieces on ASPI's *The Strategist* blog, which explain why this is so. Rob Bourke, 'The ABCs of defence industry economics: the concepts (part 1)', *The Strategist*, 11 April 2018; online; Bourke, 'The ABCs of defence industry economics: a case study (part 2)', *The Strategist*, 16 April 2018, online.

[72] In fact, most claims that assert a significant multiplier effect go back to one single case: the Swedish Gripen fighter plane.

[73] This now means that between the Defence Industry Policy Statement, the Defence Integrated Investment Plan, the Defence Export Strategy and the Defence Industrial Capability Plan the government and Defence have provided industry with 432 pages of advice on how the new streamlined processes for working with Defence will work. And it seems there's more coming, with the DICP announcing that there will be strategies for each of the six capability streams that make up the IIP.

[74] Department of Defence, 'Turnbull government moves to increase Australian involvement in Defence projects', media release, 29 June 2017, online.

[75] Defence Strategic Policy and Intelligence Group, *Australian industry capability public plans*, no date, online.

[76] For example, Innovation and Science Australia, *Australia 2030: prosperity through innovation*, 2017, online; CSIRO Futures, *Australia 2030: Navigating our uncertain future*, May 2016, online; CSIRO Futures, *Advanced manufacturing: a roadmap for unlocking future growth opportunities for Australia*, November 2016, online.

[77] Martin Callinan, Alan Gray, *Defence science and innovation: an affordable strategic advantage*, ASPI, Canberra, June 2015, online.

[78] Defence Science and Technology Group, *Defence Industry and Innovation programs update report 2017,* Australian Government, Canberra, 2018, online.

[79] Information supplied by the Department of Defence.

[80] Department of Industry, Innovation and Science (DIIS), *Defence Innovation Hub priorities*, Australian Government, Canberra, 3 May 2018, online.

[81] ACIL Allen Consulting, *Economic impact cast studies. Establishing the broad economic value of the Defence Science and Technology program*, August 2015, online.

[82] Department of Defence, *Defence Export Strategy,* 2018, online.

[83] SIPRI also provides the supporting trade registers, so it's possible to see which exports the numbers in the table refer to. From this, it would appear that the SIPRI numbers understate the dollar value of the exports.

[84] DIIS, *Global Supply Chain Program*, Australian Government, Canberra, 9 February 2018, online.

[85] Such as Andrew Davies, 'Top ten with a bullet', *The Strategist*, 20 February 2018, online; Rob Bourke, 'Exports and expectations: aspects of the new Defence export strategy', *The Strategist*, 19 February 2018, online.

[86] It's somewhat bizarre that Defence won't release information of the kind that's freely available from a Swedish think tank.

[87] Department of Defence, *Naval Shipbuilding Plan*, 2017, Australian Government, Canberra online.

[88] John Birkler, John F Schank, Mark V Arena et al., *Australia's naval shipbuilding enterprise: preparing for the 21st century*, RAND Corporation, Santa Monica, 2015, xxxv–xxxvi, online.

[89] Department of Defence, *2016 Defence White Paper*, Australian Government, Canberra, 9, online.

[90] Department of Defence, *2016 Integrated Investment Program*, Australian Government, Canberra, 2016, 23, online.

[91] The IIP gives a figure of >$30 billion for the future frigate, but the NSP (p. 80) states $35 billion.

[92] Various ministers have objected to over-programming on the basis that it 'over-promises and under-delivers', and various reviews have also suggested that it's bad practice (see Defence's response to the Pappas defence budget audit of 2009, online). Nevertheless, Defence continues to do it (as does anybody else who manages a large capital program), because if you don't you'll be left with a large amount of unspent cash that you have to hand back. The only sensible question isn't whether you should do it, but what's the right level of over-programming.

[93] Generally, governments don't like to publicise these adjustments or even admit that Defence routinely does this because of fears that it could give the impression that their fully costed plan is a failure. So, when there's a change of government, the incoming government is quick to publish a list of project delays and adjustments made under the previous government to suggest that it was a failure; consider, for example then Defence Minister David Johnston's media release citing 119 project delays under Labor (Department of Defence, 'Minister for Defence: Staunching Labor's $16 billion defence haemorrhage', media release, 16 May 2014). It would be far more sensible to accept that large capital programs aren't plans carved in stone, but living organisms that are constantly adapting in response to change in the world, whether it's the emergence of new threats, new information about technical risk or better understanding of cost drivers. Do we want Defence to be an adaptive, learning organisation, or not?

[94] By 'shipbuilding', we refer the three strands of submarines, major surface combatants and patrol vessels. We don't include all naval construction (which would also include replenishment and amphibious vessels, for example) or upgrades, because those things will still need to be done in addition to the NSP and won't be replaced by it.

[95] We aren't trying to work out what shipbuilding will truly cost in 2020–21 (the future frigates and future submarines aren't likely to hit peak cash flow until a few years after that). Rather, we're trying to estimate what peak cash flow will look like in 2020–21 dollars (because that's when the defence budget is meant to reach 2% of GDP), regardless of when that occurs. Or, put another way, we're trying to determine the percentage of a defence budget based on 2% of GDP that naval shipbuilding will consume.

[96] Mark V Arena, Irv Blickstein, Obaid Younossi, Clifford A Grammich, *Why has the cost of navy ships risen? A macroscopic examination of the trends in US naval ship costs over the past several decades*, RAND Corporation, Santa Monica, 2006, 15, online. RAND's figure for surface combatants is in fact even higher, at 10.7%. Since the move from the AWD to the future frigate isn't a generational jump, that number seems significantly too high for this exercise.

[97] Augustine's Law Number XVI: 'In the year 2054, the entire defense budget will purchase just one aircraft. This aircraft will have to be shared by the Air Force and Navy 3½ days each per week except for leap year, when it will be made available to the Marines for the extra day.' If you're wondering how reliable our estimates are, keep in mind Augustine's Law Number VIII: 'The most unsuccessful four years in the education of a cost-estimator is fifth grade arithmetic'. Norman R Augustine, *Augustine's Laws: an irreverent guide to traps, puzzles and quandaries of the defense business and other complex undertakings*, 6th edition, 1986.

[98] Due to the lack of transparency in Defence's reporting, it isn't possible to confirm the cost.

[99] The evidence for this can be found in the ANAO's annual *Major projects report*, it is based on Defence's project cost and performance data.

[100] There's no information on the extent of cost growth between IIP entry and second pass in the Australian context, as the public versions of the IIP (and before that the Defence Capability Plan) give only the roundest numbers. For example, the public Defence Capability Plan (2009) stated that the future submarine project's cost was '>$1,500 m', while the 2016 IIP gives it as '>$50 bn'. It would be rash to conclude, however, that the cost had increased over 3,000%. We note that the RAND Corporation has studied cost growth in the US context.

[101] ASPI, *The cost of Defence: ASPI defence budget brief 2017–18*, 137, online.

[102] *2016 Defence White Paper*, 31. These sentiments are essentially identical to those expressed in all previous reviews.

[103] *2016 Defence White Paper*, 100. Defence does track the life of its infrastructure. Analysing that data over time would give an indication of whether Defence's infrastructure is on the path to recovery or is continuing to age.

[104] Such as the Moffitt Review of Submarine Workforce Sustainability of 2008, online.

[105] See Department of Defence, *Part F: Allowance rates*, Australian Government, Canberra, online.

[106] The NSP says that whole-of-life costs are typically 30% in acquisition and 70% in sustainment (p. 80). By that metric, if acquisition costs for the continuous NSP are close to $4 billion per year, sustainment will be over $9 billion per year, which seems high.

[107] We have a useful example in the air combat fleet. The classic FA-18 A/B Hornet continues to serve alongside the new FA-18F Super Hornet. The much smaller number of Super Hornets costs significantly more to operate that the much larger classic Hornet fleet.

[108] Despite the government and Defence referring back to the RAND shipbuilding study, the current NSP doesn't refer to any potential scenario considered by RAND. RAND's shipbuilding study essentially assumed that builds of major surface combatant and minor war vessel classes, such as the OPV, would alternate on one production line, rather than each being a continuous build on its own production line. This meant that RAND assumed that the future frigate drumbeat would be around one year. Therefore, while the RAND study suggested that there was a 30–40% premium on local shipbuilding, the current NSP doesn't match any of the models that RAND proposed to help reduce that premium.

[109] See, for example, US Navy Sea Systems Command, *2005 cost estimating handbook*, Section 5, 67, online.

[110] ANAO, *Naval construction programs: mobilisation*, report no. 39 2017–18, Australian Government, Canberra, May 2018, online.

[111] If this sounds familiar to those who follow military technology, that's because the US Army was developing such a vehicle, called the 'MULE', as part of an ambitious and technologically challenging program of modernisation of its vehicles and weapons. The entire program was cancelled in 2009, as cost predictions exceeded US$300 billion after billions of development spending hadn't delivered anything. See Christopher G Pernin, Elliot Axelband, Jeffry A Drezner et al., *Lessons from the Army's Future Combat Systems Program,* RAND Corporation, Santa Monica, 2012, online.

[112] The Department of Finance doesn't want government departments speculating on possible changes to exchange rates and speeding up or slowing down projects as a result. Consequently, Finance compensates Defence for changes to exchange rates on a no-win, no-loss basis to maintain its purchasing power. If the Australian dollar goes up, Defence gets less money; if it goes down, Defence gets more. But projects still need to accurately estimate their exposure (that is, which of their costs will be in overseas currency).

[113] For this reason, charts that attempt to present the growth in the cost of military equipment over the longer term often use a logarithmic scale for the cost axis (i.e. 1, 10, 100, 1,000) so that they can fit on a page.

[114] Although we argue in Chapter 6 about the affordability of the Naval Shipbuilding Plan, Defence's ability to manage contingency could be challenged if the IIP is dominated by a small number of megaprojects. If a megaproject is in trouble and needs more cash, it will need a lot, which will require many smaller projects to be delayed.

[115] Defence's Naval Shipbuilding Plan suggests a rule-of-thumb metric of 30% acquisition cost plus 70% operating cost.

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Acronyms and abbreviations

ADF	Australian Defence Force
ABS	Australian Bureau of Statistics
ANAO	Australian National Audit Office
APS	Australian Public Service
ASD	Australian Signals Directorate
AWD	air warfare destroyer
BAP	big American prime
CASG	Capability Acquisition and Sustainment Group
CLC	capability life cycle
CPI	Consumer Price Index
CRC	cooperative research centre
DAR	Defence Annual report
DICP	Defence Industry Capability Plan
DFAT	Department of Foreign Affairs and Trade
FIC	fundamental input to capability
FPR	First Principles Review
GDP	gross domestic product
GPS	Global Positioning System
ICT	information and communications technology
IIP	Integrated Investment Program
IOC	initial operating capability
JSF	Joint Strike Fighter
MPR	Major Projects Report
NATO	North Atlantic Treaty Organization
NSP	Naval Shipbuilding Plan
OECD	Organisation for Economic Development and Co-operation
OPV	offshore patrol vessel
PAES	Portfolio Additional Estimates Statement
PBS	Portfolio Budget Statement
R&D	research and development
SICP	sovereign industrial capability priority
SIPRI	Stockholm International Peace Research Institute
SME	small to medium enterprise