

## Getting there—a status update for the 2000 Defence white paper

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We're now thirteen years and two white papers on from *Defence 2000* (D2000). This paper reviews the 31 major capability announcements made back then, which subsequently spawned activities involving thousands of people and costing billions of dollars. Some have been delivered—often after rather more pain and over a longer time than was anticipated at the time—but some are still in train today. Some were announced all over again in defence white papers (DWPs) in 2009 and 2013. Others have been overtaken by events and have been scaled back, revised extensively or, in some cases, cancelled. Like most DWPs, D2000 contained a mix of re-announcements of existing projects and its own genuinely new initiatives—an inevitability, given the time it takes to deliver major projects.



RAAF F/A-18F Super Hornet air-to-air refuels from a United States Air Force tanker aircraft © Defence Department

The projects generated by D2000 were developed under a different capability development governance mechanism than today, but there are some apparently eternal verities of defence acquisition. A new government and Defence Minister will face those enduring challenges in the near future, as well as inheriting a raft of projects that are the legacies of previous incumbents. Hopefully some history will help when formulating new force structure and acquisition plans.

## Waiting for capability

This exercise illustrates a number of important points that future decision-makers would do well to take into account. First is the chronic optimism that permeates projections of project time lines. D2000 was unusual among recent DWPs in giving an expected date for the delivery of many of its capability promises. The 15 delivery times given ranged from four to 15 years, with an average of seven years. The reality was very different. Even being generous and assuming that Initial Operating Capability (IOC) corresponds to successful delivery, the actual average is almost 13 years—amounting to a schedule overrun that averages a little over five years. Table 1 presents the summary data for projects announced in D2000.

Table 1: Major announcements in D2000—planned and actual delivery times

|              | Number of projects | Cancelled / scope change | Predicted average time (years) <sup>a</sup> | Actual average time (years) <sup>b</sup> |
|--------------|--------------------|--------------------------|---|--|
| Land         | 9                  | 4                        | 7.3   | 14.4                                     |
| Air combat   | 10                 | 3                        | 8.2   | 14.7                                     |
| Maritime     | 8                  | 1.5 <sup>c</sup>         | 6.0   | 10.0                                     |
| Joint/C4ISR  | 4                  | 1                        | n/a   | Partly delivered                         |
| <b>Total</b> | <b>31</b>          | <b>9.5</b>               | <b>7.4</b>                                  | <b>12.7</b>                              |

C4ISR = command, control, communications, computers, intelligence, surveillance and reconnaissance.

a Sources: D2000 and as per links in Table 3.

b To IOC.

c Significant de-scoping of lightweight torpedo project = 0.5.

In fairness, D2000 was delivered before the subsequent reforms to defence procurement (Kinnaird in 2003 and Mortimer in 2008), which introduced the 'two-pass' process and various review and oversight mechanisms intended to make predictions of project parameters more accurate.

But, for D2000, there's absolutely no ambiguity that the initial estimates of delivery times were systematically on the low side. Of the 15 project times given in D2000, only one (the Armidale patrol boats) was delivered on time. One (tactical uninhabited aerial vehicles, or UAVs) was cancelled after the projected time had already elapsed, and the remaining 13 were or will be delivered late. Barring an extraordinary statistical fluctuation (less than one chance in 10,000), there has to be an explanation beyond randomness for the observed data. Clearly, the models used to generate estimates were systemically biased. There are several possible explanations for this observation:

1. External events delayed progress across the program.
2. Defence capability and project planners exhibited an optimistic bias because they have inherent 'can do' outlooks.
3. Defence planners and suppliers exhibited an optimistic bias because it helped win support for projects in aggregate (from the government) and within the portfolio of options (within Defence). While this explanation more readily applies to cost rather than schedule, it might have been in play. Eager to lock in projects at a time of rare bipartisan and public support for strong defence after the Timor deployment in 1999, they promised what they knew couldn't be delivered.

There's not much evidence to support the first explanation, beyond the onset of a high ADF operational tempo in 2001. Budget pressures can't explain the delays because money didn't really tighten until the global financial crisis in 2008 and the subsequent decline in government revenues—after the expected delivery date of many of the D2000 programs.

The second explanation could be countered by developing a more robust cost and schedule estimation process that includes a robust understanding of past trends—often a better indicator of expected results than a priori estimates. A high degree of contestability, including from external experts in project management, could only help to produce more realistic predictions.

A more robust estimation of costs and schedules early in the capability development process would also help counter the 'gaming' of the system implicit in the third explanation. A robust—even somewhat adversarial—process in which an expert sceptical view is taken of data supplied by contractors hopeful for business and the advocacy of the services hoping to get projects into the Defence Capability Plan could help avoid the outcomes we see here. Of course, the Kinnaird and Mortimer reforms were intended to provide such review mechanisms. Data collected by the Australian National Audit Office suggests that there's been some improvement in project outcomes after second pass, but ASPI's annual budget brief analysis of the Defence Capability Plan suggests that delays before final approval offset any gains from more efficient delivery after approval. As well, it's not clear (at least from outside) how much rigour is present in the very early stages of project development. The bottom line is that adding substantial ADF capabilities through developmental projects remains a time-consuming business. As we'll see below, the frequent delays come at a significant capability cost.

## Changes of plan

One of the consequences of projects that take a decade or more to deliver is that the world can change between a project's conception and delivery. More than a quarter of the capability enhancements announced in D2000 were subsequently overtaken by events. In some cases, priorities changed in response to shifts in the strategic environment or because the government changed its thinking about the roles it sees for the ADF. That explains why the Army was expanded by two battalions in 2007 despite D2000 apparently being quite sanguine about its then size. Similarly, the 9/11 attacks had a significant impact on the resources allocated to defence generally and to intelligence specifically—so there's no reason to expect the prognostications of D2000 on intelligence capability to accurately reflect what came later.

Harder to explain is why some of the announcements made at the time seem to have gone precisely nowhere—possibly they never had sufficient priority within the services and therefore lacked a champion at the Defence Committee table. Two examples are ground-based air defence and the planned acquisition of 120 mm mortar systems for indirect fire support for the Army. Ground-based air defence has been an ADF capability shortfall for 20 years, and the Army has to rely on support from the other services or from coalition partners for protection in any operating environment with an air threat. There's no official explanation for why the 120 mm mortar project never progressed, but a likely explanation is that it originated in the 'Army 21' construct of the 1990s, which had at its core a lightweight, highly mobile land force optimised for operations in the north of Australia—a model thoroughly overtaken by experiences in the Middle East theatre in the early 2000s.

## The cost of waiting

There's a case to be made that promising to deliver big leaps in capability can actually have the effect of *lowering* the capability of the ADF in key areas. This can occur in several ways. First, older equipment is generally less capable than new equipment. Second, if life extension programs are required for existing equipment, it will need to be taken offline for a period. An even worse case is when capabilities reach the end of their economic lives and have to be retired—which can result in no capability at all for extended periods. There's also a potential dollar cost of late delivery, from either the cost of life extension programs or the acquisition cost of stop-gap solutions until the 'final' capability is delivered.

For example, if we look at the ADF's air combat capability since 2000, we can see *all* of those effects in play. D2000's force structure plans included the replacement over the 2000–2015 period of essentially all of the ADF's air combat and strike capability, then embodied in the RAAF's fleet of F/A-18 Hornets, F-111s and Boeing 707 tankers. At the time, it was expected that new fighters would be the last capability to fall into place around 2015—joining new tankers and Wedgetail airborne early warning and control aircraft (AEW&C) from 2006, and an F-111 fleet that had received upgrades to its electronic warfare self-protection and weapons suites throughout the 2000s. The tankers and AEW&C were both delivered (in the IOC sense) six years late, and in the case of the tankers the RAAF had a capability gap; there was no air-to-air refuelling capability at all for five years. The F-111 was retired earlier than expected in 2010, prompting the purchase of an 'interim' Super Hornet fleet that will now serve out to at least 2030, with concomitant costs of operating a mixed fleet. Table 2 summarises the planned and actual sequences of events.

**Table 2: D2000 air combat plans and reality**

| Capability                      | D2000 plan  | Actual   |
|---------------------------------|---|--|
| Air-to-air refuellers           | Replacement of B707 from 2006                                 | B707 retired 2008, first replacement capability 2013 = 5 year capability gap   |
| AEW&C                           | In service from 2006  | Initial capability from 2012—some contracted capability not delivered  |
| Hornet upgrade                  | To be completed 2007  | Completed 2012   |
| Hornet lifetime                 | Retirement 2012–15  | Expected to serve until 2020–21  |
| Hornet replacement              | To be delivered in first half of 2010s                        | F-35 expected to enter service ~2020   |
| F-111 upgrade                   | To be completed 2008–09, with aircraft in service until ~2020 | Weapons upgrades completed 2008; F-111 retired 2010  |
| Super Hornet 'interim' solution | No need foreseen  | First tranche of 24 ordered 2006, second (12 'Growler' electronic warfare aircraft) in 2013. Total cost will exceed \$8 billion this decade. |

To be fair, while delays in the Wedgetail and the tankers can reasonably be included in a critique of Australian planning, the classic Hornets will soldier on for an additional five to seven years largely because of delays in the F-35 Joint Strike Fighter program that were beyond the ability of anyone in the Australian system to manage. But there's still a common factor at work, as all three were developmental programs.

Air combat isn't the only domain in which there have been ADF capability gaps. The fleet air defence capability of the Perth class DDGs was decommissioned around the time of D2000, and the plan was to replace it first with upgraded Anzac frigates and then dedicated air defence platforms (later to become the air warfare destroyer project). The Anzac frigate upgrade is looking promising now, but suffered at least one 'false start' and will be the best part of a decade late, meaning that the Navy will have lacked fleet air defence for over 15 years. Similarly, only two-thirds of the Collins submarine fleet has the planned upgraded combat system today, although at least the preferred solution works properly. When the Navy gets its (almost) off-the-shelf Romeo version Seahawks from 2015, it will have modern sonar, torpedo and sensor systems on its embarked helicopters for the first time in many years. Other capability gaps include a battlefield airlift capability (the Caribou was retired in 2009 and the replacement C-27J is due in 2016–17) and tactical UAVs for the support of land forces (provided by contracted aircraft in Afghanistan).

## Conclusions

In the sense that most of its 31 major announcements are now delivered, cancelled, overtaken by events or well into the construction phase, we're getting towards the end of the delivery of the ADF capability planned in D2000. As the discussion above and the status reports at the end of this paper show, it hasn't been an especially happy process in terms of plans matching delivery. There have been several significant capability gaps; fortunately, none of those capabilities have been called upon in extremis.

There's an interesting sub-story to the D2000 tale. Several unplanned off-the-shelf purchases have been made along the way, in some cases directly as a result of plans going awry (the Super Hornet buy), in some cases because they offered a neater and better solution to existing capability requirements (the C-17 purchase rather than a Hercules upgrade) and in one case because a vital national capability had fallen over (HMAS *Choules* replacing a moribund amphibious lift fleet). In each case, the capability boost was rapid and substantial (a least until the *Choules* suffered a mechanical failure).

DWP 2009 called its future ADF 'Force 2030'—thus allowing more than two decades for its ultimate delivery. If for no other reason, that flags it as somewhat more realistic than its predecessor. And, given that two of the centrepiece capabilities of DWP 2009—the future submarines and frigates—are still in their planning stages, every one of the 21 years between 2009 and 2030 is likely to be needed to deliver to the ADF the capabilities it saw as vital. Between now and then, the world will change and there'll be project hiccups and unexpected acquisitions in response to changed circumstances. The experience of D2000 suggests that Force 2030 won't ever exist in the form planned in 2009 (and reiterated this year in DWP 2013).

With a new government due in September, it's probably a good time for the incoming Defence Minister to look back before looking forward. The three main lessons of D2000's force structure plans are unlikely to be a special case:

- Plans that take decades to be delivered are unlikely to survive the impact of external events and policy changes unscathed.
- Planning numbers *systematically* err towards the optimistic, with the downside risk of additional costs, capability gaps, or both.
- Developmental programs frequently run later than expected, while off-the-shelf purchases can provide additional capability quickly.

## Status report—land capabilities

| D2000 says ...   | What happened  |
|--|--|
| ... it is no longer a priority to provide the basis for the rapid expansion of the Army to a size required for major continental-scale operations.   | Policy change: Army has two new battalions as a result of the <a href="#">enhanced land force initiative</a> (2007).   |
| Two squadrons (around 20–24 aircraft) of Armed Reconnaissance Helicopters planned to enter service from 2004–05 ... providing deployable, flexible, high precision, and highly mobile firepower and reconnaissance.  | Tendered 2000, <a href="#">contracted December 2001</a> . Full operating status 'won't be until 2015–16'. Was on <a href="#">Projects of Concern list</a> .  |
| An additional squadron (about 12 aircraft) of troop-lift helicopters to provide extra mobility for forces on operations. In particular, these helicopters will enhance our capability to operate off our newly acquired troop ships, HMAS <i>Manoora</i> and <i>Kanimbla</i> . These helicopters are planned to enter service around 2007. | On <a href="#">Projects of Concern list</a> —initial operating capability for Army 'by mid-2014'.  |
| Major upgrade of 350 of our M113 Armoured Personnel Carrier fleet, with the upgraded vehicles planned to enter service from around 2005.   | Significant scope and cost increase and delays. Project was closed this year. Was on <a href="#">Projects of Concern list</a> . <a href="#">Does not meet current capability requirements</a> .  |
| A new shoulder-fired guided weapon for key elements of the force to attack armoured vehicles, bunkers and buildings. This weapon is planned to enter service around 2005.  | Javelin missile <a href="#">purchased off-the-shelf</a> through US Foreign Military Sales (FMS) process, 2002.   |
| New air defence missile systems to supplement the existing RBS-70 and replace the existing Rapier systems, giving comprehensive ground-based air defence coverage to deployed forces.  | No acquisition.  |
| Twenty new 120 mm mortar systems mounted in light armoured vehicles to improve mobile firepower planned to enter service in 2006.  | No acquisition.  |
| A new thermal surveillance system and tactical uninhabited aerial vehicle (UAV) to provide surveillance for deployed forces, planned to enter service from around 2003 and 2007 respectively.  | After many false starts, <a href="#">Project Land 129 was cancelled in 2008</a> (PDF, see pp. 208–212). Australian land forces in Afghanistan relied on contractor-provided capability.  |
| ... to plan on replacement of the Landing Ship HMAS <i>Tobruk</i> when it reaches the end of its service life in 2010, and to program the replacement of <i>Manoora</i> and <i>Kanimbla</i> in 2015.   | <i>Tobruk</i> is still in service (with availability issues). <i>Manoora</i> and <i>Kanimbla</i> <a href="#">were decommissioned</a> in 2011 when the amphibious capability collapsed. HMAS <i>Choules</i> <a href="#">purchased from Royal Navy</a> in 2011 (out of service June 2012 to April 2013). Landing helicopter docks expected in 2014 and 2016. |

## Status report—air combat capabilities

| D2000 says ...  | What happened   |
|---|---|
| Our airlift capabilities will be enhanced by the acquisition of new aircraft to replace the Caribou from 2010.  | Caribou retired in 2009. Acquisition of C-27J through FMS process for <a href="#">IOC late 2016</a> .   |
| ... refurbishment of our 12 C130H aircraft by about 2008.   | Policy change: overtaken by C-17 and C-27J acquisition and <a href="#">C-130H retired in 2012</a> .   |
| We plan to undertake a major program to provide better electronic warfare self-protection (EWSP) of our transport aircraft and helicopters from missiles by around 2004.  | Project Echidna delivered, with various degrees of success, EWSP to some ADF aircraft (see <a href="#">here</a> , pp. 164–173). Was on Projects of Concern list. Other aircraft have now received FMS-provided systems after the <a href="#">failure of the indigenous ALR2002</a> to provide adequate capability.                |
| ... we need to address the future of our air-combat capability after the F/A-18 aircraft reach the end of their service life between 2012 and 2015.   | Classic Hornets to serve until 2020–21.   |
| ... continue the upgrade program for the F/A-18 aircraft ... planned to be completed by 2007.   | Project <a href="#">substantially complete in 2012</a> (see pp. 309–332).   |
| ... we will proceed now to acquire four Airborne Early Warning and Control (AEW&C) aircraft, with the possibility of acquiring a further three aircraft later in the decade. The aircraft are planned to start entering service around 2006.  | Aircraft <a href="#">reached IOC in 2012</a> . <a href="#">Project of concern 2008–2012</a> .   |
| ... we have scheduled a major project to replace and upgrade our AAR capability ... planned to enter service around 2006.   | <a href="#">Boeing 707 fleet retired 2006–2008</a> . Replacement <a href="#">achieved IOC 2013</a> —but remains on the Projects of Concern list   |
| ... the Government will examine options for acquiring new combat aircraft to follow the F/A-18, and potentially also the F-111. Acquisition is planned to start in 2006–07, with the first aircraft entering service in 2012.   | F-35 deliveries late this decade, <a href="#">IOC around 2020</a> .<br><a href="#">‘Interim’ Super Hornets</a> total cost > \$10 billion.   |
| ... the Government has decided to undertake further EWSP upgrades [for the F-111] and acquire additional types of stand-off weapons with longer range ... to provide more alternative attack options and better capability against hardened and area targets. These projects are planned to start around 2004. The first enhancements from this program are expected to enter service around 2008–09. | EWSP upgrades included new radar warning receivers and jammers—but the Hornets rather than the F-111s were sent to Iraq in 2003.<br>The AGM-142 stand-off missile entered limited service in 2009 after the <a href="#">first successful test firings in 2008</a> .<br>The F-111 was <a href="#">retired at the end of 2010</a> . |

## Status report—maritime capability

| D2000 says ...  | What happened   |
|---|---|
| ... the ANZAC ships are planned to be upgraded to provide a reasonable level of anti-ship missile defences and other enhancements of their combat capabilities, including the fitting of Harpoon anti-ship missiles. This project is scheduled to start in 2001 with upgraded ships in service by 2007.   | Harpoon successfully fitted. Anti-ship missile defence project delayed and rescope. <a href="#">HMAS Perth fitted with phased array radar as proof of concept in 2011, with rest of fleet to be fitted 2013–17</a> .  |
| ... the FFGs are planned to be replaced when they are decommissioned from 2013 by a new class of at least three air-defence capable ships.  | Air warfare destroyer (DDG) project— <a href="#">expected delivery now 2016 to 2019</a> .   |
| The Government plans to replace HMAS <i>Westralia</i> , which is a converted commercial tanker, with a purpose built support ship when it pays off in 2009 ... [and] we also plan to replace our second support ship, HMAS <i>Success</i> , with another ship of the same class when it pays off in 2015. | <a href="#">Westralia decommissioned 2006</a> . Replaced by another converted commercial vessel ( <a href="#">HMAS Sirius</a> ) in 2010. <i>Sirius</i> and <i>Success</i> now in line for replacement ‘ <a href="#">at earliest possible opportunity</a> ’. |
| The Government plans a major mid-life upgrade of the Seahawk commencing around 2003.  | Seahawk midlife upgrade scaled back to a ‘capability assurance program’, prior to <a href="#">replacement with new build MH-60R Seahawks from 2015</a> .  |

| D2000 says ...  | What happened  |
|---|--|
| The Government plans to bring all six Collins class submarines to a high level of capability by major improvements to both the platform and combat systems. The first boat with the new combat system is planned to be available in 2005–06.  | As of 2013, the new combat system has been <a href="#">installed in only four of the six boats</a> .   |
| In addition, a project is also scheduled to replace our current heavyweight torpedo with a new and more capable weapon beginning in 2002–03. The first new torpedoes are planned to enter service around 2006.  | Boats with the upgraded combat system (see above) <a href="#">can fire the Mark 48 CBASS torpedo</a> . First successful trial in 2007–08.  |
| Australia's fleet of 19 P-3C Orion maritime patrol aircraft are [sic] undergoing a major upgrade ... the fitting of new electro-optical sensors ... and the acquisition of a new lightweight torpedo to improve the P-3C's critical submarine-killing capabilities, starting around 2002. | Sensor upgrade <a href="#">completed 2005</a> (PDF).<br>Lightweight torpedo upgrade <a href="#">abandoned for airborne platforms</a> (PDF, p. 40)—AP-3C and Seahawk helicopters—in 2009. Will be replaced by <a href="#">off-the-shelf Mk 54 torpedoes from the US</a> . |
| ... a project will start next year to provide a new class of patrol boat to replace the Fremantles as they are decommissioned. The new boats will preferably be built in Australia and are expected to enter service from 2004–05.  | <a href="#">First Armidale class patrol boat commissioned 2005</a> .   |

### Status report—information (C4ISR) capability

| D2000 says ...   | What happened   |
|--|---|
| ... enhanced signals intelligence and imagery collection capabilities; enhanced geospatial information systems; improved intelligence processing and dissemination systems; and deeper levels of cooperation with the United States in some key systems.   | Unable to accurately assess from open source information. Intelligence collection and processing scope <a href="#">significantly increased</a> after 9/11 attacks.  |
| A sustained program of enhancement to the JORN [Jindalee Operational Radar Network] over the horizon radar system once it enters service in 2002. We also plan to improve our ability to fuse data from JORN and other sensor systems to provide an integrated national surveillance picture.  | Phases 3 and 4 of the JORN project, commenced in 2003 to provide incremental upgrades to the newly delivered radars, <a href="#">concluded 2007</a> . Note: once delivered, Phase 5 will complete the specifications of the 1987 Defence White Paper.   |
| ... higher capacity satellite communications based on a commercial provider, enhanced broadband communications with ships at sea, and improved battlespace communications for air and land force elements.   | Delivered successfully through a <a href="#">combination of commercial and milspec systems</a> .  |
| ... key investments planned over the coming decade are the establishment of a single collocated Theatre Headquarters, and the development of two deployable headquarters to provide on the spot command for two deployed forces simultaneously; a single integrated command support system linking all ADF elements; and an integrated personnel, logistics and financial system based on e-business principles. | A joint HQ (Headquarters Australian Theatre) was already in being when D2000 was written. Renamed and expanded as HQJOC in 2004. Purpose-built centre officially <a href="#">opened at Bungendore in 2009</a> .<br>Single command and control system for all ADF elements is a <a href="#">work in progress</a> .<br>Integrated personnel, logistics and financial system for the Department of Defence seems unlikely to happen in the foreseeable future. |



## Acronyms and abbreviations

|       |  |
|-------|--|
| ADF   | Australian Defence Force   |
| AEW&C | airborne early warning and control   |
| C4ISR | command, control, communications, computers, intelligence, surveillance and reconnaissance |
| D2000 | Defence 2000: our future defence force (White Paper)                                       |
| DWP   | Defence White Paper  |
| EWSP  | electronic warfare self-protection   |
| FMS   | foreign military sales (US process)  |
| IOC   | initial operating capability   |
| JORN  | Jindalee Operational Radar Network   |
| RAAF  | Royal Australian Air Force   |
| UAV   | uninhabited/unmanned aerial vehicle  |

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