

17 Feb '06

The Secretary
Senate Foreign Affairs Defence and Trade References Committee
Suite SG-57
Parliament House
CANBERRA ACT 2600

Dear Sir/Madam

INQUIRY into NAVAL SHIPBUILDING in AUSTRALIA

Enclosed is a paper containing some thoughts concerning Australian Naval Shipbuilding and Repair which I believe are relevant to the subject inquiry.

A copy has been passed to CDRE Longbottom, DGNAVSYS, for information, as I have referenced his organization several times.

Yours faithfully

D J Truelove

Enclosure: NAVY SHIPBUILDING AND REPAIRING

NAVY SHIPBUILDING AND REPAIRING

Introduction

The following thoughts pertain to the acquisition/maintenance of ships for the Navy and represent my views only. Specifically they do not and are not intended to represent the views of any present or past Director(s) of Naval Platform Systems, the Director(s) General of Navy Systems, Commander(s) of Navy Systems Command, (Commodores) General Managers of dockyards or other enterprises, or any past equivalent offices, some of whom I can be confident will be outraged by them. Nor do they pretend to represent the views of any of my past peers, supervisors or subordinates though I suspect some of them would find themselves privately in substantial agreement, especially the Old Lags who have worked for Navy for many years. Additionally I have not researched to confirm some of my assertions, but I have no reason to suppose that they are grossly in error.

By and large submarine building and repair has been ignored as this is a rather more specialized field.

Where necessary names are suppressed to protect the guilty. I have appended some acronyms to the paper, but make no promise that all are so appended or that any are current.

Definitions

The following terms are used in this paper:

- “Frigate” covers the family of ships of about 2000 - 12000 tonnes intended to fight while remaining on the surface of the water, this term being adopted because the traditional distinctions between frigate, destroyer and cruiser have become hopelessly muddled¹. Frigates are (or should be²) serious warships, capable of going into harm's way and staying there.
- “Patrol Vessels” (PVs) covers all ships less than about 2000 tonnes which are painted haze grey, usually carry some sort of gun and occasionally a helicopter, and are run by the Navy. In general these are not warships (see below) and should never be sent after anything more formidable than a SIEV.
- “Mine countermeasures Vessels” (MCMV) also are smaller ships, but these have a specific role (clearing mines) which requires them to go into harm's way. They may also be used as Patrol Vessels, although are unlikely to have the speed of a PV proper.
- “Shipbuilder” means the prime contractor tasked with building and/or maintaining the whole ship system – ie., the hull, machinery, outfit, weapons, C4I, ILS through life etc. In reality the firm undertaking this work probably will be one of the major Defence Corporations.
- “Shipyards” means the place where the work is undertaken, and here I have assumed that this is a fixed facility. There is no in principle reason why this need be so, but as the thesis of this paper suggests that stability is an important part of reducing shipbuilder

¹ By way of example, the USN has “Destroyers” (DDG51) and “Cruisers” (CG47) of similar purpose, size and armament. The DD21 destroyer (cancelled in the late 1990s) was to have exceeded 12,000 tons, 2000 tons greater than the pre World War 2 treaty limit for a cruiser! The proposed RAN AWD in another time would be called a Fleet Cruiser or something similar – its role and size are similar to that intended of the DIDO (RN) and ATLANTA (USN) classes before World War 2.

²We still have not shock tested ANZAC to confirm this – is Australia's principal warship really no more than a large PV?

- costs and improving ship quality, a fixed facility is likely to be advantageous.
- “Shipbuilding” includes ship repair except where otherwise noted.
- “Warship” includes all ships intended to go into harm's way, including Frigates and MCMVs discussed above. Other ships in this category are submarines, aircraft carriers, troopships (LHDs, LPDs etc. which may be carrying large numbers of our most valuable resource: the army) and in some circumstances tanker/replenishment ships (AO, AOE, AOR etc.) which may be operationally bound to remain with the warships. Some PVs could be included as the larger ones could make a useful wartime contribution.

Background – Navy Shipbuilding and Ship Repairing.

My starting point is (as usual) to consider the past³.

I was employed by the Dept of the Navy in 1969 as a Cadet Naval Architect, and sometimes willingly/sometimes reluctantly worked for the RAN in Naval Engineering until 2005⁴. Over the period my work has encompassed design, production, maintenance of RAN ships, submarines and boats, as well as all sorts of *ad hoc* Engineering as I may have been tasked. Thankfully I now am retired, finishing my work⁵ for the Navy as Assistant Director in the Directorate of Naval Platform Systems with some indeterminate, undefined responsibility for future Naval projects and no authority whatsoever to effect whatever that responsibility might have been.

In 1969 Naval Engineering Design and Production was vested in 3 substantially civilian organs of the RAN, the Offices of Principal Naval Architect, Principle Marine Engineer and Principle Electrical Engineer, all of whom answered to the 3rd Naval Member, a Rear Admiral and the Chief Naval Engineer. The actual ship building and repair was undertaken in Naval and private dockyards, and by such other companies as may be contracted by Navy or through subcontract to the dockyards. Navy had enjoyed considerable successes in its shipbuilding/repairing in the 1950s and 1960s⁶, and appeared to be moving confidently to greater successes in the 1970s and beyond⁷, but in truth most the dockyards (both Navy and private) were grossly under capitalized and/or inefficient. Possible/partial exceptions were Carrington's Slipway PL, Adelaide Ship⁸ and the BHP operation in Whyalla⁹ (none of which then had any Navy dealings to my knowledge), and there may have been others.

So far as Naval *shipbuilding* is concerned, this unsatisfactory state was in large part a consequence of government policies, including:

- maintenance through the 1950s-1970s of two “building” dockyards (Cockatoo and

³ “He who will not study the past is doomed to repeat it” – apologies to Georg Santyana 1898(?)

⁴ With the exception of a couple of years attached to Support Command Australia, the consequence of some DRP fadsurfing quite out of my control and subsequently reversed because of its fundamental illogicality.

⁵ I cannot bring myself to call all those wasted years a “career”

⁶ A good example was the late HMAS MORESBY. This ship was designed by the Navy and the Ship Building Board in cooperation (“Alliance” in newspeak), commissioned into the RAN in 1964 and paid off out of service only a few years ago. Other examples were HMAS STALWART, an *ab initio* design with a propulsion efficiency as high as ever achieved, and HMA ships SWAN and TORRENS, these being extensively redesigned from their RN parent and RAN predecessors. The integration of the IKARA ASW system into the RAN ships was better done than the RN achieved in larger vessels. Project WHOMPA (?name) was to have produced an anti ship missile comparable with EXOCET or HARPOON, but apparently was canceled.

⁷ We even gave the designing and building of a first class destroyer, the DDL, a go.

⁸ These yards built small ships. Adelaide failed, allegedly through managerial corruption, in the 1970s and Carringtons when it overcommitted to the ANZAC ship project in the 1980s.

⁹ This built “large” merchant ships under subsidy, and had an arrangement with Japans Mitsui shipyard. In 1970/71 BHP Whyalla was attracting interest from foreign ship owners as a possible building yard, but nothing came of it, and governments decision to end the subsidy in the late 1970s saw the yard close. In my opinion this was a tragedy for Australian shipbuilding, and more so for Australia's defence. A Navy without a merchant service is a Navy looking for a reason to exist. Similarly the recent sale of the ANL is another nail in Navy's coffin.

Williamstown) where the RAN's shipbuilding requirements could have been met easily by one;

- failing to invest in the Naval dockyard (Williamstown), so that its processes were little changed since the 1940s;
- failing to lease Cockatoo Dockyard for a period sufficient to justify the company (Vickers) investing in the yard¹⁰.
- procrastination by restricting funding in building the DARING Class, so delaying their completion by 10 years(!) compared with their RN parents^{11 12};
- cancellation of the fourth DARING, to have been named HMAS WATERHEN;
- similar funding led delays of the RIVER Class DEs;
- building the DDG (PERTH) Class ships in the USA in the 1960s, rather than *any* modern guided missile ship in Australia;
- cancellation of the DDL Project;
- building the first 4 FFG (ADELIADÉ) class ships in the USA in the 1970s, and
- then expecting a totally demoralised yard to be able to build 2 more of these sophisticated warships in any sort of timeframe in the 1980s¹³.

To be fair, the government cannot be blamed for every ill in the Australian Naval shipbuilding industry. The DDG decision appears to have been unduly influence by Admiral ___, and the Dept of Defence/Navy's capacity for procrastination, for delaying decisions on this or that excuse, was a major factor in the demise of the MHI catamaran, a brilliant concept of Mr ___'s in 1975, which didn't see light of day until 1983 – 8 years genesis for a 220 tonne ship!¹⁴ And it wasn't actually accepted into Naval Service until 1993¹⁵ - 18 years after genesis!!

Also, it was a matter of unbelievable courage to build the COLLINS class in Australia, and for that I applaud Mr Beazley immensely.

Nor has Industry been blameless – before the contract was signed for HMAS SUCCESS, it was common knowledge¹⁶ that some equipments for the ship were quoted at a price less than that paid some years before by the parant Navy. There was no prospect of the ship being built for the tendered price.

Naval ship *repair* was not assisted by having both building dockyards undertake repair as well as maintaining a repair dockyard (Garden Island) capeable of supporting the British Pacific Fleet of World War 2¹⁷. Excess capacity always leads to idleness and/or “make work”, which (even more than idleness) is corrosive of morale and enthusiasm. The best of the tradesmen left, the “also rans” remained, the waterfront mafia moved in¹⁸. And the dockyards became more inefficient.

¹⁰I understand that Cockatoo was leased to Vickers for 2 years at a time with no guarantee of a further lease. In consequence, Vickers had no incentive to update the yard, and Cockatoo remained dependant on steam cranes into the 1970s or later. Even more “interesting”, it was only in the late 1960s that a “crane” comprising an immense baulk of timber – at a guess 24” x 24” or more – was put out of service. I saw it in (its) retirement. Probably the bushranger Frank “Darkie” Gardiner saw it in use while he was incarcerated at Cockatoo in the 1860s!

¹¹The result being that the RAN DARING Class ships were the best World War 2 destroyers ever built but not completed until 13 years after the end of the war!

¹²I have this from “Pommie Bill”, a senior and very experienced shipwright in the Hull Technical Office at Williamstown in 1970.

¹³Mr ___, then a very senior Naval Architect in the Navy's employ was most emphatic about this in the 1970s. It made a marked impression on the young and hopeful me. His reservations were fully justified by the AF Project: years later. This project failed completely and successful only when the dockyard management was changed completely.

¹⁴To keep this in perspective, Japan started World War 2 in 1937 by invading China and the USA ended it in 1945 by bombing Japan – also 8 years! Then 8 years was sufficient for whole *classes* of small warships to be designed, built, sent into action, sunk and replacement classes designed and built (and sometimes also sunk).

¹⁵By which time a good dog had a really bad name.

¹⁶Common knowledge is a bit like common sense – never there when needed. I can provide no reference to this now.

¹⁷Even if the crane intended to lift gun barrels from RN battleships was not commissioned until the year before the last ever RN battleship was decommissioned!

¹⁸None of this is entirely true. Both Naval Dockyards had suburb tradesmen, technical officers, engineers, etc right up

The consequences of the above were that the Australian Naval shipbuilding and repair industry had reached such a nadir by the mid 1980s that NDW was sold and in the 1990s GID was incorporated into ODP, then ADI and now has been sold to Thomson, a French concern. ASC is to be sold also to a foreign operator (unless TENIX can meet the price)¹⁹. Vickers Cockatoo has ceased trading and if the pollution of over a century mostly empirical shipbuilding can be resolved, the island may be sold to Japanese interests as a haven from Australians²⁰. A rebirth of sorts has occurred with the ANZAC and COLLINS Classes, and while not contributing to “Naval” shipbuilding and repair, this has been aided by the LEEWIN and ARMIDALE Classes, but these last two almost localized initiatives do not solve the Navy shipbuilding and repair problem, and the very fact that the Senate has now invited comment attests thereto²¹.

Nor was the problem limited to the shipbuilder's tradesmen – the more enterprising staff at all levels in the shipyards and in the Department “moved on”, and all the while some very ordinary persons in the Navy, tiring of a seagoing life and unable to attract employ elsewhere, displaced dedicated Navy civilians in the ship building and repair sector. This has resulted in a huge loss of “corporate knowledge”. We (the collective shipbuilding and repair community) *know* that we have forgotten, but we don't know *what* we have forgotten, we don't know *how much* we have forgotten, and we don't even know if what we have forgotten is *worth remembering*²².

And Navy's systems became impossible: in the 1980s I was asked to do something about rust on the then new FFGs, I investigated all the complaints that I could find²³. I investigated USN experience with the problem²⁴. I investigated the USN ship preservation requirements²⁵. I inquired of the RANs painting requirements as set down in ABR 19 and then presented my findings verbally to my supervisor, Mr ___ asking his advice how to proceed²⁶. I spent the next several weeks “at” Mr ___ for a decision, for a course of action, for a *anything*. It didn't happen, but presently Mr ___, leaning comfortably back in his chair, said that were I to provide him with the evidence of a problem, he would attend to it. I was furious, tied all the papers up in Public Circus file tape (we always had plenty of that!) and dropped the foot thick A4 brick on his desk, before going off to another position. Some weeks later (while investigating a quite unrelated matter) I found my brick, unopened, in the compactus.

Also unhelpful was Navy's culture of criticizing the Dockyards (or for that matter any civilian operation or individual, including all Navy's civilians) while having the same persons/organizations undertake illegal modifications²⁷ (at Navy/Commonwealth) expense for their comfort and convenience. Some of these modifications had quite detrimental effects on the ships.

to their demise, but overall the quality of individuals and the esprit *de corps* declined – and persons (including those at the highest levels) were convicted of criminal activity, though most of the rest were as honest as any citizens to be found outside politics.

¹⁹Or is it already sold?

²⁰Oh all right, that proposal was 10 or more years ago, and I guess some trendy has come up with a better one.

²¹Purchase of the off the shelf tanker to replace WESTRALIA should be seen as a National Disaster to the Australian Shipbuilding.

²²Reference my comments in a submission to the INQUIRY into MATERIAL ACQUISITION AND MANAGEMENT in the DEPARTMENT OF DEFENCE in June '02

²³They were many, but most had a sensible proposal for rectification.

²⁴The USN also had a major problem, but more practical than we, appointed a Tiger Team to solve it. We had a copy of the teams report.

²⁵The USN ship painting specification was totally incoherent, but the preservation was based on the use of epoxy red lead. Red lead had long been identified as an OH&S hazard at that time, both here and in the USA. We specifically banned its use, but ...

²⁶At that time everything pertaining to the FFGs was passed through a USN LCDR, a man of rather ordinary ability, who knew he could not get into trouble with the USN by recommending all USN initiatives. In consequence, almost nothing the RAN initiated was considered, let alone acted upon.

²⁷“rabbits”

Interlude: The Learning Curve

In all production (and almost all life) there is the “learning curve”, much discussed but little understood, where it is found that the repeating the same task requires less effort than the initial or previous doing of it. The effect of the learning curve was a major reason for the truly extraordinary production of all sorts of war materiel in the USA (and Germany and the USSR) between 1941 and 1945. It manifests itself in a steady reduction of cost and improvement in quality as a multi unit production run is undertaken.

Generally it is held that the benefit of learning is achieved when identical items (in this case ships) are built in one location and in quick succession. Ideally ships should be built so that the tradespersons have barely time to complete a task on ship n before repeating the task on ship $(n+1)$. It seems that there is almost no reduction of knowledge or of the tricks that facilitate shipbuilding where deliveries are 6 months apart, and only a slight reduction where they are 12 months separated.

Building the 10 ANZAC Frigates at Williamstown Dockyard took advantage of this.

What is not understood is that a large part of the learning is learned in the office, and this can be carried over for long periods, even when production is slow, or can be transferred to other dockyards (this is often called technology transfer). AMECON/TENIX also took advantage of this: when they restarted building at Williamstown Dockyard as they drew on the best practices available in warship building in Germany, the USA and elsewhere.

Even less understood is that the learning curve need not be applied to the completed item. The huge success of Japanese and South Korean shipyards²⁸ is because they have concentrated on perfecting *processes* which can be applied to any ship. Somewhere in HHI there is a man²⁹ who makes 250 x 250 knees. He is well paid - probably better than his Australian counterpart - and regularly goes diving in the Philippines during his leave³⁰. The knees that he makes are fitted to *any of the half dozen or so different ships under construction in the yard at the time*³¹. And the whole shipyard works that way. The special welder could be on a supertanker on Monday and a feeder container ship on Wednesday, but is doing the same job and getting better at it all the while. So is the scheduler, the purchasing officer and even the bean counter responsible for paying these people.

Time Now

Closing WND and passing Warship building to AMECON and now TENIX has been successful. A “circuit breaker” effect was created, enabling new management, processes and staff to be employed. The moribund Naval Dockyard (modernized somewhat by the Commonwealth) was reinvigorated by Industry. TENIX was able to revive the AF Project before starting on the ANZACs, and both classes appear to be reasonably successful in service. Pitching the deliveries at little over one year intervals also made good use of the learning curve and one sensed a growing confidence and growing morale in the yard, at least through 1990s.

Unfortunately some of the ills which compromised shipbuilding in the past have resurfaced:

- TENIX
 - was asked to slow production of the ANZACs because Navy cannot man the ships,

²⁸Which now build about 70% of the worlds deadweight tonnage.

²⁹Or more probably, a team.

³⁰I have met “him”, or at least some of his mates.

³¹And different means different: tankers, bulkers, containerships. Ships of 10,000 to 250,000 tonnes or more.

- has no certainty of future orders,
- appears to be an unlovely employer with consequent higher than desirable staff turnover;
- Other Naval work continues to be placed elsewhere (eg., PVs with ASI, Survey Ships with NQEA, MHCs with ADI, AWDs with ??) so drawing *some* of the TENIX retrenched/disaffected, but causing others to leave the industry;
- Government policy appears dependant on political whim (eg., to sell ASC the government appears willing to sacrifice Australia's only successful Warship builder), and
- Processes for doing anything are worse than ever³².

Meanwhile Navy's knowledge of shipbuilding and repairing declines steadily as the old lags and enterprising youngsters leave for golden or greener pastures respectively³³.

Whats to be Done?

If Australia's future is to be a political, economic and cultural colony of the USA³⁴, it matters little what is done for the Australian Shipbuilding and Repair industry. In such a scenario, we are a source of cannon fodder perhaps occasionally able to undertake some small scale/non critical maintenance. Australian defence equipment should be sourced and largely maintained by the USG or such firms as the USG may nominate, and probably there is not much of a role for the Navy anyway.

If Australia again aspires to be an independent nation, and if a Navy is seen as a part of that independence, we have a quite different scenario. There cannot be a return to the past, because it just didn't work, but there appears to be a risk of sliding backwards to a similar situation at present. I believe that this can be countered by some aggressive intervention by the Government.

Two possibilities are outlined below, and there are numerous variations which could be developed from one or both of these. The adoption of either would require considerable bravery in the political sense, as well as eternal battles between a whole host of interested parties, and to be successful would have to be sustained for years.

Proposal A - Continuous Frigate Building

Over the past few decades, the core of the RAN is the Surface Combatant force, with Australia operating a base force of 12-14 Frigates³⁵. It is proposed that all future surface warships be built

³²By way of example, in the past we endeavoured to *ensure* that RAN ships were safe, and there was an Engineering satisfaction in so doing. The emphasis now is to endeavour to *certify* that ships are safe, with a bureaucratic satisfaction that the paperwork is all in order. Whether the ships are *safe* as distinct from *certified* appears to be a lesser consideration (though this will never be admitted!)

³³Much of the renaissance in Australian Shipbuilding was a consequence of the companies having a large pool of experienced shipbuilders who formerly worked for Navy. To all intents and purposes, this pool is *gone*. Some of the companies are training juniors and others, but not in the numbers needed to support what is now a fractured business.

³⁴...really the only conclusion that can be drawn from Federal government policy over the last 10 years

³⁵Understand that the numbers now are reduced or to be reduced because of manning difficulties. For some reason the RAN requires many more expensive uniformed persons ashore than do other Navies. Depending on which figures are used, the RAN has between 25 and 30% of its personnel posted to ships, and some of these ships are in refit! USN figures show about 50% posted to ships and the USN ships are operating throughout the world, not alongside their equivalents of FBE and FBW! RNthN proportions are similar, while the RN appears to have about 40% of its uniformed persons posted to ships. A study of the RSN also would be very interesting: Singapore is in the process of building a considerable navy but committed to minimizing uniformed personnel because of its small population and the cost of Navy people. RNthN is particularly interesting: the Netherlands has a smaller population and economy than Australia, but can maintain a first class Navy larger than ours.

and maintained by one Shipbuilder, probably in one Shipyard. Other Naval ships would be acquired and maintained as circumstances permitted, but probably the Frigate Shipyard would be excluded from consideration both on political grounds and because it should not have the excess capacity needed to undertake additional work. In the discussion below a base force of 12 in service Frigates is assumed.

For this, the future Frigates be:

- built to an *evolving* design, or to designs from a *family* of designs which themselves would evolve;
- built in a *single* yard;
- delivered *annually*;
- built in *batches* of 3 or 4 substantially identical ships;
- built to retain considerable *commonality* between batches (eg., main engines might be changed only every 12th ship);
- given *minor* refits 4 and 8 years after delivery (ie., no big refits to enhance capability – no ANZAC WIP Projects. The ships relative capability will decline through life);
- refitted in the *building yard*;
- *paid off into reserve* (with a minimalist refit to preserve the ship) after 12 years, and
- sold after 18 years

The basis of this proposal is to maximize the learning curve effect in the production of *completed articles*.

The advantages that might accrue from this include:

- committing the Government to a long term funded program for the RAN, including scheduled dates for ordering accepting and maintaining ships which cannot be varied except at penalty to the Government, and
- by this providing the shipbuilder/repairer with a long term base to:
 - possess a facility sizes appropriate for the work (heshe is limited to the Frigate program);
 - develop and maintain hisher facilities (to maximize hisher return);
 - train, encourage and retain hisher people at all levels (ditto);
 - to maintain proper records of all work (because it will be himher that suffers when things go wrong);
 - be always familiar with the work (because new ships are evolved from earlier vessels, because the yard is familiar with ships that it has already built), and
 - by this is achieved:
 - a progressive improvement in shipbuilding/maintaining technique;
 - a progressive reduction in the relative cost to build and maintain ships³⁶, and
 - a progressive improvement in the quality of the ships, both in terms of habitability/general finish and battleworthiness etc.).

Other advantages include:

- a reduction in Defence Acquisition Overheads (much reduced contracting effort, much reduced oversight of CSCS and QA systems as the Commonwealth becomes more confident with the shipyard, small ship specifications which it may be possible to enforce etc.);
- reduced support costs to the Navy (many more common items between classes of ships , so reducing stores holding, maintenance of the holdings etc., personnel to manage the holdings);

³⁶The actual cost will remain dependant on the weapons and combat systems mounted in the ships. For Frigate acquisition, these typically range from 30% to 50% of the individual ship “sailaway” cost.

- simplified and less costly training of Naval staff (because of the evolving/family nature of the ships, common equipment etc.);
- flexibility in employing Naval persons (because they will be able to transfer relatively easily between ships of different batches, unlike the present situation, where almost every class has a different base design, outfit and even country of origin³⁷);
- there will be a reserve of 6 ships “not too out of date” available for emergency³⁸;
- there will exist a corps of very well trained, experienced persons which can be expanded rapidly should a future situation require a large increase in Frigate production be required³⁹, and
- the ships may have some commercial value greater than that of a dive reef when at last they are listed for disposal.

There also are disadvantages, including

- the governments flexibility is reduced (it is bound to a program for decades);
- Navy's flexibility is reduced (it may take time for the evolving of family design to address new concepts, weapon systems, threats etc.);
- the shipyard would have to be in honest partnership with the Commonwealth (and to date the companies have been anything but honest, even in Partnering agreements – eg., ___ refused to permit scrutiny of its cost structure for the ___ project, although it was to have been a sole source acquisition^{40 41}).

This is a long term endeavour – decades. It would require legal support binding the Commonwealth and other parties to the program (ie., a Navy Law⁴²), and there would have to be severe penalties for non compliance by either/any party. Some very innovative contracting by the Commonwealth and a lot of unprecedented cooperation by the shipbuilder would be essential for success.

Some costing studies for this sort of program were done by my people in the mid/late 1990s and should be available from NAVSYS.

Proposal B – Continuous Warship Building

The RAN more or less comprises 12 frigates, 2 LPDs and 6 MCMVs which might be called Warships by the definitions above. Additionally, it is conceivable that the next generation of PVs could be akin to the abandoned OPC, which, with its helicopter and missile systems, could have a possible wartime (“in harm's way”) role, and so be eligible to be listed as a Warship. All of these will require maintenance, and some at least (because they are represented in small numbers) may require quite comprehensive upgrades midway through their lives.

It is proposed that all future surface warships be built and maintained by one Shipbuilder, preferably in one Shipyard. Other Naval ships would be acquired and maintained as circumstances

³⁷This has reached the ridiculous extent where even compartment markings differ in ships of different classes. By comparison the RNZN has insisted that the one standard be used throughout its squadron (it has not the 10 commissioned ships required of a fleet).

³⁸And there will be posted ashore enough trained personnel familiar with the ships to crew at least some of them.

³⁹I believe that Japan's MSDF shipbuilding is structured precisely for this, and it echoes some of the late IJN's preparedness philosophies.

⁴⁰The project did not proceed for other reasons unrelated to cost and accountancy.

⁴¹It is worth noting here that the USG requires their GAO to scrutinize all company accounts and prepare an independent estimate of the cost of the Project, which is used as the basis for funding the Project. Despite this the USG regularly is burned by cost overruns etc., but at least they have an independent estimate and so are less at the mercy of crooked salesmen and even more crooked CEOs.

⁴²Not for a moment forgetting that the German Navy Laws of 1898 and 1905 were contributors to the antagonism between Britain and Germany which led in part to World War 1 and the Japanese equivalent (the 8/8/8 program) in 1917(?) similarly promoted antagonism between Japan and the USA which erupted in 1941!

permitted, and the “one Shipbuilder” would be eligible to bid for any work (including non Naval work) that heshe could accommodate without interfering with the core Warship work.

For this, the future Warships be:

- built to a *family* of designs (unlikely to be available), or to designs modified to become a *quasi-family* (entirely feasible), and in the case of Frigates, the design should be evolved from the previous batch;
- built *preferably* in one Shipyard;
- delivered to schedules which keeps the yard *fully employed*;
- built in *classes and batches* to suit the schedules;
- built to retain considerable *commonality* between classes and batches; (eg., main engines might be sourced from the same supplier);
- given *minor* refits at schedules to keep the Shipyard fully employed;
- as appropriate to the class, given *big refits*⁴³ to retain/enhance the effectiveness of the ship later in life at schedules to keep the Shipyard fully employed;
- in either event refitted in the *building yard*;

The basis of this proposal is to maximize the learning curve effect in the *processes* of shipbuilding/repairing, so permitting any ship to be built/repared efficiently. Potentially this is far more powerful and flexible than the case discussed above.

The advantages that might accrue from this are similar to the earlier proposal and include:

- committing the Government to a long term funded program for the RAN, but
- without binding the production to one type of ship and
- by this providing the shipbuilder/repairer with a long term base to:
 - possess a facility sizes appropriate for the work (heshe is not limited to the Frigate program);
 - develop and maintain hisher facilities (to maximize hisher return);
 - train, encourage and retain hisher people at all levels (ditto);
 - to maintain proper records of all work (because it will be himher that suffers when things go wrong);
 - be always familiar with the work (because new ships from the same family or quasi family and because the yard is familiar with ships that it has already built), and
 - by this:
 - a progressive improvement in shipbuilding/maintaining technique;
 - a progressive reduction in the relative cost to build and maintain ships, and
 - a progressive improvement in the quality of the ships, both in terms of habitability/general finish and battleworthiness etc.).

The other advantages also are similar, except that there is no certainty that the RAN would have a reserve of ships able to be used in emergency. On the other hand, even more rapid expansion of shipbuilding should be possible, and there are likely to be more opportunities to create dive reefs with older/unsalable ships.

There also are disadvantages, including:

- the Government's flexibility is reduced (it is bound to a program for decades), but not as severely as in the former proposal;
- Navy's flexibility is reduced (it may be left with unmodernized ships because these cannot be accommodated in the Shipyard's schedules⁴⁴);

⁴³*Always* preferred the old RN term for a major reconstruction! - could even understand what it means!

⁴⁴In fact the Navy would have a lot of trouble. Their posting cycle is very inflexible, and Navy would find it hard to cope with a decision to (say) refit some existing PVs for a longer life so that new PV production could be broken for

- the shipyard would have to be in honest partnership with the Commonwealth (with remarks as above);

This also is a long term endeavour – also decades. It would require legal support binding the Commonwealth and other parties to the program, but not to an inflexible construction program of the sort described above. There still would have to be severe penalties for non compliance by either/any party, with even more innovative contracting by the Commonwealth and even more cooperation by the Shipbuilder being essential.

I do not believe that any attempt has been made to schedule or cost such a system within the Department of Defence.

The Shipbuilder

Both of the above proposals are written as though there is a Government and a Shipbuilder operating almost in isolation. This is quite simplistic, and it is more likely that the system will comprise:

- the Navy,
- the Department of Defence (which often is off in auto with respect to the Navy)
- DMO (ditto),
- the Government proper,
- one or more foreign sources of Design,
- a Prime Contractor,
- a Weapons/C4I Integrator,
- a Shipyard,
- one or more ILS Contractors,
- (especially if designs come from all over the world) some Australian Ship Redesigners (who are probably foreign concerns anyway),
- the AMWU (if the Unions are on side it will fly, if not ...),
- SMEs
- Local Members
- State Governments
- the East Woop Woop Save The Trees Society
- etc.

With a bit more effort I am sure that I could expand this list considerably.

For the success of either proposal, some sort of partnering arrangement is necessary, but the ***partnering needs be driven by and to suit the Government***. I suggest that the Shipbuilder probably is a “nest” of firms contracted collectively and severally with each other and with the Government.

The “nest” might comprise:

- AMT - All design adaptation for Australia,
- CEA - All Combat System design, integration, adaption etc.
- TENIX - All Shipbuilding, Ship Repair and Ship Specific integration.
- SMA - All ILS & support.

SME's, worthy though these are, have no place other than as subcontractors to the above, and nor does any other industry, **except as it may be subcontracted by one of the above** and not in accordance with some political or other irrelevant agenda. This includes AUSTEL (the current patrol boat builders), Thomson/ADI (operators of Garden Island Dockyard), Boeing Australia, etc.

These firms would be excluded from being Prime Contractors for a long period (decades) if not for all eternity, and some would disappear⁴⁵.

Similarly, building ships here or there to suit Federal or State political agendas, local unemployment, tree huggers etc. etc. would not be an option, except perhaps in selecting a site initially.

By placing all Naval work within this nest can I see a body of Tradesmen, Technical Offices, Engineers, Purchasers, Directors, Administrators etc.:

- knowledgeable in the requirements of ships, ship systems, ship building and ship repair;
- knowledgeable in the unique requirements of Warships;
- sensibly able to discriminate what is right from that which won't work or won't work well;
- sensibly able to judge the cost effectiveness of systems, subsystems, proposals etc.;
- sensibly able to judge the risks associated with projects, sub-projects, equipments, components etc. and
- sufficiently confident of and in their different professions to be able to make timely, effective and beneficial decisions

being built up and maintained in an environment of continuous improvement.

I see also the potential for:

- more use of common systems and equipments (eg., the same engines on different classes of ships);
- more selection of equipments from common sources (eg., all engines from one supplier);
- more prospect of maintaining consistent standards across the fleet (accommodation, markings etc.), and
- these should
 - reduce the cost of supporting services for the whole fleet,
 - reduce the training and familiarization requirements of Navy personnel, and
 - improve the availability of the ships.

Even if the nest could be created, two other factors will be required for its success.

- Firstly there will need to be an immense sense of tolerance, goodwill and flexibility the firms, the firms and the Commonwealth and between the individual staff members of all organizations involved at all times⁴⁶. Whether this can be achieved and how it is to be maintained for decades I do not know, especially as some Projects will go wrong and will trigger “blame games” left, right and centre.
- The second is related: persons will have to move between the Commonwealth and the firms, and between the the firms themselves, as equipments and systems are born, evolve, are set to work, are maintained and are scrapped. Several possible mechanisms for this can be conceived, but in all some sort of assurance that the persons will not be abandoned or pigeonholed is necessary.

To achieve the sorts of targets above, there will need to be a major change in acquisition of systems as well as ships. Heavy weightings will have to be given to systems which are common to those in service and to systems of proven reliability at the expense of the cheapest bit of almost compliant rubbish available on the spot market. To do this the Commonwealth will have to find ways to effectively mandate preferred systems, contrary to almost all current and recent past policy, and to

⁴⁵The firms named in this paper are for the purposes of illustration only. The firms listed as comprising the “nest” may or may not be the best in their fields but have been nominated merely because they occurred to me at the time of writing. The firms that I have excluded in fact may be better members of the nest. I emphasize that I have no financial or other interest in any of the firms, except to have worked with some of their people occasionally.

⁴⁶At the moment there is all the goodwill in the world – upto contract signature, when the shutters come down and the problems begin.

impose these on the Shipbuilder.

Whatever the process by which the nest is selected, it needs be robust and comprehensive, as the purpose is to set up a durable system whereby Australia can maintain a long term competence in warship engineering. To preserve public accountability⁴⁷, all firms so involved would have to give the Commonwealth completely free access to all their accounts, including the accounts of any other firms with which they are associated. Restructuring of firms would be subject to discussion with all participants and ultimately to Commonwealth veto. Some really innovative and effective methods of enforcement would need to be developed.

I think that co-ordination should remain a Commonwealth responsibility – no more “Prime Contractors” turned loose to produce a “thing” 10 or so years post contract which may or may not be what was wanted, and which may or may not still be relevant even if it is what was wanted. This requires a tremendous discipline on the part of the Commonwealth, because every new generation of personnel (whether Service or Civilian) will find things that they “must have” in the finished artifact. Given that staff turnover generations⁴⁸ are only two years apart, potentially this is five sets of changes in a ten year Project! And changes are expensive^{49 50}.

There are numerous other problems which can be foreseen, including inevitable conflicts which will arise between the demands of Naval Officers to have the greatest thing **now** whereas the National objective is to have adequate things **whenever needed**.

A Final Word

My preferred position is one of vertical integration: ie that the Commonwealth owns the lot and subcontracts *as is convenient to the Commonwealth*, not as a life support system for this or that industry. I believe that the product quality and cost saving in this, *were it run properly and were it properly accounted*⁵¹, would exceed anything that can be achieved by the nest discussed above or is achieved now⁵² – but such thoughts are not politically correct ... and anyway I am an old coot now (self) put out to pasture ...

D J Truelove

⁴⁷ ... if this is still deemed important to the Commonwealth ...

⁴⁸ Another matter that would be worth investigating.

⁴⁹ The cost of changes increases exponentially as a project proceeds (this being taken from a RAND report now lost to me). Where these changes are a result of genuine operational requirements changes they just have to be borne, but it is vital that a ruthless scrutiny of proposed changes be maintained.

⁵⁰ One of the best ways to avoid this sort of cost instability is to decide and do quickly: In January 1904 Admiral Sir John Fisher, First Sea Lord and CNS (of the RN), assembled a team of Industry and Navy leaders to consider a revolutionary battleship that he wanted to arrive “like a thunderclap”. Construction commenced in October of that year and 366 days later the 18,000 ton HMS DREADNAUGHT sailed for sea trials. On 31 October 1906 all existing battleships in the world's navies were obsolete. HMS DREADNAUGHT cost little more than “traditional” battleships of the time. Mr D K Brown, RCNC, comments in one of his books that ships designed [and built – my addition] in a hurry often are successful. Contrast this with the RAN MHI: a 220 tonne ship accepted into service 18 years (!) after conception, and damned long before that date of acceptance!

⁵¹ Which it was not in the past.

⁵² HHI's successes in shipbuilding appear to be an extremely successful case of vertical integration: everything from the iron ore to the ship complete!

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Abbreviations and Acronyms

ABR 19	The RAN Painting Manual.
ADI	Australian Defence Industries, now no longer Australian.
AF	Australian Frigate – in fact the two Australian built FFGs, which are no more than copies of the later USN FFG-7 class ships.
ANZAC	Usually the Australian and New Zealand Army Corps, but here the class name for the RAN/RNZN MEKO 200 Frigates.
AO	Auxiliary Oiler – little more than a tanker which can supply fuel to other ships at sea. HMAS WESTRALIA, to be replaced by MV DELOS.
AOE	Auxiliary Oiler ?? - basically a bigger AOR
AOR	Auxiliary Oiler Replenishment – an AO which also can provide other stores (eg., food) and munitions. HMAS SUCCESS.
ASW	Anti Submarine Warfare
AWD	Air Warfare Destroyer.
CEO	Chief Executive Officer.
CNS	Chief of Naval Staff – a much more elegant and meaningful name than CN (Chief of Navy) and one which we used until only a few years ago.
DDG	Guided Missile Destroyer. Properly our DDGs were DDG-2 CHARLES F ADAMS Class, but at least we modified them to include IKARA and improve their AA capabilities compared with the USN ships. For a while they were the best ships of the class in the world.
DRP	Defence Reform Program – about the stupidest bit of trendy bullshit dreamed up for the Dept of Defence in the past 35 years.
FBE	Fleet Base East ie., near Garden Island Dockyard, Sydney.
FBW	Fleet Base West ie., HMAS Stirling at Garden Island, WA.
FFG	Guided Missile Frigate. Properly our FFGs are FFG-7 OLIVER HAZARD PERRY Class.
HHI	Hyundai Heavy Industries, Korea.
ILS	Integrated Logistic Support. All the spares, books, computer programs, schedules <i>et al</i> which keeps the Navy running
IJN	Imperial Japanese Navy.
LCDR	Lieutenant Commander
LHD	Landing ship Helicopter Dock (I think). In English, a troop ship which looks a bit like an aircraft carrier but has a dock for smaller landing craft to operate from. With a bit of thought and lateral thinking ⁵³ , LHDs can operate as troop/assult ships, tanker/supply ships, light aircraft carriers, ASW helicopter carriers, disaster relief ships, general purpose transport ships, traning ships & etc. etc.
LPD	Landing ship Helicopter Platform (I think). Say a troopship with a helicopter deck aft.
MCMV	Mine CounterMeasures Vessel.
MHC	Mine Hunter Coastal.
MHI	Mine Hunter Inshore – a potential world beating MCMV designed and built in Australia but which failed because of lack of vision, procrastination and lethargy by the RAN and its servants.
NAVSYS	Navy Systems Branch.

⁵³Lateral thinking is as hard to find as Common Sense or Common Knowledge, or if it can be found lurches off beyond all reason. In the late 1990s my people explored some concepts for multi role vessels, and while such ships must have operational (and Engineering) compromise, I could see no reason for their being infeasible in the Engineering sense, although some elements of the Navy were bitterly opposed to the concept on operational grounds. Reports on these investigations should be available through NAVSYS.

OPC	Offshore Patrol Combatant – a large PV able to operate a helicopter and possessed of some anti aircraft capacity, but not quite a Warship. The project was a Joint Venture and failed only because TENIX was unable to secure a contract with another Navy.
PV	Patrol Vessel.
RAN	Royal Australian Navy.
RN	Royal Navy.
RNthN	Royal Netherlands Navy.
RNZN	Royal New Zealand Navy.
RSN	Republic of Singapore Navy.
SIEV	Suspected Illegal Entry Vessel.
SME	Small and Medium Enterprize(s).
USG	United States Government.
USN	United States Navy.