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THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA

IMPORTANT TRENDS IN WARSHIP DESIGN - REDUX

THE NAVY AND THE 1918-19 INFLUENZA PANDEMIC

THE SPECTRE OF AUTONOMY

FIRST AWAY

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Volume 82 No.3

THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA

Front cover: HMAS PARRAMATTA (FFG 154) breaks away from USS AMERICA (LHA 6) and USS BUNKER HILL (CG 52) South China Sea (Image LSIS Leo Baumgartner).

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USMC-F35Bs operating from USS AMERICA (LHA 6) to be fitted to JMSDF DDH mini-carriers.

Russia's Small Nuclear Reactor Barge, built to power Russian arctic oil drills.

THE PAST IS A FOREIGN COUNTRY; THEY DO THINGS DIFFERENTLY THERE*

This issue maintains *The NAVY* Magazine themes. Paper 1 deals with *contemporary trends and junctures in warship design*. It builds on previous analysis that suggests the Global West's shipbuilding and design response to the increasing threat (and demand) is sclerotic at best. The second paper by Jonathan Wilson, segs from the first by considering the *Spector of Autonomy* (UUVs and UAVs) - winning first prize in the 2019 Essay Competition (non-professional section). Paper 3, by Greg Swinden – a long standing contributor to *The NAVY* – topically looks back to the response by RAN to the 1918-1920 Spanish Flu pandemic. The final paper is by another longstanding contributor, and member, Murray Dear – entitled *First Away*, dealing with HMVS VICTORIA and The First Taranaki War.

European settlement versus colonialisation (depending upon where one stands), is a difficult subject – with cultural ideologues seeking to re-appropriate identity, often through the destruction / eradication of the past. This has been seen in the desecration of statues to Lieutenant James Cook FRS RN, and the muted commemoration of the 250th anniversary of his landing in Australia. Even before COVID-19, the anniversary of Cook's landing at Botany Bay – or *Kamay* in the local indigenous language – had been tuned down. To the point where protagonists and protesters alike were, apparently, not bothering to attend. Welcome speeches played more to the politically correct and culturally acceptable, than the historically factual – as painful (on all sides) as that might be. For many Australians, Lieutenant Cook remains associated with the First Fleet, that arrived almost 20 years later. Even before the current protests, Statues and naming conventions relating to James Cook in New Zealand have been removed and there is pressure to do likewise in Australia.

In a revisionist documentary entitled *Planet of the Humans* [1], Michael Moore addresses the deceits and failings of the Green Movement. Moore examines the Green Political-Financial-Industrial-Complex (PFIC) and its powerful "carbon nexus". For many years a darling of the left-Green alliance, Moore has faced unbridled attack by activists. Themselves often funded through the Green PFIC. As the documentary reveals, a political financial industrial complex that invests in destructive biomass costing more than coal, while relying on coal or gas to burn, and generating yet more carbon. At the same time, biomass from so-called renewable forests fuels the unsustainable sustainables (UNSUs). Further destroying countryside to erect windmills and solar-power farms (needing to be replaced within 10-15 years) – all needing (reliable) biomass/gas (coal) generators to be built alongside.

Half the world's photovoltaics are manufactured in China. Initial refining turns quartz into metallurgical-grade silicon, a substance used to harden steel and other metals. That happens in giant furnaces, fuelled by coal, gas or nuclear. The next step combines the silicon with high grade coal (!) combining hydrochloric acid with metallurgical-grade silicon to turn it into trichlorosilanes. Trichlorosilanes then react with added hydrogen (from coal), producing polysilicon along with liquid silicon tetrachloride – three or four tons of highly-toxic silicon tetrachloride for every ton of polysilicon. China has seen a backlash in the eastern province of Zhejiang, where manufacturers were accused of dumping toxic waste into a nearby river.

Concomitantly, as China has built coal and nuclear power stations, the Global West has invested in unsustainable sustainables. Leading to further de-industrialisation of Western economies – outpriced due to expensive energy and the undervalued Chinese "Dollar". A form of "usefully idiotic" Political Economic Warfare against ourselves, ably abetted by the Chinese Communist Party. Leading to yet more CO2 to build UNSUs imported from China. An obscene merry-go-round, supported by politicians, consultant-activists, media and high-finance along the absurdist Vietnam-era mantra "of having to destroy the planet, in order to save it". All the while creating yet more C02 and making the future generations, poorer.

The previous issue raised the question of gender diversity versus capability. [2] As worrying, is the prohibition of debate regarding *Fourth-Wave Feminism*, and *Climate Change* – where activists are not interested in discourse. On "their" side, are professional political elites, virtuously associated with Law and the Financial Industrial Complex. The issue extends to history and how it is taught, or not. Where, to be of one culture, colour, age, or gender, is to be proscribed guilty – in itself sexist, ageist and racist. Sexual misconduct and prevention quangos predominate, which while, on the one hand, providing "immediate assistance" by positively not assuming innocence – place guilt on the "other". The weight of the institution is on the "other" proving innocence. Respondents are removed from positions until such time as accommodation is achieved. Which, when tested in law, is often found to be unsafe to both claimant and respondent alike. Such quangos are being both used and not used by those who need it. They are not trusted. To say such things in Navy, today, is to place oneself beyond the pale.

Chinese shipping company COSCO *MV Tian En* with wind turbines embarked transits the Arctic Silk Road Route for Europe.

Consequently, people say nothing, do not rock the boat – so deceits are perpetuated. Particularly when history collides with politically correct, diversity elitism and climate change.

What has this to do with *The NAVY* and the NLA? The reason is exactly because these issues are not being debated. Challenging anything to do with Climate Change, China, or Fourth Wave Feminism in politics, the APS, industry and academe, is professional suicide. Let alone combining all three! An example of but one, the unlawful dismissal of Professor Peter Ridd from the, ironically named – shortly to be renamed? – *James Cook University*.

For over eighty years, *The NAVY* has loyally maintained a set of unfashionable core values/ statement of policy (p. 4). Often derided by elites, *The NAVY*, Vol 61., No.1, Jan-Mar 1999, noted, *inter alia*, these to be:

1. Believing that Australia can be defended against attack by other than a super or major maritime power – the prime requirement being an evident ability to control the sea and air space around us and to defend essential lines of sea and air communication to/with our allies
2. Providing a significant ADF [submarine] Deterrent element capable of powerful retaliation at considerable distances from Australia
3. Supporting the ANZUS Treaty and a close relationship with ASEAN countries. PNG and the Island States of the South Pacific.
4. Given leadership by successive Governments, Australia can defend itself in the longer term within acceptable financial limits.
5. A build-up, construction and development of:
    a. Australian owned shipping to ensure the carriage of essential cargoes in war;
    b. a Maritime and Defence industry supported by strong research and design organisations capable of building:
        i. all needed types of warships and support vessels, [guided weapons, explosives ordnance and combat support auxiliaries/ logistics], including;
        ii. a future submarine construction program for 12 or more submarines; considering all forms of propulsion and nuclear.
6. The concept of a Navy capable of effective action off both East and West coasts simultaneously; including supporting operations in sub-Antarctic waters.
7. The capability to protect essential shipping at considerable distances from Australia, as well as in coastal waters.
8. The acquisition of AWACS aircraft and the update of RAAF aircraft including the development of amphibious forces [with F-35B *Lightning II*] to ensure the security of our offshore territories.
9. A Defence capability which is knowledge-based with a prime consideration given to [educating and training our people], intelligence, surveillance and reconnaissance.
10. The transfer of responsibility, and necessary resources [ships, aircraft, UAVs and UUVs], for Coastal Surveillance [and Interdiction Operations] to ADF, including in the Southern Ocean.

Why COVID-19? The pandemic has exposed deceits proselytised by professional political elites and the conveniently associated [Green] Financial Industrial Complex. A media-consultancy-nexus acting against economy and sovereignty – removing resilience and self-dependence from people and Commonwealth.

Retrospectively, COVID-19 may be seen as a blessing for revealing:

> "the past to be [quite literally] a foreign country, where they do things differently".

Finding leaders able to lead change is the most challenging issue. Most senior officers, public servants, financiers, industrialists, academics, researchers, and politicians have never designed, championed or implemented the revitalisation or building of an entire knowledge economy, or even sub-sets of that economy. It is most unlikely those who "fiddled" the way into crisis, will be those able to lead us out. It is the ultimate strength and test of Democracy and Admiralty to do so. ■

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STATEMENT OF POLICY

CURRENT AS AT 1 JULY 2020

For the maintenance of the Maritime wellbeing of the nation.

The Navy League is intent upon keeping before the Australian people the fact that we are a maritime nation and that a strong Navy and capable maritime industry are elements of our national wellbeing and vital to the freedom of Australia. The League seeks to promote Defence self-reliance by actively supporting defence manufacturing, research, cyberspace, shipping, transport and other relevant industries.

Through geographical necessity Australia's prosperity, strength, and safety depend to a great extent upon the security of the surrounding seas and island areas, and on unrestricted seaborne trade.

The strategic background to Australia's security is changing and in many respects has become much less certain following increasing tensions, particularly in East Asia involving major powers, and in Europe and the Middle East. The League believes that Australia should rapidly increase the capability to defend itself, paying particular attention to maritime defence.

The Navy League:

- Believes Australia can be defended against attack by other than a major maritime power and that the prime requirement of our defence is an evident ability to control the sea and air space around us and to contribute to defending essential lines of sea and air communication with our allies.
- Supports a continuing strong alliance with the US.
- Supports close relationships with all nations in our general area particularly New Zealand, PNG and the South Pacific island States.
- Advocates the acquisition of the most capable modern armaments, surveillance systems and sensors to ensure technological advantage over forces in our general area.
- Advocates a strong deterrent element in the ADF enabling powerful retaliation at significant distances from our shores.
- Believes the ADF must be capable of protecting commercial shipping both within Australian waters and beyond, in conjunction with allies.
- Endorses the development of the capability for the patrol and surveillance of all of Australia's ocean areas, its island territories and the Southern Ocean.
- Advocates Government initiatives for rebuilding an Australian commercial fleet capable of supporting the ADF and the carriage of essential cargoes to and from Australia in times of conflict.
- Notes the Government intention to increase maritime preparedness and gradually increase defence expenditure to 2% of GDP, while recommending that this target should be increased to 3%.
- Urges the strength and capabilities of the Army (including particularly the Army Reserve) and Air Force be enhanced, and the weaponry, intelligence, surveillance, reconnaissance, cyberspace and electronic capabilities of the ADF be increased, including an expansion in its UAV capability.

As to the RAN, the League, while noting vital national peacetime tasks conducted by Navy, including border protection, flag showing/diplomacy, disaster relief, maritime rescue, hydrography and aid to the civil power:

- Supports the maintenance of a Navy capable of effective action in hostilities and advocates a build-up of the fleet and its afloat support elements to ensure that, in conjunction with the RAAF, this can be sustained against any force which could be deployed in our area of strategic interest.
- Considers that the level of both the offensive and defensive capabilities of the RAN should be strengthened, in particular with a further increase in the number of new proposed replacement frigates and offshore patrol vessels, noting the need to ensure essential fuel and other supplies, and the many other essential maritime tasks.
- Recommends bringing forward the start date of the replacement frigate program to both strengthen the RAN and mitigate the local industry capability gap.
- Recommends the timely replacement and increase in numbers of the current mine-countermeasure force.
- Strongly supports the early acquisition of large, long range and endurance, fast submarines and notes the deterrent value, reliability and huge operational advantages of nuclear powered submarines and their value in training anti-submarine forces.
- The League is concerned at the very long time before the projected 12 new conventional submarines can enter operational service, noting very serious tensions in the NW Pacific involving major maritime powers.
- Recommends very early action to provide a submarine base on the Eastern seaboard.
- Notes the potential combat effectiveness and flexibility of the STOVL version of the Joint Strike Fighter (F35 Lightning II) and supports further examination of its application within the ADF.
- Supports the development of Australia's defence industry, including strong research and design organisations capable of the construction and maintenance of all warships, submarines and support vessels in the Navy's order of battle, and welcomes the Government decision to provide a stable and continuous shipbuilding program.
- Advocates the retention in maintained reserve of operationally capable ships that are required to be paid off for resource or other economic reasons.
- Supports a strong and identifiable Naval Reserve and Australian Navy Cadets organisation.
- Advocates urgent Government research and action to remedy the reported serious naval recruiting and retention problem.

The League:

- Calls for a bipartisan political approach to national defence with a commitment to a steady long-term build-up in Australia's defence capability including the required industrial infrastructure.
- Believes that, given leadership by successive governments, Australia can defend itself in the longer term, within acceptable financial, economic and manpower parameters.

HMAS PARRAMATTA conducts OOW manoeuvres with USS BARRY and USS AMERICA in the South China Sea (Image LSIS Leo Baumgartner).

CN Vice Admiral Michael Noonan AO and Captain Jan Noonan CSC and Bar with Daughters ANZAC 2020 (LSIS James McDougall).

Since our last edition much has happened to impact Defence planning and strategic thinking vital for the national wellbeing and freedom of Australia. When we last went to print, we were reflecting on the effects of the bushfires that had ravaged Australia, the commendable role of the ADF and the Navy in particular. The congratulations afforded to the efforts of the ADF in that regard were well warranted, and the human impacts of the fires and rebuilding must not be lost as we focus on managing the current pandemic. As we reflected earlier in the year, though, it is important to ensure that the use of Navy in response to such operations does not diminish its prime operational capabilities nor distract from its core Defence role – to deter those who would do us harm.

At the stage of our last publication we were only beginning to feel the effects of COVID-19 and see implemented the restrictions associated with the pandemic. The rapid and widespread impacts of the pandemic across the world has had a devastating human and economic toll.

The swift and drastic action taken by the Commonwealth and States (predominantly working well together) has limited the health impacts on Australia.

NAVY LEAGUE OF AUSTRALIA INTENT AND POLICY

Significantly, there have been heightened international tensions, in the relationship between China and the USA most obviously, but also, and of concern for Australian strategic thinkers, regionally. The strategic situation and the economic impact of the fallout of COVID-19 globally as well as on our near neighbours has the potential to adjust the strategic make-up of the region, with the possibility of increased regional instability as a result. This is concerning, with an ever more urgent requirement to balance the economic friendship we have with China against its rivalry with the USA and take account of any changes of the international influences in our region, especially in the South China Sea.

One issue we must be sure to keep before government, and I encourage you to keep it at the fore with your Federal Member of Parliament, is that our national wellbeing will be jeopardised should COVID-19 be used as an excuse to reduce or defer Defence expenditure.

While the Navy League encourages the ongoing bipartisan Australian political position on defence and strategic dealings and commends recent cooperation, now is not the time to let slide the commitment to national defence and Australian defence industries.

The Navy League has long supported the government commitment to increasing defence expenditure to 2% of GDP and recommending that this target should increase to 3%. While we do not wish to downplay the severity of the financial landscape that confronts the nation, we must ensure that our decision-makers do not let that negatively impact on the Defence budget and our national security spend.

If anything, this current situation has made more desperately urgent the need to maintain a strong navy and a capable maritime industry. While we do not discount the massive operational impact that COVID-19 will be having on the Navy, our strategic environment is facing pressures that only months ago were difficult to foresee.

These changed circumstances combine to encourage a re-think as to the wisdom in our plans to produce locally built submarines and surface ships at a time when effective naval operational capabilities will be of increased importance. Furthermore, ensuring that small to medium enterprises crucial to the shipbuilding supply chain are not only able to continue to operate, but are supported to ensure they thrive in this challenging local environment is essential to bolstering the Australian maritime industry.

In all, the COVID-19 pandemic should remind us that while things can change very rapidly, it is our long-term strategic wellbeing that must guide our military leaders and strategic decision makers.

THE AGM OF THE NAVY LEAGUE OF AUSTRALIA

As most readers will be aware, we usually hold the AGM and Federal Council meeting of the Navy League in October each year. Generally, the meeting is held in Canberra and from time to time we venture further, to other capital cities for State Division to host the meeting on home turf, offer hospitality and showcase their local environments.

This year is likely to be different again. It may be that by October we are able to travel again; flights will be available and affordable and our meeting could go ahead 'as usual'. At this stage, though, that seems highly unlikely and it may be that we adapt the style of the meeting to ensure all can participate safely.

While no decision has been made at this stage, we will keep a weather eye on the situation, take account of the pandemic advice from the experts, let you all know as soon as is possible and put the notice in the Oct-Dec issue of *The NAVY*.

IN THIS ISSUE

I trust you will all enjoy the great reading in this edition. We have articles from Sydney University and UNSW on *Important Trends and Junctures in Warship Design* that will be sure to generate lively debate (which we encourage). We also have two of the prize-winning essays from the Navy League Annual Essay Competition, *The Spectre of Autonomy*, written by Johnathan Wilson and *First Away* by Murray Dear. In addition, we have the very timely article written by Greg Swinden, *The Navy and the 1918-19 Influenza Pandemic*, which gives pause for reflection on our current global situation.

As always, we encourage and appreciate your feedback and love hearing from you. ■

Happy reading.

LETTERS

Dear Editor

It's been some time since I've reached out. I hope you're healthy and keeping safe.

I'm still covering national security and foreign policy for CNN and am writing this week about China exerting economic pressure against U.S. allies and U.S. companies amid the COVID crisis – some in the Pentagon are using the phrase "economic warfare."

I know China has been doing the same thing in Europe and I've just been reading about Beijing's moves against Australia's meat and barley industries. My central question is whether you see Beijing trying to leverage the pandemic to achieve strategic gains through economic means, but I'm interested in any observations or thoughts you might have.

All best, *N*
CNN National Security and Foreign Policy Correspondent

By Editor

Dear N,

On China, President Trump may have been right (if not always on COVID-19). The attached papers and editorials are from *The NAVY*, journal of the Navy League of Australia.

China is leveraging the crisis to its advantage, as it has to do – to deflect blame and criticism from the CCP (which is fighting for its existential survival right now, with Xi and his acolytes/ Princes). The crisis has starkly exposed Chinese Political Sûreté Economic Warfare PSEW policies that, since the 90s, have been undermining the West.

Yes, Political (Sûreté) Economic Warfare (PSEW) is being waged against the Global West. The COVID-19 pandemic has been a blessing in exposing the depth and breadth of these inroads [1-3], which include:

- The New Silk Road, comprising an Economic Belt and Maritime Silk Road, also known as 'the One Belt and One Road (一带一路), or OBOR Strategy'.
- 'The String of Pearls' (珍珠串) strategy incorporating China's First (essentially the Nine-Dashed Line) and Second Island Chains (the Second Dashed Lines). [2]
- 'The Dragon's Spear' (龙的) strategy incorporating the Chinese Motte, Keep, Bailey, Mote (reclaimed islands), and Moat (the SCS and ECS). [3]

Japan is critical and has been for some time now. Japan, Australia and India are at the points of the spear. The CCP is not going to allow the Global West to recover more strongly, now the mask has slipped – it has no choice. The Global West, will not "win" if it fight a communist economy with a [COVID] nationalised economy – as von Hayek and indeed Keynes would both attest. We have to enable the free, wheeler dealing of the market place and economic choice and exploration for pricing moments if we are going to re-capitalise our knowledge economies to advantage. If the Global West (for the moment, the U.S., Five Eyes, Japan, India, and [mostly] East European countries of NATO) does not respond, this will appear as appeasement.

The above analysis probably goes against many CNN editorial opinions, which may be a problem for the Global West right now?

Kind regards and Stay Safe
Aeneas

Dear Aeneas

Thank you for the fulsome response. It is much appreciated. I will print and read the articles.

Like all CNN news reporters and producers, I face no constraints on what stories I report or how I report them.

Wishing you safety and good health, *N*

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IMPORTANT TRENDS AND JUNCTURES IN WARSHIP DESIGN – REDUX

By Simon Reay Atkinson, Christopher J. Skinner, Keith F. Joiner, Nicholas H.H. Caldwell, Ahmed Swidan

To build up a capable Navy, most Countries would procure proven designs rather than providing significant R&D allocations, oversee detailed contractor designs, and build up shipyard capability. The reasons for this predilection are likely to operate both collectively and individually, such as a lack of knowledge, limited design experiences, concerns about cost estimates, uncertain results and slow investment returns. Some countries arguably do not consider fully and strategically how much they would save long-term from being able to perform their conceptual designs. Such design would then enable them to build better their warships based on their specific areas of operation and corresponding threats.

This paper was first published in a fuller form in the Journal of Marine Systems & Ocean Technology, 27 Apr 2020, [1] and has been given permission to be used in this reduced format by the Authors

USS OLIVER HAZARD PERRY (FFG7).

INTRODUCTION

To build up a capable Navy, most Countries would procure proven designs rather than providing significant R&D allocations, oversee detailed contractor designs, and build up shipyard capability. The reasons for this predilection are likely to operate both collectively and individually, such as a lack of knowledge, limited design experiences, concerns about cost estimates, uncertain results and slow investment returns. Some countries arguably do not consider fully and strategically how much they would save long-term from being able to perform their conceptual designs. Such design would then enable them to build better their warships based on their specific areas of operation and corresponding threats.

The Oliver Hazard Perry Class (FFG-7) is highly representative of an incremental design approach that the US Navy applied to ship design and construction. Although, the FFG-7 was designed and then built in large numbers of "low-mix" systems it was based on a goal known as "design to cost" and was for low-threat environments. [2] The strategies used for this design involved both significant Research and Development (R&D) allocations before construction and included detailed design specifications for contractors. Criticised at the time for being under-armed and lacking in redundancy, this class was not regarded as being part of President Reagan's 600 ship Navy. Nonetheless, its conceptual design space (CDS) created a fundamental break with pre-existing designs. Consequently, it was more representative of the Information Age (1970-2015), into which it was conceived in the mid-1970s, than the Industrial Age (1920-1965) designs that preceded it. [2]

By contrast, an examination of submarine build programmes where there are regularly refreshed conceptual designs and more modularised build and construction, show submarine Basic Mass Empty (BME) costs [3] have generally remained below those of other weapon systems. Such BME costs have only increased at, or below, historical inflation. In simple terms, submarines usually have become more affordable, not less, and this is reflected in countries like Thailand, Indonesia and Myanmar actively seeking such capabilities. [4] Theoretically, surface warship BME costs should have kept pace with submarines – but they have not. In actuality, frigate and destroyer numbers have often halved over the same period, meaning that unlike submarines, surface warships have generally become less and not more affordable.

Nearing the end of the *Information Age*, the authors submit that a reconceptualization of the warship design space; shipyards and build techniques – a revolution in warship design – is probably overdue. [5] Fundamental shifts in the political, economic and military affordability of ships and potential warfare losses appear necessary to improve the efficacy of Naval surface warfare.

BACKGROUND

Mario Bunge, when addressing the failures of individualism, attests *'knowledge is social'*. [6] If this is the case, a revolution cannot occur without the human factor. It is human, art, skill, and designs that are used in the formation of science: a synthesis to deal with new concepts and ideas, expressed in various forms of models and other abstract forms including mathematics; with the technologies derived from them. Taking the two precepts together, it is possible to conclude that *'Knowledge is Social and the Technological also'*. [7] Based on these analyses, since the British Industrial Revolution, there have been five identifiable scientific ages, such that a new age could be imminent. [8] Kossmehl traces the history of the first synthetic materials and proposes these as the starting point for a 'Synthetical Age' where the artificial outweighs the natural world.

Reay Atkinson et al. [2, 6 and 8] describe why they posit the new age should be called the Synthetical Age.

Table 1: Different Ages as defined by the Science Time Constant (45-50 years), with the gaps between ages defined by chaotic states as one age dies.

Period	Scientific Age
1770-1815	Steam Age
1820-1865	Locomotive Age
1870-1915	Turbine Age [12]
1920-1965	Industrial Age (as recognised in the literature)
1970-2015	Information Age (as recognised in the literature)
2020-2065	*Synthetical Age*

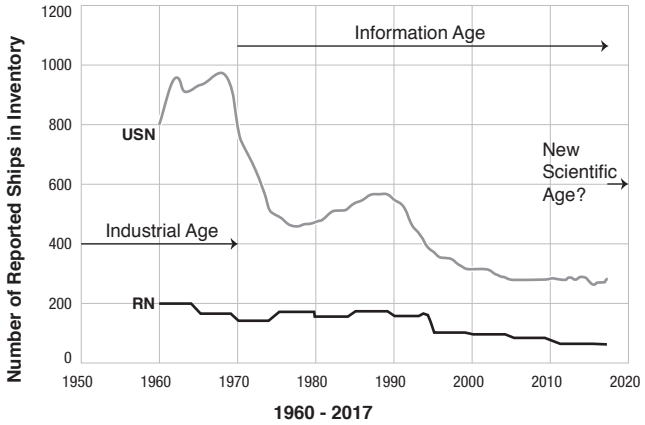
The Dreadnought Revolution (1906) was based on Parson's development of non-compounded steam turbines and, specifically, the introduction of a vacuum (1900-1904) that quadrupled thermal efficiency. [9] Marder [10] argues that *'at the turn of the [19th] century ideas on naval tactics began to emerge from their chaotic state'*. These states of *'successive growth stages of cascading logistic curves*; [connecting] *natural growth and chaos like states'* [11], typically occur at the end of an age when a system comes off-line. Although the *Turbine Age* [12] had some years to run (with the development of end-tightened blading (1918-1930)), by the beginning of the 20th century, it was coming to its end. A new critical juncture was forming with the onset of the *Industrial Age*, leading to mass production, tanks, turboprop, jet aircraft, and aircraft carriers. The German and Imperial Japanese battle doctrines of *Blitzkrieg* and *Kantai Kessen* were based to an extent on mass-produced turbines.

Towards the end of the *Industrial Age*, in the 1960s, similar chaotic states were emerging and leading, on the one hand, to the revolutionary designs behind the McDonnell Douglas F-15 Eagle (arising from the remarkable Skunk Works), nuclear-powered attack/deterrence submarines and, on the other, to the Oliver Hazard Perry (FFG-7) class. The sinking of the Israeli warship "Eilat", in 1967 by the Egyptian Navy, is considered as the primary thrust for developing the Anti-Ship Missile Defense Program (ASMD) within the US Navy. Thus, the FFG-7 was designed and provided with anti-ship missiles, anti-aircraft and anti-submarine guided missile to provide the open-waters escort of amphibious task groups; e.g. warfare ships and merchant ship convoys:

The Israeli CNO Admiral Yohai Ben Nun placed great emphasis on sophisticated equipment – essentially dividing naval content (weapons, sensors, crewing etc.) from the hull (sometimes considered as the platform). After heated debate, it was decided that the 'boats' (subsequently to be known as Missile Boats) should be based on an existing hull or platform whose operational functionality had already been proven in a [West] European country. It is not clear whether or not Yohai envisioned the vessel in detail. However, his staff made a huge effort to take forward his design thinking. They were aware of the miniaturization process evolving in technology and electronics. They therefore decided to adopt the concept of designing highly sophisticated smaller [missile] 'boats', each capable of working alone or networked, and supporting electronic systems and equipment with the ability for over-the-horizon picture forming and sharing the operational picture to shape the tactical moves and develop firing solutions, in advance. [13]

Golding in Reay Atkinson et al. [3] writing in *Versatile Modular System designs for a Versatile Modular Fleet*, concludes that there are peacetime and wartime builds. This phenomenon appears to be evident in meta-analyses of recent defeats and victories examined by Biddle and concepts like the Revolution in Military Affairs (RMA) when rapid-evolutionary (and revolutionary) technological and organisational changes occur in warfare. [14]

Figure 1: U.S. Navy (USN) and U.K. Royal Navy Fleet (RN) sizes [15, 21]



Through policies such as *'front line first'* [15], the formal end of the Cold War in 1992 led to reductions in Fleet sizes (see Figure 1). Also, the U.K. research and development budgets were reduced by as much as 85 per cent in real Defence cost inflation terms between 1979 and 2008. [16]

The cost imperative of conceptualising and creating new designs removes or significantly reduces Defence Cost inflation from the system. As recognised by Pugh (1986, 2007) and Augustine, by creating new designs, one begins again. [17] In other words, the replacement designs for the U.K. Type 22 (T22) Frigate, itself very similar in design and concept to the FFG-7, were not optimised versions of older designs, such as the Leander Class. Instead, they maintained inflationary adjusted unit costs; designed and conceptualised anew to maintain numbers.

CURRENT TRENDS

Without investment in new designs, concepts and strategies, inadequacies in equipment had to be compensated for by better-trained people, and, in conflict, by urgent operational requirements. Cuts to research budgets correlated to the failure to invest in a revised Frigate programme in the U.K., U.S., other NATO countries and Australia through the 1990s, when the emphasis was also placed on maintaining status-quo designs. For example, three Australian classes of warship programmes approved between 2003 and 2004 were all based extensively on re-designs. The designs were the ASMD-enhanced ANZAC Class (incorporating CEAFAR phased array radar), the Air Warfare Destroyers (Hobart Class) and the Canberra Class Landing Helicopter Docks. The cause of such re-use, it is argued, lay in the structural shift between investing in, or abstracting, new designs and optimising existing or status quo

Australian Made and Designed INCAT 096.

ones. The enablers to critical deeper thinking, being research and education, were not used or were *'drowned out'*. [18] This potential illusory thinking of *'saving money and time'* is most recently evident in the Canadian decision to look for an existing frigate design.

The global stagnation of Defence research and development, outside of a few critical areas in the U.S. and China, is apparent in reviews like Bitzinger. [4] Specific to maritime, Bitzinger covers the U.S. Navy DDG-1000 program and attempts at new destroyer and cruiser designs (DD-21 & CG-21). He cites Luttwak [19] as concluding that,

> *'instead of shaping new platforms and weapons configurations to fit today's information technology, communications, sensor and guidance equipment, we are shoving, cramming and moulding such technology to fit the nooks and crannies of 1945-era platforms.'*

In seeking to explain the reasons for stagnation and re-use rather than innovation, he references Kaldor [20] , asserting that,

> *'… military bureaucracies, being naturally "conservative" and operating according to "dominant scenarios", are not really comfortable with radical new technologies, since they "pose a risk for organizational survival".*

Kaldor [20] herself states,

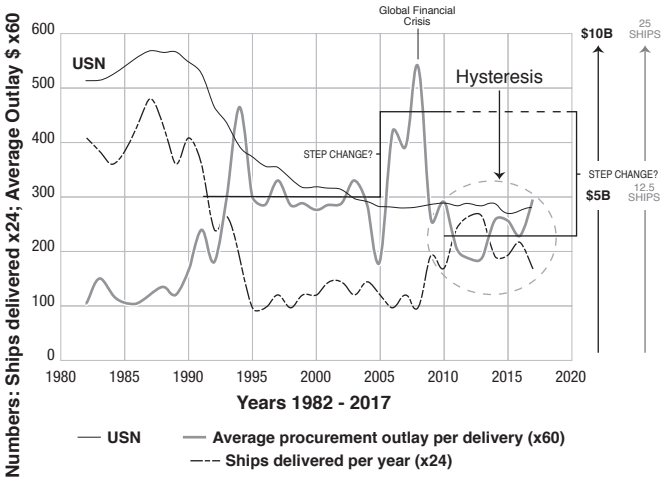
> *'New technologies can only get through the innovation and integration stages if they conform to the requirements of the dominant scenario … directed towards the improvement in performance of missions that were established nearly 40 years ago…'.*

Pugh [17] observes,

> *'We are at a turning point in the history of Defence. Future generations of combat [Fleets] are unaffordable for any save the USA. Major changes to the landscape are inevitable.'*

The tightly coupled Optimised Design Space is based upon enforcing evidence-based performance constraints and transaction history. It generally predicts outcome – more-for-less – and does not account for alternative empirical concepts; experiments; experiences or existences. It can also remove variety, reflection, possibilities and *'plausible alternative concepts'* from designs. As identified by Modis [11], systems coming *"offload"* show hysteresis, identified in the wide swings in BME costs of latter T23s, and seemingly in *Average Procurement Outlay* per Delivery (about an average of about $4B) variations, amplified (60 times) in Figure 2. [3]

Figure 2: US Navy Fleet Size; Ship Deliveries and Average Procurement Outlay per Delivery, estimated/abstracted from Kirkpatrick, Hall and Richardson [21]



Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress, Dec. 22, 2017

The position arrived at may be unstable, unsustainable and, ultimately *"unaffordable"* in political, military and economic terms (even for the U.S.). More demanded from even less to the point, potentially, of *reductio ad absurdum*; sweating assets and people at the expense of readiness and productivity.

HIGH-LEVEL STRATEGIES

High-level strategies to enable a fundamental shift in warship design could include:

1. **Abstracting, conceptualising and creating new designs – new conceptual design spaces.** This design approach is advocated. The revolutionary designs of FFG-7 (and UK T42s and T22s) were not reconceptualised and maintained in the early 1990s, due to the Peace Dividend and the end

of the Cold War. Combined with a new scientific age, a revolution in naval affairs (RNA) is in the offing. [5]

2. **Reconceptualising and redesigning** existing classes and combinations/compositions of systems / capabilities / platforms. For example, the U.K. ship HMS OCEAN (L12) designed to commercial standards came in at the same mean unit cost of the Invincible Class carriers built 20 years earlier. [16]

3. **Maintaining a regular refresh and build rate – tempo.** This approach requires a programme connecting design and conceptualisation if one is going to change from one generation to the next continuously.

4. **Spending much, much more** (power-law increases in budgets) to maintain/preserve existing (obsolescent) design and build capabilities, e.g. the T45, the Zumwalt class, or Australia's Hobart Class. This approach is the risk the Australian Navy faces in a premature down-selection for SEA 5000, which was one of the reasons the Hunter Class variant of the T26 was chosen. However, by cost and BME, the Hunter Class remains a derivative of the FFG-7 and UK T42s.

5. **Stop and get off**, as the U.K. Royal Navy appears to have done:

Even if the T26 GCS were truly an innovative and impressive design, its prospects would be hobbled by the decision of the Cameron government to go back on its plan to buy 13 of them (replacing 19 T22 and T23 Frigates). Instead of purchasing eight anti-submarine versions and five general purpose versions, the government is now committed to buying just eight ASW frigates. This is fewer than a traditional ship class and that matters because you need to commission and build at least ten vessels to be able to assess their real abilities (to distinguish good, from poor, from average) and make appropriate improvements. [22]

This research re-examined the revolutionary aspects of the FFG-7 warship design to provide more strategic detail to these high-level design strategies. These aspects are presented in the next section, followed by a contemporary reflection of each of them.

THE REVOLUTION THAT WAS FFG-7

The FFG-7 class frigate was for the U.S. Navy a revolutionary *'design-to-cost'* program designed to compensate for dwindling numbers of anti-submarine warfare escort ships with which to protect convoys such as supply to NATO or for U.S. amphibious task forces. The FFG-7 class was explicitly not required for escort of carrier task forces, for which the more capable and more expensive Spruance class DD-963 destroyers were acquired in a similar time frame (from the late 70s through early 90s). The cost criterion also extended to the numbers of ship's force and air detachment personnel to be accommodated. The corporate mantra was the 'High-Low mix' approach mandated by the then U.S. Chief of Naval Operations, Admiral Elmo Zumwalt, quoting Soviet Fleet Admiral Sergei Gorshkov who proclaimed, 'Better is the enemy of good enough.' FFG-7s were to be "expendable tin cans".

It was notable in Australia's Collins Class submarine program that this approach was not followed with the predictable result that corrective actions spanned more than a decade following construction. [18]

For each FFG-7 ship, there would be a period of shakedown and acceptance trials after delivery, followed by a post-shakedown availability when corrective actions would be programmed. The lead ship, the USS OLIVER HAZARD PERRY, was also be subjected to class design evaluations of a formal operational test and evaluation when fully configured and to a whole-ship shock test.

The importance of the land-based test sites in managing revolutionary designs is captured by Stark and Stembel [23] as follows, and is in stark contrast to the Australian experiences of the Collins Class Submarine a decade later [18] and the Landing Helicopter Dock ships only a few years ago [24]:

Although costly to design and to build, these two test sites were of inestimable value in accelerating the Lead Ship design and the FFG Program. The Propulsion LBTS permitted ordering and testing of the gas turbine, reduction gear, shaft, propulsion control console, and associated lube oil system more than a year earlier than would otherwise have been the case. Similarly, early development of the Combat System LBTS forced decisions on equipments and arrangements and made data available much earlier than normal. As a result of the two test sites, data for these systems were never a problem in the Lead Ship design, and the successful Acceptance Trials of FFG-7 were attributed in large measure to these Facilities. [23]

REVOLUTIONARY TRENDS IN MILITARY RESEARCH AND DEVELOPMENT EFFECTING NEXT FFG DESIGN

To see where the next innovative FFG design might come from requires two significant steps. First, to remove from consideration all recent warfare where naval forces were arguably only an enabler of majority land conflicts and held mostly by one side only. Second, to step away from platform-thinking to systems-thinking, to see where technology can go if unconstrained. Taking the first, the last naval engagement between near-peer adversaries, where these engagements seriously shaped the outcome, was the Argentine-U.K. Falklands War in 1982, 35 years ago. [25]

With the recent identification of Russia and China as the primary competitive forces for the West to address, the emphasis is again onto the redesign of surface warships to meet 21st Century adversarial capabilities. In particular, the expected widespread use of autonomous unmanned vehicles (AUV) is highly likely to change dramatically the design of the operating and support platforms from which the AUV will operate. Bitzinger [4] also points to Chinese research and development (R&D) as the most influential in Defense innovation:

… this possible "lull" in disruptive strategic innovation … may provide a pause or slow-down in the global process of defense technology development that would permit latecomer innovators and "fast-followers" to draw nearer to the state of the art. This is particularly apropos in the case of China. China has … increasing military expenditures at least five-fold over the past 15 years … its defense R&D, although classified, probably approaches $6 billion annually … Certainly, in its pursuit of a fifth-generation fighter aircraft (e.g., the J-20 and the J-31 prototypes), it is poised to overtake Europe in this one particular area.

See Table 2

The final trend to cover is that of cybersecurity, where arguably the pursuit of information dominance has led to an inevitable counter of malicious use of the cyber-domain. [26] Heinl [27] points out that:

> *…acquiring offensive or advanced cyber capabilities could seem financially attractive, in particular for less wealthier states in the [South-East Asia] region, relative to the higher costs of other weapons … defence analysts predict that many South Asian states will undertake state-sponsored cyber programs facilitated by low barriers of entry, the availability of large pools of skilled manpower and extensive IT infrastructures.*

ENVISAGING REVOLUTIONARY WARSHIP DESIGNS

> Against a *first-world* contender, *'to survive in the modern battlespace, Fleets will need to be able to afford to take the hits and the losses'* [3]

Therefore, losses will need to be politically, militarily and economically affordable if ships are going to be used, such as was epitomised in the design approach of the FFG-7 class. This section examines the main contemporary design influences for greater affordability in the context of warship attrition, then how these influences might be modularised and conceptualised to create the new design spaces and to envisage impacts on crew and fleet compositions. The section then examines the cultural influences that have constrained more affordable attrition before concluding with key recommendations and the associated high-level design criteria.

Table 2: Critical Emerging Technologies effecting naval ship design, especially in Asia-Pacific

Predominately Forcing	Forcing and Enabling
Over-the-horizon Radar (OTHR)	Electronically Scanning Array (ESA) radars
High-Frequency Surface Wave Radar (HFSWR)	Ship-borne sonar-arrays, hull-mounted & towed
Hypersonic missiles, including long-range aircraft-launched [25]	Unmanned Underwater Vehicles (UUVs) & Unmanned Aerial Vehicles (UAVs)
Cyber-warfare [26,27]	Cyber-security [26]
Ocean-bottom & tethered remote-sensing sonar arrays	Information dominance (networking plus cooperative engagement)
Highly programmable sea mines employed analogously to improvised explosive devices	Unmanned surveillance & maritime patrol aircraft
Submarine endurance from nuclear or air-independent propulsion [4]	Active stealth vice passive reflectance & absorbent designs
Submarine stealth	Swarming of unmanned vehicles, counter-measures or weaponry
Space-based persistent infra-red sensing	Intelligent Integrated Platform Management Systems (IPMS)
Cyber, Bigdata, Artificial Intelligence, and Quantum AI (QAI)	Remote situational awareness to hardened command centres
Laser weapons	Tactical nuclear weapons
Lightweight armour made of composite materials	Anti-ship ballistic weapons

Contemporary Design Influences. In projecting the emerging military technologies on future surface warship design to provide for greater attrition, the following salient design influences are emerging.

Modularising. Blake in a *New Model Navy* [28] considers the need to move from 'crewing the equipment', to 'equipping the crew' – a long-standing criticism by Army (and Marines) of navies and air forces. This paradigm shift would be a fundamental change in procurement and acquisition doctrine, training and education; emphasizing the *agility* of crews to think through and solve problems tactically, and the *fidelity* of the system to enable o*perational versatility and strategic adaptability*. [3] At its heart, this is what we envisage by the *Versatile Modular Systems* approach to conceptualising, designing, building and crewing affordable and sustainable future navies.

Conceptualising Design Spaces. Considerations set out in this paper, have concomitantly led to the development of consolidated deductions for conceptual design space for warships, as set out in Table 3.

Table 3: Consolidated Conceptual Design Space Considerations

Current Position	Assumption	Deduction
Improvements to networking cross-spectrum sensors, including sonar, electromagnetic & from satellite & cyber tracking of resources (i.e., logistics chains/ information/big-data flows)	A Fleet Vessel will be detected at some stage of an operation	Stealthy hulls are of less value & the expensive premium paid for quiet hull/tiles etc. may not be justified against a first-world contender
The threat posed by conventional weapon systems like cruise & ballistic missiles of first-world adversaries is such that even the largest vessels will not survive a hit. The threat posed by other anti-access systems such as sea-mines would disable most frigates & destroyers	Such weapon systems are not going to be used singularly but in salvos or fields	Scale counts. Either very much larger than current US aircraft carriers or many more frigates & destroyers are required to ensure the survival of the whole.
The affordability question becomes key to political, economic & military decision-making & taking.	The question is not whether or not losses are going to be taken – because they certainly will be – but what price each sector is likely to set	Political affordability (often tied militarily) can determine operational use. Numbers need to be both affordable (in build) & replicable in a timely way (during conflict) if they are going to have political value in conflict.
UAVs, USVs & UUVs are being pursued primarily to reduce risk to the up-front operator of systems – this includes smaller platforms, without life support & deck launch at much higher force.	Processing of data for these machines & the number of people necessary to maintain & operate these systems (from a distance), means a larger footprint. Alternatively, this requires a greater level of autonomy in the vehicle, which in turn requires a level of trust regarding both effectiveness and ethical behaviour.	For real-time processing of data, such processing power may need: a) to be closer to the operation, & b) more influenced by humans in the real-time loop. Local, as opposed to remote, mobile platforms capable of piloting UAVs & assessing/ processing data becomes more critical.

Emma Maersk potential as fixed-wing aircraft carrier or ISO Containerised Guided Weapons Ship (Image Maersk Line).

Blake [28] also stipulates as critical, the management of the flows of systems, crews and materiel between the Navy; its Auxiliary and Support elements and the Merchant Marine. He envisages the capitalisation and rescaling of Naval and Auxiliary Fleets through the application of 'fit-for-purpose', versatilely modularised merchant hulls – in a way also to grow and sustain (red flagged) merchant marines and ship-building industries [3, 28]

Cultural influences. Another way to deal with attrition is to revisit paradigms for setting fleet (and so crewing) numbers. First, consider the cultural paradigm that set fleet numbers in the *Information Age*. The Cold War threat equation believed that *'Threat was equal to Capability plus Intent and Will'*. Because *Capability* could be objectively measured (in terms of numbers of tanks, ships, aircraft etc.), it was. Ultimately, this over-concentration on *Capability* led arguably to collective difficulties in anticipating and transitioning from the end of the Cold War and an over-reliance on information and technological dominance.

A fundamental design difficulty introduced by 1990s reductionist and optimised design space thinking was to confuse and conflate scale with numbers – as in numbers of ships and crew sizes. This difficulty was further compounded by an accountancy-based predilection conflating capability, with strategy; and ranking (ordering, controlling, tiering etc.), with positioning. [30]

Key recommendations and associated high-level design criteria. To develop novel conceptual designs of surface warships requires significant R&D allocations before construction and creation of smart naval ship design centres in parallel with smart shipyards that can produce needed equipment in terms of time, quantity and quality. *Scalability* and *Composability* become critical – which are as important political and economic considerations, as they are military ones.

"Versatile Modularisation", which is a form of agile adaptation, therefore becomes key. [3] The first Aircraft Carrier, HMS ARK ROYAL (II), was laid down in 1914 as a freighter, designed for the coal-grain trade in the Black Sea. More recently, the U.K. ship HMS OCEAN applied merchant-marine standards to achieve something of an affordable half-way house, between conflated Navy Engineering and Lloyds Standards, and a fully versatile modularised system.

Taken with the Army's long-standing criticism of Navies and Air Forces, that '*they man the equipment; rather than equipping the man*', this suggests four critical design criteria that could improve naval systems thinking.

1. Ask first, '*what would we be doing, if we were at war – and, if not, why not?*';
2. Adopt the *Cult of the Imperfect* – sometimes adapted as '*second best, today*': '*give them the third-best to go on*; t*he second-best comes too late*, [and] t*he best never comes*'. [31] Remember what Admiral Gorshkov said '*Better is the enemy of good enough.*', with parallels to Voltaire of "not letting the perfect become the enemy of the good".
3. Enable compositions for '*crewing the ship (and its unmanned vehicles that it operates and sustains); rather than shipping the crew*';
4. Scale capability-networks for '*fitting the kit; rather than kitting the fit*'.

CONCLUSIONS

A new conceptualization of the warship design space; shipyards and build techniques – a revolution in warship design – is pressingly overdue. This juncture may be reinforced following the catastrophic sinking of the Norwegian Frigate, the KNM HELGE INGSTAD (F313), following a collision in a Norwegian Fiord due (it is claimed) to a fundamental mismatch with the crewing of current frigate designs. [29] Addressing the political, economic and military affordability of ships and potential losses is needed to shift the efficacy of Naval surface warfare. ■

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THE SPECTRE OF AUTONOMY

By Jonathan Wilson

Operation Iraqi Freedom, in 2003, marked the first time an unmanned undersea vehicle (UUV) was used in combat. A Remote Environmental Measurement UnitS (REMUS) vehicle was deployed around the port of Umm Qasr to assist the U.S. Navy's Special Clearance Team (NSCT)-1. [1] Members of NSCT-1 were impressed by the versatility of these autonomous underwater vehicles (AUVs) as they searched through hazards and the sediment-heavy waters for mines. A human diver takes 21 days to clear mines in one square mile, whereas the REMUS can complete the task in only 16 hours. [2] In an era of increasing automation, many wonder if naval drones will replace manned platforms.

INTRODUCTION

Current technological trends indicate that UUVs certainly have a growing role in 21st century navies. The implications for the Royal Australian Navy (RAN) are significant. The replacement of Australia's Collins Class submarines will come at a time of rapid growth in UUV technology and implementation. This paper, however, will argue that submarines and UUVs are not mutually exclusive technologies in the medium term. Though governments are eagerly researching and developing new capabilities, it will likely be many decades before UUVs replace manned platforms outright.

While UUV refers to a broad range of vehicles, including wired-guided units and remote operated vehicles, this essay will focus exclusively on autonomous vehicles.

STRATEGIC CONTEXT

The 2020s is forecast to be an era of Great Power competition. Disputes over the South China Sea, North and South Korea, and the Taiwanese Strait have been identified as possible flashpoints. [3] If ignited, these conflicts will likely draw Australia into a war involving Great Powers, such as the United States, Russia and China. The Asia-Pacific region is home to some of the largest submarine fleets in the world, so it is in Australia's interest to maintain a strong underwater capability. In any case, Australia is a maritime nation and a middle power that depends on seaborne trade.

Australia's economic veins run through two large Indonesian straits. [4] Delivery of energy sources and export of agricultural goods through congested sea lanes, such as the Straits of Malacca, are vulnerable to piracy. The situation in the South China Sea is complicated by China's construction of bases on various atolls, reefs and artificial islands. Sea lines of communication (SLOCs) that pass through the South China Sea are trade routes used by many nations. Disputes over maritime boundaries between China and other claimant states will have consequences for Australia.

As an island nation, Australia has no land connections to other countries. While this has been strategically beneficial, this lack of shared borders precludes recourse to friendly countries. In a crisis, Australia will not be able to rely on lifelines such as fuel pipe lines, highways or railway systems. The primary objective of strategic planners has long been to defend against or deter threats that may come through the archipelagos to Australia's north. [5] In recent years, Defence White Papers have looked further north, openly identifying China as a potential adversary. [6] While a politically sensitive issue due to strong trading ties, China's naval expansion and build up in the South China Sea is monitored warily by Australia and its allies.

Fig 1 - Image of a Remus Drone.

With the geopolitical situation in mind UUVs are certainly a positive insofar as the capabilities they could add to the RAN. Submarines, whether diesel-electric or nuclear, can only last as long as provisions, munitions and the endurance of their crews permit. Though unmanned systems will need a team of shore or mothership-based crew, their use will lessen casualties and extend mission durations. UUVs will also pose a challenge as enemies with advanced technology may threaten Australian navy assets and SLOCs in the decades to come. The following is a summary of some of the more salient points being raised in Australian circles with regards to UUVs.

MANNED VERSUS UNMANNED PLATFORMS

The Australian government's landmark deal with the French company Naval Group promises 12 new diesel-electric submarines to replace the existing aging fleet. At a total cost of $50 billion, the first submarine is not due for operation until 2034. [7] To avoid a capability gap, the RAN will extend the life of the Collins Class fleet

beyond its original 2026 retirement date. [8] Various stakeholders argue that Australia's future submarines may lose their strategic edge to UUVs in the coming decades.

Some thinkers have posited that future conflicts underwater may be fought exclusively by armies of underwater drones. A few members of the Australian Strategic Policy Institute (ASPI) say that the oceans could one day be too dangerous for manned underwater platforms. [9] One thinker flagged China's advancing artificial intelligence, robotics and AUV development, which will be further developed in contrast to the decades-long roll out of Australia's Attack class. [10] A spokesman for the Australian Submarine Institute (ASI) views undersea drones as being a boon to manned platforms, rather than a replacement. [11] The ASI of Canberra affirms the Naval Group project, staunchly advocating for no less than the 12 submarines on order. [12]

A snapshot of global naval construction shows that manned submarines have not fallen out of favour. It is not within the scope of this essay to detail every major construction project. The following section, therefore, summarises the submarine programmes of major powers that are also investing in UUV technologies.

SUBMARINE CONSTRUCTION IN THE 2020S

While strong maritime powers such as China and the United States are investing in AUVs, they continue to operate manned submarines, with more scheduled for production. Submarine fleets are forecast to operate well into the 21st century.

China is modernising its naval fleet and is expected to wield a force of between 65 and 70 submarines by 2020. [13] It is important to note that the People's Liberation Army Navy (PLAN) operates the largest fleet of submarines in the world. Most of them are diesel-electric. The Yuan-Class type 39A submarines are small air-independent, propulsion-powered vessels. [14] They carry nuclear missiles that have a 1500-kilometer range. With more slated for production, the Yuan-class have low acoustic signatures and can stay submerged for up to forty days. These vessels have the ability to lurk in shallow waters and narrow passages, as well as the high seas, making them formidable platforms. [15] China also launched two nuclear-powered submarines – type 094 Jin-class – in the middle of 2019. The type 094, which can carry up to 12 CSS-N-14 (JL-2) submarine-launched ballistic missiles, has a range of 4,500 miles. [16] A U.S. Defence Department report said that China is also planning a new class of nuclear-powered ballistic missile submarine with construction expected to begin in the early part of the 2020s. [17]

In 2016, the U.S. Navy announced that it needed 66 attack submarines. By early 2019, however, its force comprised 51 attack boats. This figure is expected to drop, especially with the 14-strong Ohio-class fleet – built between 1981 and 1997 – fast approaching retirement. In May 2019 Huntington Ingalls Industries began construction of the first of 12 Columbia-class submarines, which are expected to serve more than 40 years. [18] The total cost of the Columbia fleet will be $109 billion. [19] Significantly, the first of this class, USS COLUMBIA, will not be ready until 2031, a few years before the first of the RAN's new submarines become operational.

Continued investment in traditional platforms suggests that submarines will form the backbones of navies for much of the 21st century.

RECENT TRENDS IN US DRONE TECHNOLOGY

The following section details a selection of UUV platforms that may strongly influence Australian strategic decision making.

REMUS

REMUS units, were developed by Woods Hole Oceanographic Institution and Hydroid, and are owned by Kongsberg Maritime. These AUVs have seen wide military and civilian use, with several variants already in service with the U.S. Navy. REMUS units in U.S. Navy service are used mainly for mine clearance duties. The key feature of the REMUS is its torpedo shape. The U.S. Navy operate a version of the REMUS 100, known as Mk 18 Mod 1 "Swordfish". It can travel up to 5 knots and has an endurance of 22 hours while operating at a cruising speed of 3 knots. [20] At a weight of 85 lbs, this unit is a two-man lift. The US marines employ the larger REMUS 600, known as the Mk 18 mod 2 "Kingfish". With a maximum operating depth of 600 metres, this unit features a side-scan sonar, a video camera, GPS and a beam attenuation meter (BAM) to gauge water turbidity. It can travel up to 5 knots, with an endurance of 70 hours, when at a cruising speed of 3 knots. The size and potential for launch and recovery in submarines could have applications in the RAN.

The Boeing Orca Extra Large Underwater Unmanned Vehicle (XLUUV) is based on the company's Echo Voyager prototype. This AUV is designed to launch from piers, and it is too large for submarines. The unit has a range of 6500 nautical miles and is capable of reaching a depth of 11,000 feet. [21] The Orca platforms are designed to be adaptable. The U.S. Navy intends to fit them with new technologies and payloads as they become available in the

Fig 2 - Shipping in the Malacca Strait.

Fig 3 PLAN YUAN-Class 39A Type Submarine.

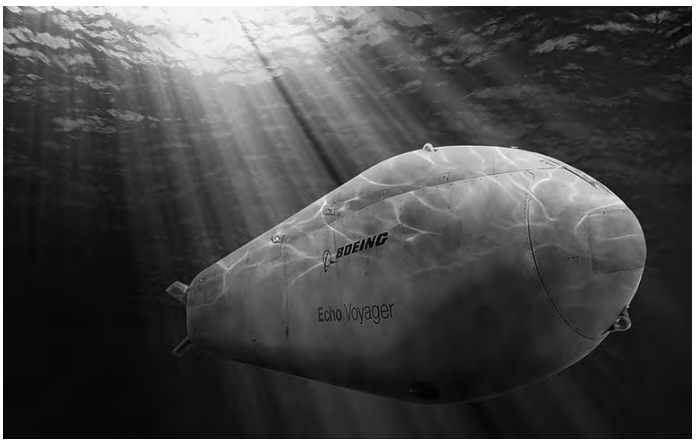

Fig 4 - BOEING Echo Voyager.

Fig 5 The BOEING Australian Manufactured Loyal Wingman Prototype - Capable of being flung off Frigate and Destroyer Flight Deck.

coming years. The Orcas will likely be used for mine and counter-mine warfare in their initial operations. [22] They have possible applications in intelligence gathering and could even act as decoys to confuse enemy combatants. [23] The Echo Voyager prototype has space to carry torpedoes internally, whereas the Orca could carry torpedoes externally. The Orca is significant for Australia as there may be scope for technology transfer with the United States.

GLIDERS

Gliders are small drones that travel through the ocean by adjusting buoyancy. They do not require propellers which allow these units to operate on the same battery charge for months at a time. Gliders have been used to track oil spills, pollution and even fish movements. Observers have noted that their low acoustic signature would make them ideal for anti-submarine missions. [24] Chinese companies have made headway in new UUV technologies. The Haiyan glider set an endurance record in 2018 after sailing 3619.6 km in the South China Sea over 141 days. [25] Chinese state media allege that Haiyan gliders have an anti-submarine warfare (ASW) role. It is easy to envision a future in which the underwater battle space is monitored by armies of these cheaper and easily-manufacturable units. One commentator touted a future scenario where Britain's Trident nuclear submarine force is stalked by an army of gliders. [26] Such an eventuality could make nuclear deterrence – let alone Australia's future submarine force – obsolete.

A PARADIGM SHIFT?

UUVs may represent a significant paradigm shift in naval warfare. The U.S. Navy looked to unmanned drones during the Gulf War after two ships were badly damaged by mines. The 1994 'Unmanned Undersea Vehicle (UUV) Plan' outlined the U.S. Navy's roadmap for UUVs. The priority then was for UUVs to work as mine clearers. The last publically available Masterplan was the 2004 Update which outlined nine priorities for their use. [27] Importantly, the report identifies UUVs as the only force that can gain early and undenied entrance to a battlefield, especially with their ability to traverse waters too shallow for manned platforms. [28] The 2004 report details how fielding UUVs will multiply the number of available sensors in an environment. Undersea drones can also be connected to a mothership, operating as forward detectors and/or aggressors, without risking lives. UUVs can provide data on bathymetry, tidal and wave current information, winds, acoustic signatures, environmental hazards and other information. [29] By 2004, the U.S. Navy came to view UUVs as a force multiplier that can strengthen the reach and lethality of manned platforms. The key takeaway from the Masterplan is that unmanned vehicles are intended as supporting vessels, not primary warfighting assets.

In 2019 the US Navy requested $628.8 million in research and development funds for unmanned naval units. An author of a Congressional Research Service (CRS) Report noted that the US Navy seems to be moving away from a naval force centred on large and expensive surface ships, towards a more 'distributed architecture'. [30] One former US Admiral believes that the greatest challenge to the U.S. Navy is the asymmetric threat, primarily from mine warfare. [31] The current array of naval assets is now regarded by the U.S. Navy as vulnerable to anti-ship missiles and interlinked detection and targeting systems. [32] UUVs and other small unmanned platforms are relatively cheaper vehicles that could drastically increase the target load for enemy units, thereby mitigating risk to manned vessels.

The UUVs Masterplan is slowly being realised. The US Navy contract with Boeing, finalised in early 2019, promises up to five Orca XLUUVs. [33] They want to acquire a total of nine XLUUVs between the 2020-2024 Financial Years. The CRS noted the unusually accelerated pace at which the US Navy is planning to acquire and integrate these new unmanned systems into the fleet. This move is seen as a response to China's rapidly expanding naval forces. In spite of these developments, it is too early ascertain the extent to which UUVs will change naval warfare in the 21st century.

It is useful to analyse how unmanned aerial vehicles (UAVs) have been utilised by the U.S. military, so as to avoid overstating the impact that UUVs might have in the short term. The United States military employs UAVs widely in a number of different operations. Some considerable technical feats were also achieved in the recent, experimental X-47B program, such as autonomous air-to-air refuelling and a successful carrier landing. [34] Aerial drones, however, are used exclusively in an air-to-ground role, with human fighter pilots the guarantors of air superiority for now. This serves as an important reminder that while drone technologies have come a long way, they serve to augment manned systems rather than supplant them.

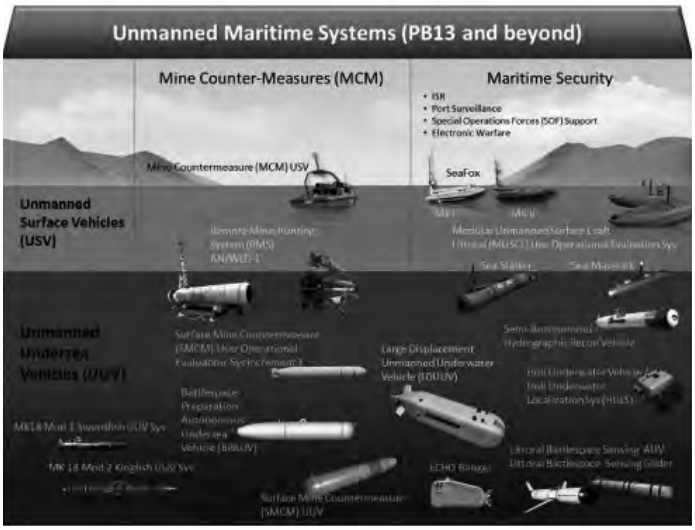

Fig 6 Un-Crewed Integrated Maritime Systems in the 21st Century. (Image DoD December 24, 2013, Unmanned Systems Integrated Roadmap).

CONCLUSION

Australia's new submarine fleet will have a vital role in contributing to regional security. This role may be a greater and more taxing responsibility for future RAN submariners than ever before. By the time the last of the Collins Class submarines are retired, the new force will likely be operating in an environment of retrenched great power competition. The steel for the new fleet has not yet been cut, which is why it is vital that the conversation over UUVs and manned platforms continues. Ultimately, the most important stakeholders in this debate are not members of big industry or the government, but the Australian people themselves. Their prosperity and, ultimately, survival, depend upon the men and women in uniform who will serve in their name. Underwater drones have operational merit, and so they can be paired together in complimentary service to enhance Australia's future submarine force. ■

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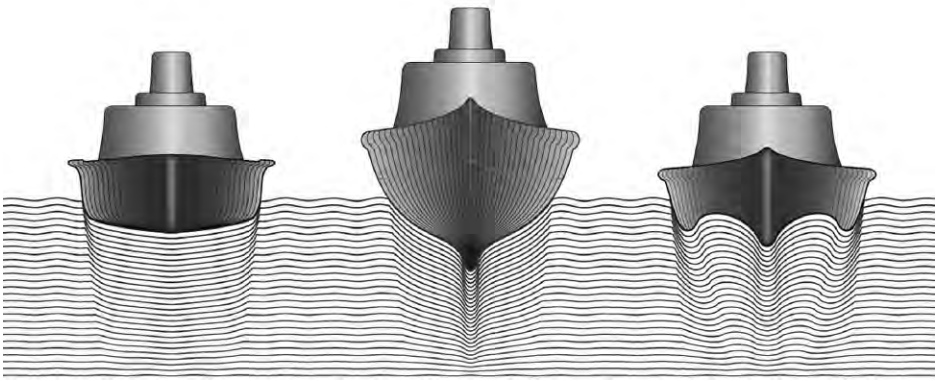


Fundamentals of Naval Architecture at the Australian Maritime College University of Tasmania.

NAVAL SHIPBUILDING COLLEGE (NSC)

Dear John,

(John Merriman, Communications Specialist to NSC).

Thank you for making contact with me following your talk with Robert Albert AO, RFD, RD of the Navy League last week.

As Robert would have mentioned, I am the Editor in Chief of *The Australian Naval Architect*, the quarterly journal of the Australian Division of the Royal Institution of Naval Architects (RINA).

The RINA is the premier institution representing the profession of naval architecture in Australia, naval architects being the profession specialising in the design, construction, maintenance and support of ships. They will play an indispensable role in our naval shipbuilding programme.

Over the past year or so the President of the Australia Division has been in communication with Ian Irving (*Chief Executive of the NSC*) with the aim of establishing a cooperative relationship as the programme develops. In this time, we have offered the NSC the opportunity to contribute an article for T*he Australian Naval Architect* however that opportunity has not been taken up so far. Your suggestion of an article is, therefore, welcome.

Most of the members of the RINA in Australia will be aware of the Naval Shipbuilding College but an outline of the college and its plans to enhance the development of the skills required for the Naval Shipbuilding Programme would be welcome. Members of the RINA are, of course, already involved in the programme and the Institution is particularly concerned that the profession, which we would expect to be in considerable demand in coming years, is properly included in the work of the NSC.

For your information, I have attached a copy of the November 2019 edition of The Australian Naval Architect. You will find mention of the NSC in this edition. The February 2020 edition of The ANA and earlier editions can also be downloaded from https://www.rina.org.uk/australian_naval_architect.html

Regards

John Jeremy AM

Editor in Chief

The Australian Naval Architect

26 April 2020

RINA SUBMISSION

RINA Motto: Salum et carinae pignora vitae (To the open seas and ships, we pledge)

…to the Senate Economic References Committee Inquiry into Australia's Sovereign Naval Shipbuilding Capacity, 20 December 2019.

Conclusions and Closing Remarks

The Royal Institution of Naval Architects recognises the need to develop an indigenous naval shipbuilding capability, and strongly supports the proposed Naval Shipbuilding Program (NSP). The Institution, through its members in Australia together with its international resources, has the domain knowledge in this field, and we are enthusiastic to support the Government in its goal to achieve a sustainable NSP.

In particular, we would like to make the following points:

- Demand for maritime engineers is only just being met by current supply levels, the increase in naval ship production, operation and sustainment will be well beyond current supply levels of graduates. Increasing the number of maritime engineers in Australia should be one of the highest focuses for the NSC – the Institution is very happy to provide any appropriate assistance in this regard, noting that it is the responsibility of the NSC and its member bodies to meet the NSP's needs regarding provision of courses and student places.
- There is effectively no current supply line for para-professionals in maritime engineering, with the industry having to make-do with personnel from other areas – this should be rectified by the prompt establishment of appropriate training courses to meet the industry's needs.
- The NSC has not examined maritime engineering requirements in the industry, either at engineer or para-professional level; we see the low priority given to this through para 4.50 of the NSP as a glaring shortcoming in the NSC's establishment.
- Long term commitment to indigenous design capability, extending to exports, is essential to the success of the NSP.
- [Knowledge Information Technical Data and] IP transfer is essential and must be assured in contract negotiation and contract conduct, and be available for transfer from one project to another.
- Integration of Industry 4.0 into shipyards is heavily reliant on the platform systems engineering that a maritime engineer performs, so implementation of Industry 4.0 will most likely involve different IT system components and branding between shipyards and projects.
- RINA Australian Division, through its membership, includes experience from every field of Australian naval ship construction, operation and sustainment over most of the past half-century. This wealth of knowledge can be made available to the Committee, Defence and related bodies.
- And finally, a reminder, it is naval architects / maritime engineers that have the training and experience to plan for and understand the engineering, production and sustainment of ships - any development proposals that omit the

appropriate promotion and development of naval architecture within the NSP will most likely fail in the long term.

By Editorial Board

In case readers are wondering, a *Communications Specialist* is what used to be called a Media Adviser or a PR Manager. Mr John Merriman's bio does not appear to show any higher education qualifications and he has worked largely in state Government, media and PR.

From Mr Ian Irving's bio, he graduated from the University of Sydney BEng (Elec) in 1987 and subsequently attended management and executive programmes at the Boeing Centre for Leadership and Learning, Thales University Paris (France), and the Australian Graduate School of Management (Executive Consortium Programme).

Irving was previously Chairperson Australian Industry Group; Chief Executive Northrup Grumman Australia (Jun 2013 to Feb 2019); Member of the Board of Directors of The Sir Richerd (*sic*) Williams Foundation (in detail, *Air Marshal Sir Richard Williams, KBE, CB, DSO*), MD ALTILUS Pty Ltd, and is currently Chief Executive of the National Shipbuilding Institute, which manages the NSC – of which he is also the Chief Executive.

With us so far?

There should be real concerns about the lack of apparent formal engagement with RINA and the publicly funded National Shipbuilding Institute, and its college. Particularly given the recent run down of funding for universities in NSW and Tasmania that had previously kept the flame of naval architecture alive. It looks, *prima facie*, to be classic pork barrelling dressed up as re-modelling.

> *A College is an educational institution or establishment into which certain universities are separated, in particular providing higher education or specialized or vocational training with identifiable aims, duties and privileges, representing an organized group of professional people, and having its own teaching staff, students, and buildings.*

The *Image & Video Gallery* (beneath which three video-proms for the CE appears (see: https://www.navalshipbuildingcollege.com.au/gallery/) suggests that:

> *The Naval Shipbuilding College leads the way in advocating the development and sustainment of a skilled, national naval shipbuilding workforce.*

Is this case? Is the NSC a shell advocacy group for maritime political-financial-industry-complex activism? Another policy-wonk think tank?

Guided Missile Frigate (FFG(X)) contract awarded to Marinette Marine Corporation, Wiconsin.

Without knowing more about the NSC, it is difficult to understand its academic competencies for educating and training future maritime specialists and naval architects, presumably from apprentices to PhDs? There is no obvious detail on the webpages (see: https://www.navalshipbuildingcollege.com.au/) of specific courses, or academics and lecturers who might be involved. The site talks of 'pathways into the maritime industry (including PhDs)' and points to a 'workforce register' – rather than providing (it would appear) actual courses and details of who would be doing the teaching and research?

Prestigious specialist and Defence colleges/ academies/ universities of this type in the U.S., Russia, China, the Middle East and Europe, are led by renowned academics and professors with research PhDs. They hold titles such as "Dean" or "Head of School". Chief Executives are generally tasked to grind the organ. Maybe this is "old thinking", based upon inculcating empirical values and enquiry amongst our future generations? Tragically, it may also be typical of Australian Higher Education, where managerialism has long corrupted Academy.

If the NSC would like to provide a paper for *The NAVY*, in addition to that one kindly offered by/to RINA, then the Editorial Board would be delighted to accept. We would hope that the NSC would set out in detail how it will provide for the vital research, education and training of Australian maritime specialists, beyond SA, in a post-COVID world – where self-resilience and the rebuild of our maritime industry, Merchant Fleet and RAN will be fundamental.

FUTURE FRIGATE (FFG(X)) CONSIDERATIONS

Paper 1 (this issue), citing Blake [1], concludes:

> *A new conceptualization of the warship design space; shipyards and build techniques – a revolution in warship design – is pressingly overdue. This juncture may be reinforced following the catastrophic sinking of the Norwegian Frigate, the* KNM HELGE INGSTAD (F313)*, following a collision in a Norwegian Fiord due (it is claimed) to a fundamental mismatch with the crewing current frigate designs. Addressing the political, economic and military affordability of ships and potential losses is needed to shift the efficacy of Naval surface warfare.*

Blake with the NLA [1], in their analysis of the sinking of the HELGE INGSTAD, suggest that:

> *The damage described, including the gear room and forward and aft engine rooms, would exceed 21 m so the ship was going to sink – as surely as Titanic was going to sink with six compartments broached. The real questions, are why:*
>
> *a. The gear room flooded through the shafts (or at least one, on the side of the damage)*
>
> *b. The stuffing boxes (presumably they mean the bulkhead penetrations for the shafts and drives from the diesels and gas turbine in the forward and aft bulkheads of the gear room) failed.*
>
> *This raises questions regarding damage control in respect of Navantia ships. An alarming commentary on the frigate's*

PLAN Type 075 (01) catches fire.

officers and its builder. The inadequacy of its bulkheads is particularly worrying in view of all [RAN] Navantia ships.

Paper 1 (this Issue), suggests:

Without investment in new designs, concepts and strategies, inadequacies in equipment had to be compensated for by better trained people, and, in conflict, by urgent operational requirements.

Cuts to research budgets correlated to the failure to invest in a revised Frigate programme in the U.K., U.S., other NATO countries and Australia through the 1990s, when the emphasis was also placed on maintaining status-quo designs. For example, three Australian classes of warship programmes approved between 2003 and 2004 were all based extensively on re-designs. The designs were the ASMD-enhanced ANZAC Class (incorporating CEAFAR phased array radar), the Air Warfare Destroyers (Hobart Class) and the Canberra Class Landing Helicopter Docks. The cause of such reuse, it is argued, lay in the structural shift between investing in, or abstracting, new designs and optimising existing or status quo ones.

Blake [at 2] observed:

The immutable facts that are seemingly being placed before all Western Navies – brought home by the HELGE INGSTAD sinking – is that current surface ship designs and builds are simply unaffordable in the numbers required, and may no longer be either 'fit for purpose', or 'fit for the crews' that serve in them. This is not to argue against the choice of the Hunter-class (Type-26 GCS) for the RAN – it is a fine ship, and without a shadow of doubt the best of the designs available. However, it is perfectly matched to a pre-juncture (pre 2000/2010s) and not a post-juncture era.

Blake was considering the onset of a new scientific age, suggested by Paper 1 (this Issue) to be the *Synthetical Age*. However, it might also and equally refer to the *post-COVID age*.

FFG(X)

On May 4, 2020 the Congressional Research Service report, Navy Frigate (FFG[X]) Program, provided Background and Issues for Congress:

The FFG(X) program is a Navy program to build a class of 20 guided-missile frigates (FFGs). Congress funded the procurement of the first FFG(X) in FY2020 at a cost of $1,830m. The Navy's proposed FY2021 budget requests $1,504 million for the procurement of the second FFG(X). The Navy estimates that subsequent ships in the class will cost roughly $1,350 million each in then-year dollars.

As announced April 30, 2020:

Navy awarded a contract to design and produce the next generation small surface combatant, the Guided Missile Frigate (FFG(X)) today. The contract for detail design and construction (DD&C) of up to 10 Guided Missile Frigates (consisting of one base ship and nine option ships) was awarded to Marinette Marine Corporation (MMC) of Marinette, Wisconsin. [The FFG(X) design is based on the Fincantieri FREMM (Fregata europea multi-missione) design].

The FFG(X) at 6,700 tonnes and 151m relates directly to The Type 26 Global Combat Ship (6,900 tonnes and 150m) in terms of cost. In other words, the FFG(X) is an extension of the FFG (7) *OLIVER HAZARD PERRY class*, at two-to-four times the price. Instead of 60 such ships, the USN will be "lucky" to get 20-30. It is not (and neither is the Type 26) an abstracted conceptualisation of a new frigate design space.

The projected costs for future ships of the class are illusory – based on accountancy imagery. The class is not being developed in large enough numbers (and to new designs) to offset Defence Cost Inflation. The more likely average cost, allowing for DCI over a 10-year build program of small be-spoke numbers, is between $2 and $2.25b a ship. Costs will not be driven down, but up – and blow outs/ featurism are inevitable.

Based upon Paper 1, and references [1] and [2], it should have been possible to design a FFG(X) costing the same today (even allowing for a doubling in tonnage) as did the FFG (7) in the 1970s. In other words, the choice to Congress and the USN should have been between as many FFG(X) today, as FFG(7)s in the 1970s (at increased tonnage) – or twice as many, at the same tonnage: 120 versus 60.

Five Eyes Frigate?

The other fundamental contradiction is that the Marinette Marine Corporation is an American company belonging to Fincantieri S.p.A (with Lockheed Martin as a minority shareholder). Fincantieri is an Italian shipbuilding company based in Trieste, Italy. It is the largest shipbuilder in Europe. After the acquisition of Vard in 2013 and 50% of STX France in 2018, Fincantieri group doubled in size to become the fourth largest shipbuilding in the world.

There is nothing against the decision to go with the FREMM design – but BAE Systems is also an American and British company, with deep roots in the U.S. The Global Type 26 Combat Ship is being built in variant forms for the Royal Canadian Navy, the Royal Navy, and the Royal Australian Navy (as the *Hunter-class*). Australia, the UK, and Canada are all members of Five Eyes. There is some likelihood that New Zealand may at some point opt for the *Hunter-class*, Type 26 derivative. If so, four of the Five Eyes countries will be building fundamentally the same design.

A question that emerges is "what cost and value is membership of Five Eyes?", if, on cooperative programmes such as the FFG(X) – where there was a clear Five Eyes front-runner – the U.S. goes with a non-Five Eyes design? With all that that will imply to the build and integration of combat and command systems into the ship – as Australia is confronting with the *Attack-class* submarine?

Analysis undertaken by the NLA suggests that the Type 26, Hunter-class, to be a better

designed ship, more closely matched to blue-water Atlantic and Pacific operations; connecting to existing secure supply chains, and manufacturing bases.

BACK TO PURPOSE OF NSC

As discussed above, the National Shipbuilding College will contribute little or nothing to the post-COVID revitalisation of Australia's Industrial Base, if it does not directly contribute to the research, education, and training necessary to create new designs. These designs are needed today, not in 2035 – and need to be affordable. Given the talent base of our people and the existential Australian maritime base, Australia can make a real and meaningful contribution. Perhaps that is something that might be built on at the NSC? What is certain, is that Australia cannot afford to continue *paying good money for old rope* – just at a time when every dollar counts.

PLAN SHOWING THE WAY?

TYPE 075

The first of four PLAN Type 075 landing helicopter docks (*Yushen-class* landing helicopter assault) under construction by the Hudong–Zhonghua Shipbuilding company, caught fire on 11 Apr 2020.

The Type 075 is slightly smaller than the U.S. Navy's LHA (*Wasp-class*), it is larger than the French or Spanish/Australian LHD (*Adelaide-class*) equivalents. It is very close in size to Italy's future Trieste LHD. It is a new generation of amphibious assault vessel, giving PLAN the ability to launch various types of helicopters to attack naval vessels, enemy ground forces, and submarines. The vessels can also deploy landing craft and troops, in addition to provided Command and Flag support facilities.

With four ships under construction, for launching and commissioning between 2019 and 2023, the first of type was due to begin sea trials by the end of 2020.

The response to the fire by the PLAN – despite setbacks due to COVID-19 – was simply to bring forward the second Type 075 being simultaneously built alongside the first, while repairs and investigations were conducted. The third and fourth planned Type 075s will be built in parallel at the same location.

The scale of response is fundamental to PLAN designs and strategy. Compare, for example, to a similar fire in a US. UK, or Australian dockyard – or the sinking of the HELGE INGSTAD – that would set the program back months, with no immediate ship or backup plan available. PLAN demonstrated essentially that its designs and ships can afford to take the losses, politically, militarily and economically. Can the Global West?

TYPE 055

There is increasing concern about the potency and capability of the Type 055, *Renhai-class* Destroyer. It is a multi-mission design; the combination of sensors and weapons suggests a main role of area air defence, with anti-submarine warfare capabilities, significantly surpassing previous Chinese surface combatants. It is expected to undertake expeditionary missions and provide escort support for Chinese aircraft carriers and LHDs (Type 075). The Type 055 is being seen as a modern contender of the ageing *Ticonderoga-class* cruiser.

The first six of the class are commissioned and / or fitting out. Further orders for up to 36 such destroyers to be built between 2021 and 2030 are expected.

A critical advantage that the PLAN has, is that its strategies are based upon *Land to Sea Objective Manoeuvre,* as opposed to *Sea to Land Objective Manoeuvre*. The US and its Allies will always have to reach in, for example to the South China Sea, whereas China – through its island chain build programme – does not have to. It can defend the space, which the Type 055s are ideally designed to do – if needs be feinting forward to Blue Water Operations.

RIMPAC 2020

The United States Navy will sponsor the 27th Rim of the Pacific exercise, Aug. 17-31.

Hosted by Commander, U.S. Pacific Fleet, this biennial maritime exercise will be an at-sea-only event in light of COVID-19 concerns. The theme of RIMPAC 2020 is "Capable, Adaptive, Partners."

The at-sea-only construct for RIMPAC 2020 was developed to ensure the safety of sailors and base facilities during the COVID-19 pandemic, while exercising and showing intent and will.

MK 48 MOD 6 TORPEDOES FOR TAIWAN

The State Department, Defense Security Cooperation Agency approved a Foreign Military Sale (FMS) to TECRO (the Taipei Economic and Cultural Representative Office) of eighteen (18) MK-48 Mod 6 Advanced Technology (AT) Heavy Weight Torpedoes (HWT) and related equipment for an estimated cost of $180 million. This delivered the required certification notifying Congress of this possible sale.

TECRO has requested to buy eighteen (18) MK-48 Mod6 Advanced Technology (AT) Heavy Weight Torpedoes (HWT). Also included are spares special to type test equipment, shipping and shipping containers, operator manuals, technical documentation, training, U.S. Government and contractor engineering, technical and logistics support services; and other related elements of logistics maintenance, and sustainment support. The total estimated program cost is $260m.

GREENWICH STATION

Just over half of HMS GLASGOW is now complete or under construction, out of eight planned vessels in the class (all are named, three have been ordered, two are in build at Govan – HMS CARDIFF is No.2).

The souped-up Type 26s will replace eight of the ageing anti-submarine Type 23s, which begin retiring from service in the late 2020s after more than 30 years' service (at 150% extended Design-Life).

The slow rate of production of the T26, is down to the artificially created $13.5B (plus) black hole in the UK Defence budget and the MoD trying to spread the annual cost through resource asset budgeting. There is a huge cash flow problem and MOD is trying to avoid going bust by further sweating assets and people.

Until there are properly thought through designs and stable strategies with capital investment to match, the MoD will be left trying to deliver a 1970s Minis at 2020 prices. Good leadership, strategy and design with imagination is the best place to start! ■

REFERENCES

[1] R. C. Blake, Flash Traffic: There seems to be something wrong with our bloody ships today, and Under-Crewing / Investment in Frigates and Destroyers. *The NAVY Magazine of the Navy League of Australia*, 80, 1 (2019, pp. 19-21)

[2] R.C. Blake, The Emergence of Zombie Fleets (And BMW Builds Minis in Oxford). *The NAVY Magazine of the Navy League of Australia*, Vol. 81, No. 2, (2019, pp. 13-18)

APL England ISO Containers in Disarray off NSW Coast May 2020.

APL ENGLAND DETAINED

The Australian Maritime Safety Authority (AMSA) laid charges against the Master of the *APL England*, that lost 50 containers overboard. Allan Schwartz from the AMSA, stated:

> *This and other incidents remind us of the important role the ship's Master has in ensuring the ships that ply our waters are operated safely and do not damage our marine environment.*

APL has paid for contractors to assist NSW Maritime in retrieving the lost containers, which continue to be found across the NSW coastline.

> *We welcome APL taking responsibility by engaging contractors to undertake shoreline clean-up and retrieve some of the floating containers this week, but the impacts of this incident could take months, if not years to remediate and we expect these efforts to be sustained for however long it takes.*

The *APL England* was placed under detention in the Port of Brisbane until the AMSA receives $22 million in financial security.

> *This action...provides a commitment that they will remediate all impacts of this incident. That $22 million covers estimated costs including that of a clean-up.*

Debris from the incident have now been found from Wollongong to Port Stephens.

Forty shipping containers were lost overboard off the NSW coast after a ship rolled during heavy seas while travelling from China to Australia. The Singapore-flagged container ship *APL England* experienced a temporary loss of propulsion during heavy seas about 73km southeast of Sydney.

MERCHANT NAVY DAY, 3RD SEPTEMBER 2020

Merchant Navy Day commemorates those who served in the Merchant Navy and lost their lives over the past 100 years. The day remembers all those from various countries who served aboard civilian ships, which became known as the 'Merchant Navy' and who lost their lives during wars, conflicts, campaigns and peacetime disasters.

The UK's Merchant Navy was the largest in the world and in 1939, a third of the world's merchant ships were British, employing around 200,000 seamen. September 3rd was chosen because on that day in 1939, just 10 hours after the declaration of World War II by Neville Chamberlain, the transatlantic liner S.S. *Athenia* was the first marine casualty of the war – torpedoed by a German U-Boat, with the loss of 117 lives.

Merchant Navy Remembered at Anzac Park 3 Sep 2016.

NEW BUNKER TANKER FOR FREMANTLE

BP Marine (BP) and ASP Ships Group (ASP) announced the arrival of the bunker tanker *Absolute I* in Fremantle. This replaces the smaller vessel *Vacamonte*. ASP has time chartered the vessel to BP to supply bunkers to its customers' vessels in Fremantle, Kwinana and at the local Anchorages. *Absolute I* is an 8,646 dwt tanker, capable of carrying three grades of fuel. She was launched in October 2019 and delivered into Fremantle in April 2020. Following a change of flag and inspections, the vessel is now in service for BP. Her first bunker delivery was to the bulk carrier *ASL Fortune* at the Fremantle/Kwinana Anchorage on 23 April 202. Anthony Tolani, BP Marine general manager ANZ, said the arrival of *Absolute I* comes after many months of planning and provides the flexibility needed to deliver three grades of fuel in the future.

At present the vessel will continue to supply BP Very Low Sulphur Fuel Oil (VLSFO) and Marine Gas Oil (MGO). The increased capacity of *Absolute I* means BP are in a better position to service the growing number of ships calling at Fremantle and Kwinana and will allow them to increase bunker deliveries at the Gage Roads Anchorage. Anthony thanked ASP and the vessel crew for their efforts in bringing the vessel on-line in a timely and professional manner.

(Hellenic Shipping News – 20 MAY 20)

THE P'S & D'S

No history of Australian shipping would be complete without mention of one of its most notorious and colourful species, the ships painters and dockers (Ps & Ds). They were a curious bunch of "permanents" and "casuals", who seemingly operated on an agenda that was quite a mystery to all the other trades at the dockyard. The union was run out of the shadiest part of the Albion Hotel across the creek from the floating dock. Here, information was whispered out of the sides of mouths about everything that was happening on the waterfront.

If the antics of the Newcastle "dockers" was legend, they were nothing compared to the Melbourne waterfront in the 60s and 70s. A particularly entertaining account of those days was aired a few years ago on the *ABC Conversations* series with Richard Fydler interviewing a journalist who also went under the pseudonym "Jack the Insider". Without splitting hairs, the Victorian Branch of the Federated Ships Painters and Dockers was a thinly disguised front for some of the earliest organised crime in Australia. Virtually everyone who did "business" on the Melbourne waterfront paid hush money to the Secretary of the P&Ds at the time. You could order anything that took your fancy and invariably it would fall off the back of a truck in the vicinity of the port.

Without mentioning any names, a certain Chief Engineer on the *Empress of Australia* had two of these fabulous looking wheels on his new Monaro. In a clandestine arrangement with one of the P&D entrepreneurs he ordered another two of these wheels to complete the set. When he returned to Melbourne, he was elated to find two matched wheels (complete with tyres) leaning against the gangway. His joy soon turned to sorrow when he returned to his beloved Monaro only to find his car sitting on blocks and his original two wheels missing. An honest mistake and he got a full refund for what was described as a "clerical error".

There are many more stories like this, still one has to be careful about airing them. Retribution with the Melbourne P&Ds was always swift and permanent and didn't usually involve lawyers. When I see Webb Dock today with its sterile automation and absence of dockers I look back almost nostalgically on those good old days of that now extinct band of scoundrels, the Ships Painters and Dockers. ■

By Kent Stewart

THE NAVY AND THE 1918-19 INFLUENZA PANDEMIC

By Greg Swinden

The world is currently combatting the Coronavirus 19 (COVID 19) which originated in China and has now spread throughout the globe. Australia has fortunately been spared, so far, the worst of the outbreak but this is not the first pandemic to reach our shores.

This paper was first published by the *Naval Historical Society of Australia*, as Occasional Paper 76 in Call The Hands, Issue No.40, April 2020

SS *Mataram* off Darwin 1 Jan 1915.

INTRODUCTION

In 1918, towards the end of the First World War, the world began suffering the worst pandemic since the Black Death (Great Bubonic Plague of 1346-1353 which killed an estimated 75-200 million). The 1918-19 Influenza Pandemic killed more than 50 million people worldwide and was erroneously called the 'Spanish Influenza'; as it was neutral Spain that first reported the outbreak which is now widely accepted as having originated in the United States in late 1917. The disease was taken to Europe by US troops where it spread throughout Britain and France during 1918. [1] There were three waves of the virus as it mutated and these became more and more virulent as the disease spread world-wide. [2]

In Australia quarantine measures were enacted in October 1918, however cases of 'Spanish Influenza' began to appear throughout the country mostly by returning soldiers. About 40 per cent of the Australian population (then five million people) fell sick and around 15,000 died as the virus spread through Australia.

FIRST INFECTIONS

The first infected ship to enter Australian waters was the SS *Mataram* arriving in Darwin, from Singapore, on 18 October 1918. Over the next six months the quarantine services intercepted 323 vessels, 174 of which carried the infection. Of the 81,510 people who were checked, 1,102 were infected. In a sign of things to come the troopship *Boonah*, which had left England in October 1918 arrived in Western Australian waters in December with over 300 sick men on board. She was diverted to the quarantine station at Woodman Point where the soldiers were disembarked. One of the nursing staff later recorded "There was little that could be done for the cyanosis, the croupy cough, the delirium and final unconsciousness" [3]; 27 soldiers and four medical staff died.

The federal government held a national influenza planning conference, in Melbourne during 26-27 November 1918, where state health ministers, the directors-general of their health departments and British Medical Association representatives met to discuss what action was to be taken. The conference agreed that the federal government would take responsibility for proclaiming which states were infected along with organising maritime and land quarantine. The states would arrange emergency hospitals, vaccination depots, ambulance services, medical staff and public awareness measures. All states had quarantine stations (North Head in New South Wales, Point Nepean in Victoria, Bruny Island in Tasmania, Torrens Island in South Australia, Woodman Point in Western Australia and Lytton in Brisbane) but more were planned in case numbers over-whelmed their capacity In due course temporary quarantine stations and influenza hospitals were set up to handle the increasing volume of affected Australians.

Additionally the Commonwealth Serum Laboratories, that had been established during the war to alleviate Australia's dependence on imported vaccines, developed its first experimental pneumonic influenza vaccine. Between 15 October 1918 and 15 March 1919 over three million doses were given to returning Australian soldiers and sailors and also to the civilian population. The vaccine was deemed to be partially effective in preventing death in inoculated individuals.

The first recorded case of pneumonic influenza appeared in Melbourne on 9/10 January 1919 but the disease may have reached Victoria before then as there was delay in the Victorian Government advising Federal authorities. Early cases were also so mild that there was confusion about whether the virus was the 'Spanish Influenza' or a continuation of the seasonal flu virus from the previous winter. This uncertainty delayed the confirmation of an outbreak from Victorian health authorities, which allowed the infection to spread to New South Wales and South Australia by the end of January 1919. New South Wales was the first state to officially proclaim an outbreak of pneumonic influenza on 27 January 1919, with Victoria declaring the outbreak the following day. [4] In New South Wales the compulsory wearing of masks was directed on 31 January 1919 but with mixed results, and variation of masks, across the state.

THE NAVY'S HERE

The Royal Australian Navy was both a victim of the outbreak and part of the solution. Australian warships operating in the northern hemisphere, in late 1918, were struck by the virus with the destroyer HMAS HUON, then in dry-dock in Genoa in northern Italy, suffering five deaths in late October 1918, including two brothers (Stokers Ernest and Reginald Browne from Wollongong who died within a few days of each other). [5] Torrens, a sister ship of Huon, lost only one of her ships company; 30-year-old Lieutenant Reginald Farmer who died at Messina, Sicily on 9 October 1918. The light cruiser HMAS BRISBANE, arriving in the eastern Mediterranean in late November 1918, was also greatly affected with 183 of her ships company of 400 men contracting the disease with three dying as a result.

The battlecruiser HMAS AUSTRALIA and the light cruisers HMA ships MELBOURNE and SYDNEY, then in English waters were also affected, but the death toll was lower as they had access to better medical facilities. Amongst the dead was 35-year-old Chief Yeoman of Signals Thomas Moylan, from AUSTRALIA, who died in the Naval Sick Quarters on the island of Guernsey, in the Channel Islands, on 16 February 1919.

The troopship HMAT BARAMBAH, departing Australian waters in early September 1918, allegedly in a filthy state from her previous troopship voyage to Australia, had an outbreak of influenza on board, while off the west coast of Africa. Over 20 soldiers and four RAN personnel died. The naval casualties were Engineer Lieutenant Norman Davies, Stoker Petty Officer William Craddock, Stoker George Nye and Stoker Albert Thatcher who all died between 19 October and 1 November 1918. Nye and Thatcher died in hospital in Freetown, Sierra Leone while Craddock and Davies died on board Barambah and were buried at sea.

Lieutenant Reginald William Bartlett Farmer RAN remembered on the Mosman War Memoral. We Will Remember.

Following the Armistice of 11 November 1918, the RAN ships overseas began to return to Australia, however many sick personnel were left behind in hospitals in Britain where some died. The battle-cruiser AUSTRALIA was one of the last ships to return to Australia arriving in Fremantle on 28 May 1919 for a four-day visit. Perth due to the city's relative isolation and effective state border quarantine control had effectively avoided pneumonic influenza, but an outbreak occurred in June 1919. There is a possibility that the battlecruiser may have brought the contagion to Western Australia and Perth experienced a spike in infections after crowds gathered to celebrate Peace Day on 19 July 1919.

HMAT BARAMBAH Troops Being Sent Off from Port Melbourne 27 June 1916, image (Josiah Barnes, AWM).

WORST CASES

Sub-Lieutenant (later Vice Admiral) John Collins was one of the few RAN personnel remaining behind in England after the Armistice. He was appointed to the new destroyer HMS SPENCER and recalled the ship carrying the bodies of influenza victims from England to Holland for burial. [6]

Prime Minister Billy Hughes Inspecting the Crew of HMAS SYDNEY (II) as directed by then Captain John Augustine Collins RAN 10 Feb 1941, Image ANM.

Overall, the RAN suffered 284 deaths between 4 August 1914 and 31 August 1921 (the Commonwealth War Graves Commission official period for commemoration) of which 35 can be directly linked to the Influenza Pandemic. Another 15 deaths were potentially exacerbated by the illness thus making one in every six members of the RAN who died during World War I a victim of the pandemic. Hundreds more were hospitalised and at times ships were unable to proceed to sea due to the lack of fit crew-members. The RAN's major training base, Williamstown Naval Depot in Victoria, was also placed in quarantine with 345 personnel affected. [7] Those who died were often young fit men although the oldest was 44-year-old Lieutenant Commander David Ross, who was a senior Naval Transport Officer in Sydney, and is believed to have contracted the disease while visiting a returning troopship in June 1919.

PACIFIC ENCOUNTERS

The Australian Navy was also part of the solution to the pandemic. In late November 1918 news was received in Australia that the Influenza Pandemic had struck the South West Pacific islands of Samoa (a former German colony now controlled by New Zealand), Fiji and Tonga (both British Protectorates). All three outbreaks were linked to sick persons arriving by ship and no quarantine procedures being enforced. Britain and New Zealand requested immediate assistance from Australia (the influenza pandemic had struck New Zealand in October 1918 resulting in several thousands of deaths and overwhelming the nation's health systems). The Australian Government acted with alacrity and the light cruiser HMAS ENCOUNTER was directed to embark navy and army medical personnel, equipment to set up field hospitals and all necessary medical equipment and supplies to combat the scourge.

Encounter sailed on 24 November 1918 visiting all three islands and medical teams were disembarked at Samoa and Tonga to combat the disease. These teams effectively brought the disease under control but not before hundreds had died. In Fiji the sloop HMAS FANTOME, that had operated in the Pacific for most of the war, provided support to a New Zealand medical team even though 67 members of her crew were suffering from disease (although none died). ENCOUNTER returned to Sydney on 17 December 1918 and her crew immediately placed into quarantine which lasted until 26 December. The naval and army medical teams left in Samoa and Tonga returned to Australia during January - February 1919. [8]

Maritime quarantine also played a major in containing the spread of the virus until its virulence lessened and the RAN also assisted with this activity. HMAS SLEUTH a former patrol vessel and attached to the training ship HMAS TINGIRA, [9] moored in Rose Bay (Sydney), was utilised as a patrol vessel off the North Head Quarantine Station during the first few months of 1919. Her task was to monitor the ships that had been quarantined, after entering Sydney Harbour, and prevent passengers and returning soldiers from 'breaking out' from the ships and the North Head Quarantine Station. Some

HMAS ENCOUNTER paid off and HMAS AUSTRALIA flying Decommissioning Pennant Port Jackson 1920 (Image RAN).

HMAS TINGIRA Moored in Rose Bay, Port Jackson, 1912.

of the soldiers had been away from Australia for many years and 'escape attempts' by boat or swimming ashore had to be prevented. The task of quarantining these returning soldiers should not be under-estimated with over 160,000 Australian military personnel returning from Europe and the Middle East from December 1918 until September 1919 (in 147 troopships). Many of the men, who had served on the Western Front, had also married in England and were bringing wives and children with them. In addition there were several thousand's more Australians who had served in the various British forces who were also returning to Australia from the epicentre of virus.

CONCLUSIONS

The various measures employed in each state (i.e. mandatory wearing of masks and prevention of mass gatherings) did not stop the disease but did dramatically slow its spread and by the end of 1919 the influenza pandemic was over. The 'Spanish Flu' had a devastating effect across the globe killing at least 50 million people. In Australia the estimated death toll of 15,000 people was still high (but it was less than a quarter of the country's 62,000 service personnel who died as a result of the First World War).

The bulk of deaths occurred in the capital cities of the Australian states where the population was more densely housed; particularly in the working class 'slums' with larger numbers of people per dwelling and lower standards of health, hygiene and diet. RAN warships were also susceptible to higher infection rates due to overcrowded mess-decks and lack of fresh vegetables and fruit when at sea. Overall, however, Australia's death rate of 2.7 per 1000 head of population was one of the lowest recorded of any country during the pandemic. ■

NOTES REFERENCES

[1] A number of counter claims have been made that the Influenza (H1N1) was 'brought' to Europe by members of the Chinese Labour Corps who had transited via Canada in 1916 - 17 (following an outbreak of virulent influenza in southern China) and who subsequently served on the Western Front. This theory was first proposed in 1942 by Australians Frank MacFarlane Burnett and Ellen Clark in *Influenza: A Survey of the last 50 years in the light of Modern Work on the Virus of Epidemic Influenza* (published by Macmillan and Co. Ltd of Melbourne) and further detailed by Christopher Langford in September 2005 (*Population and Development Review*) and in 2014 by Mark Humphries from the Memorial University of Newfoundland, Canada. Counter claims have also been made the Chinese Medical Association, in their Journal, stating that members of the Chinese Labour Corps suffered from the disease only after they had arrived in France and also after the disease had affected other troops. This article will not delve into this complex issue.

[2] In New South Wales 50 deaths were recorded as attributable to the virus during January – March 1919, during March to May 1919 there were 1,542 deaths and during May to September 1919 the state recorded 4,302 deaths.

[3] Plowman, Peter *Across the Sea to War*, Rosenberg Publishing Pty Ltd, Dural NSW, 2003, Page 73.

[4] A returned soldier who had disembarked from a troopship in Melbourne before travelling by train to Sydney was the first reported case in NSW (on 24 January 1919) with seven other soldiers, who has also disembarked in Melbourne, soon falling ill at the No 4 Military Hospital at Randwick.

[5] The entire ships company of 70 personnel was afflicted, to various degrees, by the virus and hospitalised.

[6] Macdougal, Anthony *Collins of the Sydney*, Clarion Editions, Mudgee NSW, 2018, Page 99.

[7] HMAS ENCOUNTER was located at Williamstown, from early 1919 onwards, as the RAN's sea-going training ship and it is possible an infected member of her ships company may have spread the virus to those at the training depot.

[8] For more information refer to *Influenza in Samoa* by Surgeon Lieutenant Francis Temple Grey, RAN in the *British Medical Journal* Volume 1, 1919.

[9] Despite the threat of influenza the training ship HMAS TINGIRA continued to recruit boys, aged between 14 and 16, throughout the pandemic. Those recruited spending up to two weeks at the recruiting processing buildings at Lyne Park before going on board the ship.

2ND PLACE

FIRST AWAY

By Murray Dear

In 1860 the ship's company of the colonial screw sloop VICTORIA became the first Australian naval unit to see active service in a foreign conflict, the First Taranaki War. This war was the first of a series of civil conflicts between the New Zealand colonial government and Maori iwi (tribes) fought between 1860 and 1872. With the impending 160th anniversary of the First Taranaki War, a review is now timely of the contribution made by the VICTORIA in support of the imperial and colonial forces during the conflict.

HMVS VICTORIA Portsmouth Harbour 1884 (Image RAN).

INTRODUCTION

Among the several candidates for the title of Australia's first warship, the VICTORIA stands out as the forerunner of a long line of Australian warships. She was designed as a specialized warship, armed and commissioned for warlike purposes by a colonial government. The origins of the VICTORIA lie in the 1854-56 Crimean War and a perceived Russian threat to the colony. On 19 July 1854, Victoria's Governor Hotham placed an order for a sea-going screw steamer warship in London. By January 1855 the ship had been designed by Oliver Lang of Pembroke Dockyard after the style of British sloops of war.

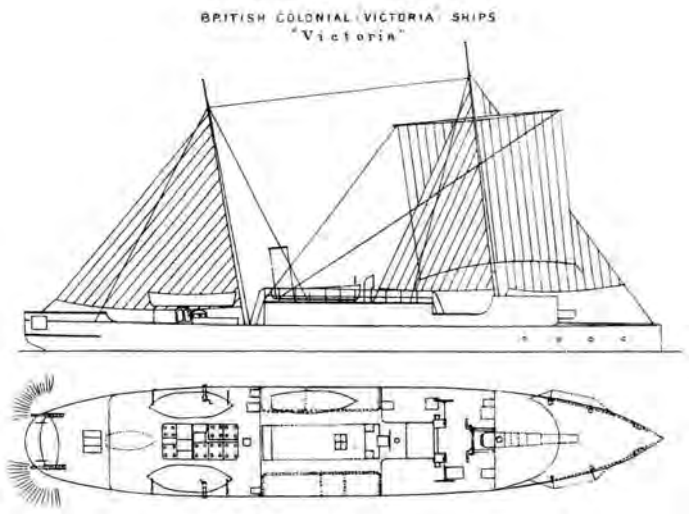
THE SCREW SLOOP VICTORIA

The new warship was to be of 580 tons burthen, around 800 tons displacement, 167 feet long with a beam of 27 feet and a draught of 12 feet. The hull was to be of two thicknesses of diagonal mahogany planking with the bow to carry a figurehead. She was built by Young, Son, Mangay & Co. of Limehouse, London with engines of 150 nominal horsepower supplied by George Rennie and Company, Blackfriars. A very fast ship for her day, the VICTORIA as the new ship was patriotically named, was rated at 9.5 knots under steam, 12 knots under sail alone and 14.5 knots under steam and sail combined. The original armament comprised a long 32-pounder, 56 cwt (9 feet 6 inches) pivot gun mounted forward and a pair of 32-pounder, 25 cwt (6 feet) guns mounted in broadside. [1] When the VICTORIA was launched on 30 June 1855, the London Times prophetically commented that "This event marks the foundation of a great navy in the Southern seas." Delayed by a lawsuit over a propellor patent, VICTORIA set sail from Plymouth on 8 March 1856 under the command of Captain William Norman. By the time she arrived in Melbourne on 31 May, the Crimean War was over.

The VICTORIA proved to be a good investment for the Victorian colonial government. It gave assistance to ships which had run aground, taking mails from vessels in Port Phillip Bay, acting as a lighthouse tender and in various other ways. In October 1856 and

March 1857, she gave assistance to the prison hulks DEBORAH, LYSANDER, PRESIDENT, SACRAMENTO and SUCCESS moored off Williamstown during prisoner insurrections. During 1857 and 1858 she made surveys prior to the laying of the Tasmanian cable and then provided assistance to steamers engaged to lay the cable.

With the government unsure where the VICTORIA stood in the official establishment, she was placed on the strength of the water police in January 1858. This was never a happy arrangement and at the urging of Captain (later Commodore) Frederick Beauchamp-Seymour RN, VICTORIA was returned to the direct control of the colonial chief secretary and measures were put in hand to provide Captain Norman and his officers with commissions from the Victorian colonial government. When fighting broke out in March 1860 between settlers and Maori in New Zealand's Taranaki Province, the colonial government placed the VICTORIA at the disposal of the New Zealand governor for twelve months.



British Colonial (Victoria) Ship VICTORIA Brasseys Naval Annual 1888-1889.

THE ORIGINS OF THE FIRST TARANAKI WAR

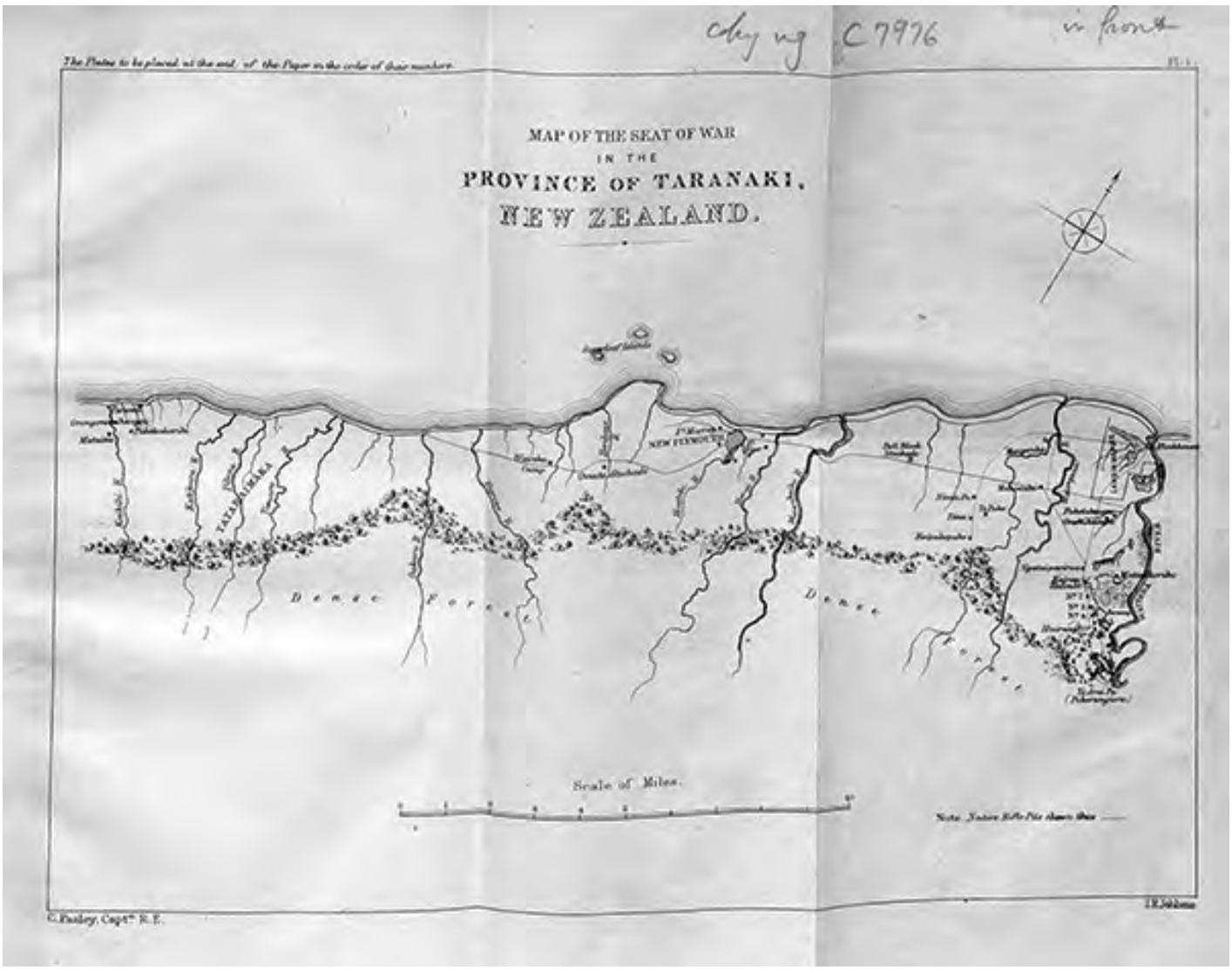
The war has its origins in a land dispute over the Waitara Purchase. To understand the implications of this transaction, it is useful to have some understanding of the Treaty of Waitangi signed 20 years earlier. On 6 February 1840 Captain William Hobson RN, Lieutenant-Governor of New Zealand, negotiated the Treaty of Waitangi on behalf of the British Crown at a gathering of Maori Chiefs at the Bay of Islands. The Treaty is a short document with a preamble and three articles. There are three versions: an English text, a Maori text and an English translation of the Maori text (which differs from the English text). It is the Maori text which is considered pre-eminent in international law. The English translation of the Maori text of Article the Second states, "The Queen of England agrees to protect the Chiefs, the subtribes and all the people of New Zealand in the unqualified exercise of their citizenship over their lands, villages and all their treasures. But on the other hand, the Chiefs of the Confederation and all the Chiefs will sell land to Queen at a price agreed to by the person owning it and by the person buying it (the latter being) appointed by the Queen as her purchase agent." In simple terms Maori were confirmed as owners of their lands, but such lands could be sold by mutual agreement to the Queen's representatives.

The complicated history of the Waitara Purchase can be reduced to a simple summary. Teira, a minor chief of the Atiawa iwi, living

Able Seaman William Odgers HMS NIGER Winning the VC at Kaipopo pã 28 March 1861.

with his fellow tribesmen on ancestral lands near the Waitara River, was persuaded to offer 600 acres of land to the Colonial Government at a price of one pound per acre. The block was on the left side of the Waitara River near its mouth and included the land on which the present town of Waitara is situated. A number of Teira's people supported him but the majority of the Atiawa, headed by paramount chief Wiremu Kingi te Rangitaake, opposed the transaction and made vehement and repeated protests. It was acknowledged that Teira was the occupier of a portion of the land and the Government contention was that a native had a right to dispose of his individual interest in land. The opposing contention was that while individual cultivation rights existed, no one had the right to part with the tribal estate, which was common property of the people, without general consent. Compounding the issue was a private feud between Teira and Wiremu Kingi and to obtain revenge, Teira deliberately proposed the sale in order to bring trouble on his antagonist and the tribe. Wiser statesmanship might have devised a method of conciliating the antagonistic factions and averting a clash, but unfortunately such leadership was lacking by Governor Thomas Gore-Browne and the Colonial Government.

Despite Wiremu Kingi's protests, the completion of the Waitara Purchase was resolved upon by the Governor in early 1860. A survey party was prevented from beginning their work and failing an ultimatum given to Wiremu Kingi, Lieutenant Colonel Murray, commanding the Militia and Taranaki Rifle Volunteers, proclaimed martial law in the Taranaki Province on 22 February. The country settlers began their migration to the safety of the settlement (now city) of New Plymouth abandoning their homes which were to soon go up in flames.



Map of the Seat of War in the Province of Taranaki, New Zealand (C Pasley and CAPT J.R. Robbins RE).

VICTORIA GOES TO WAR

The first shots were fired on 17 March when an an attack was was made on a Maori pa (fortification) two miles from the Waitara River. Colonel Gold's attacking force comprised three companies of the 65th Regiment, a few sailors with a rocket tube from the screw corvette NIGER (which was anchored off the mouth of the river), twenty Royal Artillery gunners with three field guns, ten sappers and twenty troopers of the local Volunteer Cavalry. When the pa was eventually seized on the morning of the 18th it was found the garrison of around 100 Te Atiawa had prudently evacuated the strongpoint during the night. This skirmish was to be the trigger for the Victorian Government's offer of the VICTORIA for New Zealand service.

Prior to her departure from Melbourne, the Colonial Government passed an Act giving VICTORIA legal status, but this law was subsequently overturned by Britain as an attempt to create a naval force independent of the Royal Navy. On 19 April the VICTORIA sailed to Hobart where she embarked 134 troops comprising two companies of the 40th Regiment of Foot. She sailed from Hobart on 24 April for Nelson which she reached on 1 May. Ordered northward, VICTORIA joined a Royal Navy flotilla operating off the Taranaki coast under the command of Captain Peter Cracroft RN. In addition to the NIGER, Cracroft's command comprised the 26-gun sailing frigate IRIS and the screw corvettes CORDELIA and PELORUS. By now the Taranaki district was in turmoil with the New Plymouth settlers besieged by Maori guerrillas operating with some impunity outside the British and Colonial fortifications.

The first major action of the war was fought on 28 March when colonial and imperial forces won a victory at the Battle of Waireka. The battle was in doubt until a naval column under Cracroft's command from NIGER seized the Kaipopo pa. Following the battle, warships landed some parties of sailors and marines to form a Naval Brigade of around 300 men under the command of Commodore Beauchamp-Seymour. On her arrival at New Plymouth, sixty men were landed from VICTORIA to help garrison Fort Niger, the sailor's redoubt on a hill on the eastern side of the town. Wiremu Kingi had been reinforced by other Taranaki iwi and the sailors from VICTORIA, armed with Enfield breech loading rifles, faced Maori warriors armed with muskets, tupara (shotguns) and tomahawks in addition to traditional weapons such as taiaha (fighting sticks) and mere (short clubs).

By June, Maori warriors from Waikato and South Taranaki iwi had joined the conflict. The Waikato was the home of the Kingitanga (Maori King Movement) and while King Potatau Te Wherowhero gave consent to Chief Rewi Maniapoto of Ngati-Maniapoto iwi to assist Wiremu Kingi, the Kingitanga did not directly participate in

Chief Rewi Manga Maniapoto, June 1879.

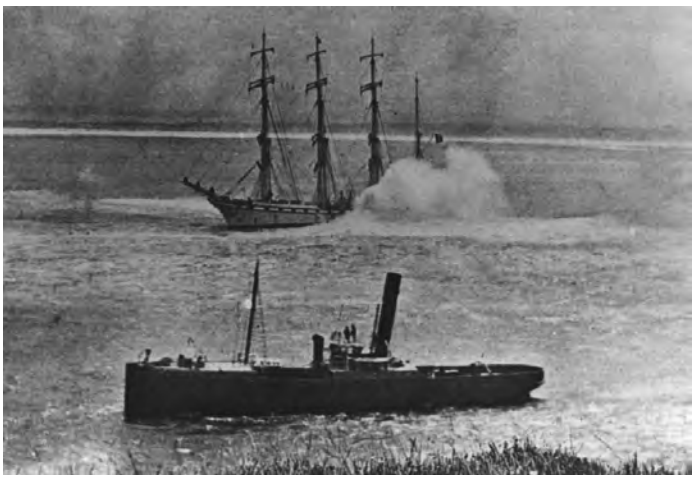
the war. Rather than taking their waka taua (war canoes) down the coast and risking interception by warships, the Waikato Maori went down the Mokau River to the Mokau Heads and then along the beach to Waitara. The VICTORIA is reported to have shelled a pa at the Mokau heads but there is no record of this in what is regarded as the official history of the war. [2] The South Taranaki Maori used trails inland of Mount Egmont (now Mount Taranaki) to join the war. The Waikato and South Taranaki reinforcements were crucial to the next major action, the Battle of Puke-te-kaure on 27 June. The battle was a disaster for the imperial troops and naval brigade with 30 killed and 34 wounded, including Beauchamp-Seymour, out of an attacking force totalling 350. Maori losses were minimal.

In July a shore party under Lieutenant Woods was left to help man the New Plymouth defences while VICTORIA sailed for Sydney with despatches There she embarked Major-General Pratt, the new commanding officer of imperial and colonial forces, together with the headquarters staff of the 40th Regiment with VICTORIA then returning to New Plymouth on 3 August. Following the defeat at Puke-te-kaure and continued probing by Maori, the hemmed-in citizens of New Plymouth were loath to venture out beyond the precincts of the town. It was deemed necessary to remove the women and children from the town and a proclamation was issued by Colonel Gold. The VICTORIA assisted with the evacuation of women and children to Nelson. While the skirmishing continued on land, VICTORIA performed coastal patrols and maintained supply routes between New Plymouth and Auckland. In October, the ship underwent a refit in Wellington and then resumed duties delivering reinforcements and supplies to the combat area then returning to Auckland with the wounded.

Following the death of the elderly King Potatau on 25 June, war parties from Ngati-Maniapoto (south Waikato) and Ngati-Haua (east Waikato) marched southward in reinforcement of Wiremu Kingi. On 6 November these warriors were at Mahoetahi pa where they faced a force of 670 troops, including 130 Volunteers, under the command of Major-General Pratt. The resulting battle was a disaster for the Waikato iwi with Maori casualties comprising 50 dead and 60 wounded. Imperial and colonial losses comprised four killed and 17 wounded. Major-General Pratt took the field once more towards the end of December when he concentrated a force of a thousand strong at Waitara. On 30 December he attacked the stockaded and trenched pa at Mata-rikoriko, a short distance inland of Puke-te-kauere and somewhat nearer the Waikato River. A naval brigade of 138 officers and men from CORDELIA, IRIS, NIGER, PELORUS and VICTORIA provided artillery and infantry support for this operation. While the pa was seized on 31 December it was found to have been evacuated during the night. Three of the attacking force were killed and 20 wounded while six Maori defenders were killed.

On 14 January 1861 Major-General Pratt marched from Waitara towards Huirangi with a force of around 700, including a naval brigade, to attack Maoris entrenched between Kairau and Huirangi. After quickly building a second redoubt (No. 2 Redoubt) near Kairau, Pratt advanced with a force of 1,000 strong on 18 January towards the Te Arei pa stronghold. Pratt steadily advanced while building redoubts to support his attack and secure against counter-attacks. A major attack against the No. 3 Redoubt on 23 January was beaten off with large Maori losses (50 killed and 40 wounded) with the defending troops casualties comprising five killed and eleven wounded. Pratt's advance towards Te Arei was slow and steady with a long sap interspersed by redoubts with covering artillery. The last two mortar shells were fired from No. 7 Redoubt into Te Arei on 19 March following which the Maori defenders raised a white flag.

Ōrākau survivors at the 50th commemoration of the battle 2 April 1914.



The Converted HMVS Victoria as a Tug Standing by a Grounded Vessel sometime after 1902 (Image RAN).

While Pratt was slowly and steadily grinding down the defenders of Te Arei, minor coastal operations were being undertaken against South Taranaki iwi. These were supported by VICTORIA, which had re-embarked her men from the naval brigade on 29 January, and other naval vessels. While the New Zealand colonial government would have liked to have kept VICTORIA on station, the Victorian government wanted to use her as a survey vessel and gave notice she would be withdrawn. Following the reduction of Te Arei pa, she conveyed Major-General Pratt back to Melbourne where he was greeted as a hero.

The war was terminated in an agreement between the warring iwi and the Government. The net result of the war was the enormous destruction of settler's property with the total value of homes and stock lost estimated at two hundred thousand pounds. The blunder of the Waitara Purchase had set the province back well-nigh twenty years.

CONCLUSIONS

The VICTORIA made a small but useful contribution to both sea and land operations during the war. Her only casualty was a man lost due to an accidental gunshot wound. Captain Norman was mentioned in despatches while one officer and 39 members of the ship's company who had seen active service in shore parties were listed as recipients of the New Zealand Service Medal. Sixteen thousand pounds was spent on maintaining the VCTORIA while on New Zealand operations.

When war broke out again in Taranaki and later the Waikato in 1863 there was no interest in committing VICTORIA to the conflict. However, VICTORIA was to make a brief return to New Zealand waters following the shipwreck of three sailing vessels at the Auckland Islands in the Sub-Antarctic. In October 1865 the Victorian colonial government sent VICTORIA to search for castaways and release domestic animals suitable as food. All the Sub-Antarctic islands, except the Snares, were searched without success. While at the Auckland Islands, the VICTORIA became the first vessel to enter the narrow western entrance into Carnley Harbour. [3] During the period VICTORIA was operating in Sub-Antarctic waters, there was fierce fighting on the east coast of the North Island. All New Zealand government steamers were committed to the war effort carrying troops and supplies, so once again VICTORIA had provided support to the colony during a time of need.

The participation of VICTORIA in the First Taranaki War may be viewed as a model for the later Australian naval involvement in minor conflicts such as the Boxer Rebellion, Confrontation and East Timor. While warfare has changed dramatically over the past 160 years, there remains some useful knowledge gained from the war regarding the use of naval forces when countering local insurrections. ■

NOTES

[1] Four additional 32-pounder, 25 cwt broadside guns were mounted later.

[2] It appears that the Armed Constabulary witness to this incident has mistakenly attributed this attack to the VICTORIA. The Armed Constabulary was not formed until the mid-1860s after the withdrawal of imperial troops and the Maori are referred to as "Hau Hau", the fanatical followers of the Pai-Marire religion which did not emerge until 1864. The vessel concerned is more probably the New Zealand paddle steamer STURT which shelled Mokau in April 1869.

[3] Now known as Victoria Passage and together with Norman Inlet on the east coast of Auckland Island these are respectively the only New Zealand geographical features named after an Australia warship and an Australian naval officer.

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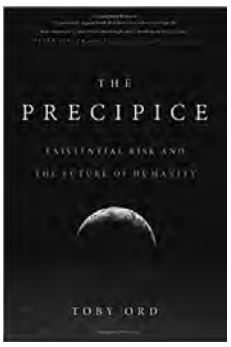


THE PRECIPICE

Existential Risk and the Future of Humanity

Toby Ord

Bloomsbury Publishing (5 Mar, 2020)

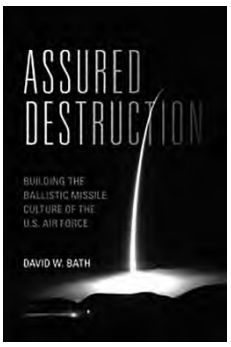
ISBN: 1526600218

Hardcover: $55.00

Toby Ord is an Australian philosopher. He was educated at the University of Melbourne, before moving to Oxford, Christ Church, where he obtained his D. Phil (PhD). He is currently a Senior Research Fellow at Balliol College and the *Oxford Future of Humanity Institute*, where his work is focused on existential risk; resulting in *The Precipice*. Although his specialist areas are normative/ practical ethics and moral uncertainty, he has used his research to undertake existential risk analysis of catastrophic probabilities. In recent decades, he is one of only a few "social scientists" to seek an empirical understanding on which to base their argument.

In his book, largely written between 2017 and 2019, Toby assesses the total natural existential *catastrophe* risk (from asteroids/ comets; super volcanoes; and stellar explosion) to be 1 in 10,000 (over the next 100 years). He considers, despite the activism, that both Nuclear War and Climate Change have a 1 in 1,000 risk of existential *catastrophe* in the next 100 years. Much more seriously, writing before COVID-19, he assessed naturally arising pandemics at 1 in 10,000, and engineered pandemics at 1 in 30. Perhaps giving some indication of possible COVID-19 origins? He assesses the risk of Artificial Intelligence (impacted also by nanotechnology and Quantum) causing an existential catastrophe in the next 100 years at 1 in 10. The highest of his risk assessments.

This is an excellent, well researched and written book. Perhaps it, along with Michael Moore's Documentary (see Editorial) should be compulsory reading/viewing for all year 12 and social science activists?



ASSURED DESTRUCTION

Building the Ballistic Missile Culture of the U.S. Air Force

David W. Bath

USNI (15 Mar, 2020)

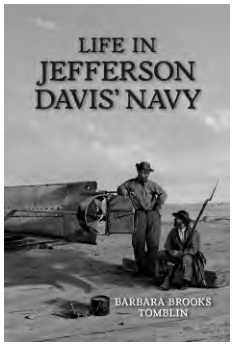
ISBN-10: 1682474933

ISBN-13: 9781682474938

Hardcover: $60.00

David Bath served as a *Missileer* in the USAF at the end of the Cold war, and teaches military history at Rogers State University in Oklahoma.

Just as Toby Orb addresses the existential question from a cultural perspective, so David argues from an empirical perspective (as a scholar practitioner) for the need to develop a culture for handling and understanding the existential. Perhaps the two authors should meet someday, for there is much within the area of moral uncertainty and leadership upon which they could both agree. Perhaps fortuitously, the USAF were fixated more on its strategic bomber fleet, than ballistic missiles. This allowed the culture to evolve out of the limelight – potentially further eclipsed by submarine nuclear deterrence, that held sway from the 1960s. USAF concentration on flying missions, rather than delivering nuclear ballistic missiles, pertains to this day. Bath gets at this and, while looking to the future, also warns of the reduction in command, influence and standing of the Missileer force – at a time, potentially, of increasing focus. Where lack of expertise and knowing may increase the risks both to safe custodianship, and errors in responding to existential threats. A good read – perhaps asking for a response from the French, British (and indeed USN) SSBN submariners, and their perspectives. As previously reported in *The NAVY*, the UK can no longer sustain a second strike capability – without the industrial base, maritime air patrol aircraft, frigates, submarines, ability to crew them and indeed army required to safely sustain a Deterrence capability. The question becomes "can the UK be trusted to have Nuclear Weapons?" And what impact does this have on Toby Orbs 1 in 1,000 risk?



LIFE IN JEFFERSON DAVIS' NAVY

Barbara Brooks Tomblin

USNI (15 Apr, 2019)

ISBN-10: 1682471187

ISBN-13: 9781682471180

Hardcover: $70.00

Barbara Brooks Tomblin is a naval and military historian, with a PhD from Rutgers University, where she taught.

This interesting book examines the daily life of the Confederate Navy, and what it was like to be a sailor at the time. As John Newland Maffitt (1819 – 1886) an officer in the Confederate States Navy who was nicknamed the "Prince of Privateers" due to his remarkable success as a blockade runner and commerce raider in the U.S. Civil War, observed:

> *To the Confederates the credit belongs of testing in battle the invulnerability of ironclads and revolutionising the navies of the world. The MERRIMACK did that.*

At a time of near revolution, at least in the sciences and technology, there are echoes in this book that the USN would be wise to consider. A well written and generous book – one wonders if it will be possible to write let alone publish such books in a decade's time? Worth a read.

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DEADLINE

Saturday 22 August 2020

Prize-winners announced in the January-March 2021 Issue of *The NAVY*.

The Navy reserves the right to reprint all essays in the magazine, together with the right to edit them as considered appropriate for publication.

HATCH: NUSHIP ARAFURA (OPV) Two halves of the bow section joined together (Image OSBORNE Shipyard).

MATCH: HMAS SYDNEY V (DDG 42) Commissioing off NSW Coast 18 May 2020 (ABIS Benjamin Ricketts).

DESPATCH: PLAN HONGZEHO (AO881) Type 905 ex-TAICANG decommissioned to become a Museum-ship at the PLA Memorial Hall Taizhou City.