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Senate Foreign Affairs, Defence and Trade Committee
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

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SUBMISSION TO THE INQUIRY INTO NAVAL SHIPBUILDING IN AUSTRALIA

I have the honour to submit the attached paper to the Senate Foreign Affairs, Defence and Trade Committee for consideration in the Inquiry into Naval; Shipbuilding in Australia

I have also reviewed some of the other submissions made to the Inquiry and consider them to be authoritative and objective in the main in their articulation of the issues involved in naval shipbuilding in Australia. My submission makes reference to some aspects raised in the other submissions where I think it helpful either to qualify what has been stated or to suggest extensions of the points made.

The timing and scope of this Inquiry is apposite with a high level of activity in current programs nearing completion and large new programs getting started. Nevertheless most of the issues that arise are not new or revolutionary; rather they are ongoing issues that must be kept under surveillance and made the subject of more formal periodic reviews such as this Inquiry. To that end the Inquiry may conclude that there should be future reviews of naval shipbuilding on a periodic basis in much the same manner as the broader Defence strategic and industrial reviews are undertaken.

The absence of an endorsed naval shipbuilding sector plan from the Defence Materiel Organisation is to be regretted and will hopefully be addressed soon. Many of the issues raised in the many submissions would be worthy of discussion in the sector plan

I will be pleased to provide further information or clarification should the Committee desire this

With best wishes for the success of the Inquiry
DISplay Pty Ltd

Chris J Skinner
Principal

Attachment

Summary of this Submission

This submission addresses firstly the four questions raised in the Inquiry Terms of Reference, then provides a series of proposed Key Success Factors for Naval Shipbuilding and finally provides Commentaries on selected matters from other submissions made to the Inquiry and published on the Committee website

Inquiry Terms of Reference

There are four primary questions posed by the Inquiry dealing with:

1. Sustainable capacity of the Australian industrial base
2. Comparative productivity of shipbuilding
3. Comparative cost of ownership
4. Economic benefits in the broader national context.

Q1: The capacity of the Australian industrial base to construct large Naval vessels over the long term and on a sustainable basis

Capacity is a function of a number of factors, including: current level of activity, previous and ongoing investment, available facilities, skilled workforce and access and comprehension of relevant intellectual property and 'know-how'.

Fortuitously there has been a recent high level of Australian naval shipbuilding for Australia, New Zealand, South-West Pacific countries and, by proxy, for the USA. What has characterized these shipbuilding programs has been the nature and extent of design adaptation inherent in each of them to meet specific requirements that differ from those of other customers of the designs. In some of the smaller vessels the design has been *ab initio* but this does not apply to larger and more complex ships and submarines that are the focus of the Inquiry.

With regard to capacity it is helpful to project the industry human resource needs by program and to discuss the availability of such skilled people when needed by a combination of the various program workforce projections. However this approach is only a static view of the world and needs to be tempered by a number of other dynamics, for example:

- The degree to which the skill sets needed for design, construction and integration of naval vessels are also applicable in similar industries such as mining and offshore resource exploration and exploitation. These industries have been experiencing a major expansion in recent years and have attracted many workers who might otherwise be applicable for shipbuilding. One day the mining and energy sector will reduce its needs and at that time many suitable people would be available for shipbuilding
- The timing of the major programs in the next decade – the Air Warfare Destroyer [AWD] and the Landing Ship Helicopter / Dock [LHD] – is arbitrary. The timing may not be ideal anyway and is certainly open to adjustment to smooth the peaks and troughs. It is an entirely reasonable approach and is general practice for this to be done in other countries. These two points are elaborated later in this submission.
- Once there is a degree of predictability in forward work planning as has already been achieved with AWD commitments, then industry participants can

be expected to refine their planning accordingly, including the recruitment and training of necessary skilled workers. This planning includes the expectation that there will be reductions in their workforces at the end of significant program phases. This is always so and should not be regarded with undue concern. The resources thus freed represent an opportunity to look for similar work for the company in export and other markets in need of similar skill sets. By that time there may well be another area of rapid expansion – for example transportation – that would provide an attractive and appropriate application of the excess skilled workforce.

- The workforce does not need to be all located in one construction site, and some of them may therefore reside elsewhere within Australia or overseas in some cases. This arises out of three main developments in ship design, construction and integration:
 - Ship design is conducted using computer-aided processes that are amenable to collaboration and dissemination by electronic means, even to fabrication, measurement and testing tools
 - Modular construction and partial fit-out has become the norm thereby allowing for significant modules to be produced anywhere in the world and then brought together in a mature state for consolidation and integration at the main site.
 - A large part of warship integration requires information and communications technology [ICT] skills and professionals with such skills are widely available and very accustomed to working in collaborative virtual teams at multiple sites.

The combination of these major changes has changed the shipbuilding industry in fundamental ways and provided enormous opportunities for proactive participants.

In a similar vein the capacity of fixed assets and other capital investments should not be considered as constrained geographically. With the universal trend to the use of vertical lifting facilities for ship construction and maintenance there is no longer a requirements for inclined building slipways for large ships as is evident by the closure of Cockatoo Island and the reduced work loading at Williamstown. What is more important is large level areas and significant investment in lifting platforms in one of three forms: synchrolift, floating dock or dry dock (possibly with slave dock). All of these are available in Australia in significant numbers and over a wide span of the southeastern part of the country, and are being expanded in SA and WA.

Then there is the matter of sustainability in which there are several criteria:

- The naval forces in being and in development must be sustained through refitting, modification and repair in a customary cyclic fashion
- The skills of the workforce must be available in sufficient numbers and with recent currency, whenever you need them. This is not only for the planned maintenance activities. There are also the unplanned yet predictable needs of combat, accident and natural phenomena that require major repairs and even additional construction if a ship is lost altogether or if Defence Capability requirements change. These eventualities do occur and there must always be the capability for rapid extension of work from the base workload projected for benign situations
- The acquisition and exploitation of intellectual property is a significant factor in sustainment. It is essential for national sovereignty that additional ships and

fundamental modifications to projected units are legally possible if they are ever required. This applies in shipbuilding no less than any other Defence industry domain

Finally in this discussion of capacity there should be acknowledgement that Naval shipbuilding is only a part of a broader scientific and industrial base in this country and every effort should be made to see this in an inclusive manner so that the full might of Australian industry can be involved to the extent this is helpful.

Q2: The comparative economic productivity of the Australia shipbuilding industrial base and associated activity with other shipbuilding nations

The comparative economic productivity is a matter for careful survey and analysis and this submission acknowledges that this has been undertaken in several forms in recent years, and the results have been published and are likely to be considered by the Inquiry. However this submission does wish to suggest that such results should be tempered by some other considerations:

- As has been noted in other submissions, much of the industrial base comprises second and third tier subcontractors and consultants and their capabilities should be taken into account in productivity analysis. This is more than a matter of Australian Industry Involvement [AII] it is also the innovation and focus that such small and medium enterprises [SME] bring to the equation. A local SME is more likely to find a local source for an item than is a counterpart in another country for whom canvassing the Australian market is costly in time and money
- The productivity is also heavily affected by the complexity of the project and this varies enormously even among Naval ships let alone civil vessels. Consequently a more sophisticated basis for comparison is needed beyond the traditional metrics for productivity as has been developed by the US Naval Shipbuilding Research Program (FMI 2005)
- Thirdly there are enormous differences in the manner in which the customer is involved in the Naval shipbuilding programs in other countries. In some there is a paternal partnership where construction is the major focus of private or even government-owned industrial entities. In others even the conceptual design is performed in the private sector and a highly structured governance role is performed by the Government customer. There is a practical way to overcome this disparity – by the inclusion of risk responsibility costs in the assessment of productivity. In other words if the customer is taking some of the responsibility then the cost of shipbuilding will appear to be less; when the actuarial cost of risk-taking is added in a fairer comparison can be made.

There is also large variation of productivity between companies, sites and projects and thus it is probably invalid to extrapolate past experience as a likely predictor of future productivity. So many things are different in each program – complexity of the design, sourcing of materials, availability of intellectual property and other technology information, state of recruitment and training, specialist facilities that are needed, staff morale and industrial relations, cost of capital, management expertise and past experience and many other factors. With this range of factors it is more reasonable to assess the risks associated with a specific industrial capability for each

specific design or production requirement and thence to arrive at an overall estimate of productivity rather than attempt an aggregated measure with many simplifications.

Q3: The comparative economic costs of maintaining, repairing and refitting large Naval vessels throughout their useful lives when constructed in Australia vice overseas

There are at least two primary issues in responding to this question:

- The consideration of life-cycle costs of ownership [COO] for the vessels, and hence the discussion of what are the life spans and what are the factors that affect the achievement of the life span.
- The degree to which country of construction affects the cost of ownership and related matters.

Cost of ownership is heavily affected by the magnitudes of the respective areas of sustainment:

- Maintenance is about ensuring the condition and capability of the vessel is sufficient at all times that it is required and that it is fit for its intended service. The service provided by the vessel is well defined and provisioned to ensure that for whatever proportion of time it was designed to provide that service it will do so. This activity is reasonably well defined and predictable. It includes not only the physical restoration or replacement of materiel but also the re-integration, recalibration and reassurance of performance.
- Repairs arise from combat exposure, accidental misadventure and natural phenomena. They are not predictable in either scope or timing except statistically it can be assumed that they will be required.
- The third category is not refitting, which is merely a specific activity within maintenance as such. Rather the third vital area of activity deserving of consideration for their costs and benefits is that of modification and adaptation of a vessel through its service life to meet unanticipated capability requirements, changes in technology such as obsolescence and even to reduce costs of maintenance and repair. This capability is vital and has always been recognised as such in the Australian approach to almost every Defence acquisition program. Our needs differ at least in detail from any other country or customer. The cost of addressing these differences cannot all be quarantined to the initial set of requirements and the construction program. They occur through life and they must be expected and factored into the discussion of comparative economic costs. There are many examples of such needs in Australian Defence experience

The country of construction is a major factor for Australia because any offshore construction will invariably be remote geographically – the tyranny of distance really does matter for COO. One only has to look at the cost of the HMAS PERTH (DDG-38) upgrade in Long Beach Naval Shipyard in 1974/5 to see how such work is affected by country of construction. The ship had been constructed in the USA and was undertaking a modernisation that required at the time a major involvement by the US Navy. This upgrade marked the introduction of a new generation of command, control, communications and computer [C4] technology in the form of the Naval Combat Data System [NCDS] and the preparations for that major step included the first of class upgrade and the development of the Combat Data Systems Centre

[CDSC] in Canberra. This need for overseas experience and technology transfer does not apply in the same way today and would be unthinkable for the FFG Upgrade.

In a similar program the Submarine Weapons Upgrade Program [SWUP] for the Oberon Class submarines was successfully undertaken in Australia with suitable preparation and investment in the Submarine Warfare Systems Centre [SWSC] in Sydney, and without the involvement of navies of either UK or Canada that were at the time operating the same class of submarines. This demonstrates that such major changes in technology can be accomplished in various ways drawing on overseas experience where it exists but equally it can be accomplished in Australia when there is no cost-effective alternative.

The salient point then is that country of construction has little bearing on total (or life-cycle) cost of ownership and is certainly not an argument in favour of overseas construction. On the contrary these matters are strongly in favour of construction in Australia because they provide greater assurance of the possession of intellectual property and knowledge and experience of the existing ships as is needed for cost-effective maintenance, repair and modification to meet emerging new requirements.

Q4: The broader economic development and associated benefits accrued from undertaking the construction of large Naval vessels

There are many benefits of constructing large Naval vessels in Australia, and there are risks and significant costs. On balance the nation should benefit significantly and these benefits should be cumulative and broadly based. This submission is not able to address all of the benefits, risks and costs in detail but acknowledges that the subject has been partly addressed by others for ANZAC frigate and Huon Mine-Hunter, Coastal [MHC] projects. (It will also be the subject of the author's research project '*New Construction Submarine – Analysis of National Benefits and Costs*' that received the inaugural Maritime Advancement Australia award in February 2006.)

The benefits of constructing large Naval vessels in Australia arise at many levels:

- At the Defence capability level there is greater understanding and potential for flexible adaptation. Sustainment is better assured. Repairs and maintenance are more effectively achieved. The standby and commissioning crews are in their home country. Security for the site and other risks for the Australian Government are better managed. Involvement of second and third tier suppliers, especially SMEs, is more readily achieved.
- At the industry level there is greater opportunity for skills development and sustainment and for better utilization of common-user assets. Knowledge and experience of the ships is more readily available especially when needed at short notice for repair or urgent adaptation. Intellectual property will all have been settled in time for construction or else alternative long-term arrangements will have been put in place. There will not be any delay in discovering issues with ship information as would occur with overseas construction. This is of greater importance with more complex ships but the problem exists with any warship subject to the additional risks of combat and of being employed in novel ways that were not all envisaged at the time of design
- At the national level the benefits are the contributions to sovereignty, to industrial expertise, to employment and to wealth and capital formation

There are risks - but there are always risks with any innovative undertaking. Australia is the source of the acknowledged leading methodology for risk management in the form of Australian Standard AS4360. We know how to manage risk. We do it every day in every way imaginable. But we don't always do it well so the major risk is not inherent in the design, construction and integration of naval vessels but rather the most challenging risk is in our approach to risk management as part of governance. We must consider everything that could go wrong – no matter how unlikely or how unpopular the concept is – and then ensure the risk is managed in the time-honoured way. And it is very clear to all which organisation and which executive has responsibility for each risk mitigation plan, and that governance of the program includes attention to how effectively risk management is performed.

The costs are enormous when aggregated for the entire program. Unlike some other countries program costs in Australia are expressed in today's dollars without discounting for the spread of expenditure over future years. Even if this were practiced the sums would still be immense in total – less so though if expressed as an annual cost of ownership for the service life envisaged.

This latter issue is also important in itself. The benefits of the program are received for every year of effective ship service the program delivers. Thus the length of the service life does affect the value of benefits. The full consideration then is perhaps expressed as:

$$\frac{(\text{Years of service life}) * (\text{Beneficial service delivered each year})}{\text{Cost of ownership}}$$

Where:

$$\text{Cost of ownership} = (\text{Non-recurring costs} + \text{Construction costs} + \text{Operating costs})$$

Beneficial service could be quantified in a manner similar to the Value Index that been proposed by ASC in their submission. (ASC 2006)

There will also be macroeconomic benefits of employment and other economic benefits that may be determined through regional input-output modelling and analysis. These relate to any large undertaking and should be applied in the same manner as any other large project of national significance, such as the Snowy Mountains scheme or the Alice Springs to Darwin rail link.

Key Success Factors [KSF] for Naval Shipbuilding in Australia

The following section proposes a series of key success factors for Naval shipbuilding in Australia. Each of them is asserted and then supported by some further discussion. They are not presented as proven or self-evident but they are suggested as worthy of consideration

Important

The Naval ship and submarine construction programs are important. Naval shipbuilding in Australia is important. The very fact of this Inquiry highlights that importance and therefore there should be no hesitation in projecting that importance

into the general community. There is a lot of taxpayers' money involved. Therefore there should be a high level of public education regarding the nature of the programs and the complexity, risks, costs and most of all, the benefits of such programs. We do not need a repetition of past programs that have endured the depredations of a poorly informed Press Corps only to be recognised later as extraordinarily good programs delivering great national benefits – F-111 aircraft, Collins submarines and, most recently, HMA Ships KANIMBLA and MANOORA come readily to mind. This time around all of the information should be out there as the project proceeds and Government and industry should be forthcoming about all of the costs, risks and the benefits as each project proceeds.

Complex

Naval ships and submarines are very complex and therefore require more effort and greater understanding than other shipbuilding projects. Upgrades are even more complex and fraught. The challenge is how to manage complexity and that is not yet assured – not in Australia and not anywhere else either – so there is a need to exercise close and effective governance and that is much more readily achieved if the construction and integration is performed in Australia by competent contractors, subject to effective governance.

There is increasing recognition of the need for coordinated employment of complementary military platforms and this requires an appreciation by the designers of more than just the platform itself extending through connectivity, interoperability and networking of ships, submarines and aircraft with ground, sea and air forces and their commanders, government and private organisations and allied and other foreign entities. These issues will be less well understood by an offshore organisation involved in design, construction or integration of a Naval vessel in isolation.

Beneficial

The benefits of shipbuilding in Australia have been discussed earlier in general terms. There are also more specific benefits to be recognised. Construction in Australia opens up an opportunity for export of the platform or similar vessels. This could never be contemplated with offshore construction (indeed the country of origin has exported already to Australia and would happily do so again to other third parties)

There are often specialist skills and technologies involved in new programs and these are brought to Australia as part of the construction program. Offshore construction would not preclude this but the scope and impact would be less.

The people involved in the detail design for construction in Australia will experience large program engineering management in a manner that happens infrequently and is invaluable in growing the national capabilities for other work

Essential

The conduct of Naval shipbuilding in Australia is essential; of that there appears to be little disagreement. Whether all such construction is undertaken in-country is really the issue to be considered. If as a last resort the capacity cannot be found, or if the premium for such work plus the risk allowance exceeds the benefits for undertaking the work here then so be it. However this should be the non-preferred alternative in

the business case. The argument should be mounted to justify why it is being taken offshore rather than the other way around.

It is not a random outcome that developed countries work to build military ships and aircraft in their own countries. This is a manifestation of industrial development and maturity of scientific and engineering capability.

Flexible

Design, construction and integration in Australia provides greater flexibility for Government as customer to apply lessons learned or changing priorities to a program. The law of contract is our own. The commercial arrangements follow Australian law and practice. The workforce and site security are subject to national oversight. These aspects do matter and can be the source of risk and hidden added cost by moving them offshore.

While there will be ongoing international agreements affecting intellectual property, and government-to-government supply of information and materiel, these will be common to either approach but will be more clearly defined earlier for construction in Australia.

Proven

Australian industry has demonstrated on many programs in all parts of the country and under public and private ownership that construction of Naval vessels is a proven capability. The most significant recent extensions of this national capability are in the MHC involving very large glass-reinforced plastic [GRP] hulls and exacting management of magnetic materials; and in the Collins class submarines – a truly remarkable achievement in safety and performance, and one that required the effective management of international industrial and inter-governmental relationships of great complexity.

Achievable

The Naval shipbuilding programs now in progress and foreshadowed are very much achievable. There may be some benefit in adjusting the timings and the manner in which delivery programs are rolled out to better match capacity with delivery but such matters are the very heart of program management and there is ample experience in Australia of how to do this.

Supportable

Supportability means such things as having the skills when and where you need them and having spare parts in Australia when you need them. There are many stories illustrating the detrimental effects of overseas sourcing and the extended pipeline to obtain spare parts. This is not totally avoidable but the problem can be reduced with every local sourced piece of equipment and every item approved for local repair.

By undertaking the detailed design in Australia there will always be greater likelihood of finding locally available equipments for inclusion in the design

Cost-effective

Cost effectiveness has been discussed earlier in general terms. This is always an important criterion and Naval shipbuilding should not be exempted. The benefits must

also be given full attention in this consideration and the risks must be quantified and the cost of risk management added to the apparent costs for full assessment. Most contemporary large projects are subjected to benefit/cost analysis and this ensures the full range of issues is addressed

Manageable

Management is a challenge and there are no guarantees. Experience is important and governance is mandatory. It can be done effectively and governance is there to ensure that it is. Australia has much experience – good and bad – to draw on. All of that experience should be called on and the lessons shared and discussed

Various contracting and alliance arrangements can be considered – none of them is a guarantee of success. Better governance will make a significant difference. Recognition of the inherent complexity and assessing the implications and avoiding any unnecessary increases in complexity will be helpful. Providing a full range of information for the public will help to avoid detrimental media campaigns that are later proven to have been ill-founded and undermine real advancement in national capability.

Commentaries on Other Submissions

The many submissions made to the Inquiry have canvassed a great many valid and relevant issues and made a number of recommendations. It is not appropriate to attempt to comment on all of them but the following comments are provided on some issues considered of importance

P20: Department of Defence Submission

The submission is comprehensive and highly relevant to the Inquiry as is to be expected. In general the submission is strongly supported and regarded as an authoritative basis for other contributions. Some specific comments are provided as follows (with reference to the section of the Defence submission):

Defence Strategic Aims (§1.3ff)

The strategic aims are expressed with regard to the *maritime industry* (sic) but does not define what is included in this grouping. In §1.4 the submission goes on to state that discussion of the Australian maritime industry should consider various aspects including *'the nature of modern warship construction and support, the imperatives for Australian skills and capacity and the supply and demand economics for Australian naval ships'...* and *'recognition of the large number of small to medium size companies that provide specialist services and bring significant technology, innovation and skills to the maritime industry, particularly during upgrades and through-life support programs.'* (Emphasis added)(ADO 2006)

Comment: The difficulty with this collection of strategic aims is that no specific aim has been articulated relating to naval shipbuilding; the emphasis has been instead on life-cycle support for the Navy fleet and the implications for industry. This then leaves some question as to what is the linkage between naval shipbuilding and the follow-on supporting role by industry. This subject is covered to some degree in other submissions but is not established to the degree necessary or to the level, for example in the Aerospace Sector Plan (DMO 2003)

Strategic Reasons for Building in Australia (§1.6ff)

The Defence submission refers to the ASPI paper, which stated there is ‘*no strong strategic reason to build the Navy’s warships here in Australia.*’ ‘*... the real strategic priority is to have the ability to repair and maintain our ships...*’ (ASPI 2002; ADO 2006). This assertion was not substantiated in the original ASPI report and neither has it been supported in the Defence submission to the Inquiry. This assertion must at least be qualified by the strategic considerations of timely adaptation and enhancement that may sometimes be needed and the relevance of original shipbuilding in Australia to the ability to provide this capability.

As the Defence submission says later (§1.9): ‘*Critical to the ability to provide maintenance, repair, refitting and capability upgrade services is a shipbuilder’s access to deep design expertise and a sound understanding of the source and history behind the design.*’ (Op Cit) What better way to acquire this access and understanding than to build the ships in the first place? This is the real meaning of the so-called ‘Parent Navy’ concept. Whereas once the expertise referred to resided in the design bureaux of the parent navy now this expertise has been privatized and resides in the organisation that undertakes the detailed design and construction. It is therefore strategically essential that this expertise is recognised and supported for as long as it is needed, and that means though the major part of the service life of the vessel.

Workforce Requirements (§3.6ff)

In figure 7 et seq the Defence submission shows a massive variation in workforce requirements in naval construction and upgrade work over the period 2005-2025. To this is added a relatively constant workforce requirement for in-service support over the same period. However in the disaggregation of these figures it becomes clear that some skills vary more markedly than others. Systems engineering and platform engineering vary only slightly. Design, integrated logistic support, project management and planning, construction and subcontracted fabrication vary significantly – but this is only with the postulated delivery program, which is under the direct control of Defence. Therefore the fluctuations can be changed, as ASPI recommended in 2002 ‘*Smooth the shipbuilding workload.*’ (ASPI 2002)

In addition in the case of the AWD there is another reason to vary the building timeline and that is to provide a gap between lead ship and two follow ships so that the lessons from construction, shipyard testing and even the early phases of trials can be reflected into the two follow ships more readily. This is recommended in the submission from Rear Admiral Rourke who said ‘*Shipyards building warships... should ensure sufficient time is provided to sort out any problems in the first of class before follow-on ships are built to the same specification.*’ (Rourke 2006)

Engineers Australia said much the same thing in their submission: ‘*In future programs, it would be prudent to plan a gap between the lead-ship and subsequent follow-on ships to facilitate feedback of changes identified from testing the lead ship into the remaining build program.*’ (EA 2006) §7 page 27

P24: Engineers Australia Submission

EA also discusses the comparative economic productivity of shipbuilding and makes reference to a US Naval Shipbuilding Research Program Report (USNSRP 1995) and the 2005 update (FMI 2005). EA says that ‘*it is believed that the type of detailed*

benchmarking and analysis required of Australian shipyards with shipyards overseas has never been done.' (EA 2006) p22. This recommended approach is supported but as stated earlier it is important to do so in the context of cost of ownership and to factor in all of the relevant costs including, inter alia, those relating to parent navy and access to intellectual property.

P17: ASC Pty Ltd Submission

ASC has provided a comprehensive submission with a wealth of information and comment relevant to the Inquiry, drawing from their experience with the complex but successful Collins submarine program. However there are a few items worthy of comment as follows:

Design Authority [DA]

In the opening statement ASC says: '*ASC is the only Australian shipbuilder that is a design authority.*' (ASC 2006) p1 However there is very little added to explain the enormous significance of this critical role; rather the reader is taken through a comprehensive tour of the vast array of processes and functions performed by ASC as Design Authority for the Collins class submarines but without identifying them as essential facets of the Design Authority role. We should acknowledge the special insight that ASC brings to this discussion because of its experience (on-going) as DA

Complexity in Ship Design

ASC also make the point in the latter part of their submission discussing the benefits of trading off service lifespan for the added value of upgrades or replacements that a key determining factor is the complexity of the ship systems and their integration into the ship design. This consideration is dominant in high-capability ships such as the AWD and is also considered in the benchmarking process that was mentioned earlier. (FMI 2005) Complexity of the vessel and the system embodied therein is a challenging matter – but one that we have much better probability of successful outcomes when the ships are built in Australia.

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Chris Skinner served for 30 years in the RAN as a Weapons Electrical Engineering Officer with a number of sea postings including service in South Vietnam and the North West Indian Ocean, and in ships based in Singapore and in WA as well as Sydney.

His shore service was almost entirely associated with science and technology, major ship projects and systems and software development, and included secondments to the Australian Defence Science and Technology Organisation and to the US Naval Sea Systems Command where he was responsible for first of class trials for the USS Oliver Hazard Perry (FFG-07), lead ship of the largest warship building program since World War 2, and contributed to planning the operational evaluation of the SH-60B Seahawk for the USN. He served as Superintendent Missile and Torpedo Maintenance at the time of introduction of the Harpoon and Standard missiles and the Mk 48 Torpedo.

Later he served as the New Surface Combatant Project Director, the precursor to the ANZAC Ship Project and as Director of the RAN Trials and Assessing Unit

Skinner went on to lead technical teams working on the Jindalee (Over the horizon) Operational HF Radar Network [JORN], F/A-18 aircraft radars, FFG Progressive Upgrade Project [PUP] and on trials planning for the Landing Ships HMA Ships Manoora and Kanimbla. The FFGPUP required extensive discussions and teaming with Gibbs & Cox and major US combat systems suppliers that are heavily involved in current Australian naval programs

In February 2006 Skinner was the recipient of the inaugural Maritime Advancement Australia award by the Australian Naval Institute and the Centre for Maritime Policy of the University of Wollongong and sponsored generously by Booz Allen Hamilton for the project '*New Construction Submarine – Analysis of National Benefits and Costs.*'