

The Global Combat Ship Programmes (Type 26 Frigate, Hunter Class Frigate, Canadian Surface Combatant)

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Synopsis

The Royal Navy, Royal Australian Navy, and Royal Canadian Navy have a long history of mutual respect and cooperation, in war and peace. Opportunities to enhance this cooperation and interoperability have significantly increased following the decisions by the governments of Australia and Canada to base their next surface combatants on the Type 26 frigate under construction for the Royal Navy. In June 2018, Australia announced the selection of the Type 26 design as the basis for the SEA5000 programme to deliver nine frigates for the Royal Australian Navy. In February 2019, the government of Canada and Irving Shipbuilding Inc. announced that they had selected Lockheed Martin Canada for the design of the Canadian Surface Combatant ship that will be based on the BAE Systems Type 26 Global Combat Ship design. Fifteen Canadian Surface Combatant (CSC) ships are planned to be built at Irving Shipbuilding's Halifax Shipyard.

Collectively, there is now a 32-ship programme, constituting three national endeavours involving significant government commitment, and large-scale investment and development, to enable continuous shipbuilding activity. The United Kingdom, Australia and Canada have formed a Global Combat Ship (GCS) User Group to advance cooperation and shared learning. The member navies are proud to be part of a collaborative programme that will deliver world-class multi-threat naval surface combatant capability, tailored to each country's specific requirements, as part of our respective warfighting and shipbuilding strategies.

This paper will present the background to each national programme, identifying the strategic commitments that each government has made for their shipbuilding endeavour. It will then look at the role of the GCS User Group and how it will support each of the respective programmes and their country's security and resilience. The paper will reveal the goals and opportunities derived from a more collaborative approach, leading to increased interoperability between our respective navies; maintaining capability superiority through an agile and innovative relationship with acquisition, science and technology organisations and partner nations; and assisting our shipbuilding industries in delivering capability, on time and budget, against evolving threats.

Keywords: Type 26, HCF, CSC, GCS, Royal Navy, Royal Australian Navy, Royal Canadian Navy

1. INTRODUCTION

The design and build of a successful, complex warship is inherently difficult. Irrespective of experience and skill, it will continuously present a considerable challenge to balance the right capabilities with budget and time, all of which will be characterised and managed as risk. Warships are national statements and embodiments of sovereignty. They attract considerable national and government scrutiny during their build programmes, and are often used to underpin other national strategic investments or strategies, such as shipbuilding capability or national industry enterprises, all of which can add to the complexity of such a programme. In recent years, the navies of the United Kingdom, Australia and Canada have been looking to replace capabilities and ships that have reached, or are approaching, the end of their life. Each of these navies faces a growing underwater threat. They have all been juggling with how to develop a warship class that has the weapon systems and sensors to meet this threat, whilst providing a platform that can deliver the other capabilities required by their nations. In parallel, they have

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been seeking the most effective ways to harness the promised potential from new technologies and develop a design that has an architecture that is flexible enough to be adapted to meet future threats. They have also been directed that resulting warships are to be built in their respective country in order to support national shipbuilding strategies.

The Type 26 Global Combat Ship (GCS) has been chosen by the United Kingdom, Australia and Canada as the platform to meet these requirements. There are currently three individual, national Programmes utilising the GCS as the core design, each with several design differences, such as the Combat System (CS), sensors and weapons to meet the requirements of their country.

2. Type 26 Programme

2.1. Genesis

The Type 26 Frigate has developed over a period of approximately 25 years. Originally part of the Future Surface Combatant (FSC) programme, it was initiated in the late 1990s and aimed at replacing the Type 22 and Type 23 Frigates. By 2005, the intent was to procure two classes of frigate, comprising 10 Anti-Submarine Warfare (ASW) and eight General Purpose (GP) platforms. However, this concept was adapted with the introduction of the Sustained Surface Combatant Capability (S2C2) initiative, which introduced the additional capability requirements of mine countermeasures and survey (Hansard 2010); this latter requirement was later moved to a separate programme. The FSC concept was brought forward in the 2008 budget, at the expense of hulls 7 and 8 in the T45 destroyer programme (Ministry of Defence, 2008) and, in 2009, BAE Systems received a contract to design the C1 (ASW) and C2 (GP) frigates; a total of 18 vessels. The frigate programme was further reshaped following the Strategic Defence and Security Review (SDSR) 2010 to one class of 13 ships, the Type 26 Global Combat Ship (GCS), with 2 variants. (Cm 7948, 2010). The programme entered the Demonstration Phase on 1 Apr 15 with the intention to progress to manufacture the following year. However, SDSR 15 reduced the scope of the Type 26 GCS, from 13 vessels, to 8 multi-mission frigates, optimised for Force ASW (Cm 9161, 2015) and the Demonstration Phase was extended to accommodate a re-baselining of the programme. A separate Type 31 programme was established to meet the requirement for GP frigates.

2.2. Type 26 GCS

From its inception, the Type 26 GCS programme has needed to respond to several challenges and objectives, some of which have changed part-way through design, these include:

Military Capability. The need to replace the Type 23 class frigate, and the need to increase the capability due to continually developing and increasingly sophisticated threats. There is a requirement to enhance capability for ASW, Anti-Air Warfare (AAW) and Anti Surface Warfare (ASuW) in the Surface Fleet. Furthermore, flexible joint capability (e.g. Special Forces; Cyber; Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR); Command and Control, and Coalition) and increased global availability need to be improved, together with a more cost-effective change management or technology insertion methodology to provide a more flexible platform to meet the changing threats throughout a ship's life.

Financial. The drive for affordability and value for money remains fundamental in all acquisition programmes together with the need to weave in incentivisation mechanisms and better strategic partnering with industry.

Political and Commercial. Complex warship shipbuilding capability and skills are highly specialised and only kept current through continual work streams. SDSR 15 highlighted this constraint and was used to launch the National Shipbuilding Strategy (NSbS) (Cm 9161, 2015 para 6.55). UK policy is that the warship programmes for Type 26 GCS and T31 will align with this new strategy to ensure a modern and sustainable shipbuilding industry.

Safety and Environmental. The Type 26 is mandated to comply with all relevant safety and environmental legislation applicable at the time of manufacture, this includes the International Maritime Organization (IMO) Tier III NOx emission compliancy and the latest Royal Navy Survivability and Stability Standards.

To assist in meeting these challenges a set of programme drivers with associated objectives, at Table 1, have been created which in turn link to the Key User Requirements (KURs) and a series of Capability Gates so that they can be measured effectively throughout the build, delivery, acceptance and operation of the Type 26. This lasts

until Ship 08 meets Initial Operating Capability and all the Defence Lines of Development (DLoDs) for the programme have met Full Operating Capability.

Table 1: Type 26 Programme Drivers and Objectives

Programme Driver	Programme Objective
Protect Strategic Assets	Deliver a credible ASW capability that can fight and win
	Facilitate a flexible range of capabilities to satisfy national security requirements & Defence Strategic Direction (DSD)
	Deploy globally, independently and in task groups
Sustain National Capability	Deliver an improved industrial capability
	Enable exportable solutions
Increase Resilience and Sustainability	Deliver value for money through life, through cost effective manning, training and support solutions.
	Enable through life support and skills

2.3. Procurement Strategy

In order to grow the Fleet and support the maritime industrial sector, Type 26 procurement was aligned with the NSbS, which was in-turn informed by the Independent Review of Shipbuilding in the UK by Sir John Parker (Ministry of Defence, 2017). Numerous changes have been made in Defence to improve processes for ships acquisition since this review, including governance structures, programme management; contracting and partnering, and supporting export opportunities. The independent review and strategy have also assisted senior government officials to understand the need to manage ship acquisition programmes in order to sustain a steady production rate. This is required to balance future workstreams so as to avoid a down-turn in production or loss of specific skill sets, which can lead to a degradation of the shipbuilding industry and potentially a 'boom-bust' scenario. The key is balancing need, with government policy and industrial resilience.

There are few companies capable of building large, complex warships in the UK and the consequence of this is the inability to place competitive contracts and the need to comply with single source regulations. The Type 26 GCS procurement strategy is a single-source non-competitive contract with BAES, broken down in to separate phases. This approach supports the defence policy imperative and the NSbS, to maintain naval shipbuilding as a UK sovereign capability. The Manufacture Phase 1 (MP1) contract of Ships 01-03 uses a Target Cost Incentive Fee (TCIF) pricing mechanism with a share line to transfer cost and performance risk to BAES with an aspiration to achieve 'firm price, build to print' strategy for Batch 2 in the Manufacture Phase 2 (MP2) contract. The approval for MP1 also includes the investment in Initial Enabling Infrastructure (IEI) of shipbuilding facilities.

2.4. Shipbuilding Facilities Strategy.

The Type 26 vessel differs in size and specification from those previously fabricated and integrated at the sites, meaning elements of the current facilities at BAES' yards in both Scotstoun and Govan need to be altered to allow either the entire vessel or its component parts to be fabricated, manoeuvred, integrated, commissioned and tested. The shipbuilding facilities option being taken forward, known as the IEI project, are essential for the Type 26 vessel to be manufactured. The ship building strategy developed by BAES, utilising IEI, will enable the delivery of ships at a steady state output of 18 months from Ship 04 onwards.

3. CONVERGENCE OF REQUIREMENTS

The Type 26 GCS Programme will deliver a single class of ship, comprising 8 multi-mission frigates, optimised for Force ASW, designed to fight, survive and defeat an enemy. With an acoustically quiet hull and strong emphasis on submarine detection and prosecution, it will be equipped with an integrated sonar suite with long range active/passive towed array sonar and both offensive and defensive weapons. This comes at a time of considerable need due to several factors:

- a. The time since the Type 23 frigate entered service and the cost to maintain them in service;
- b. The revived submarine challenge and strategic interest around the Greenland-Iceland-United Kingdom (GIUK) gap (HC 388, 2018); and,
- c. Wider proliferation of advanced submarine capabilities.

A number of these challenges have been mitigated by introducing new technology and capabilities in the Type 23 frigates, thus minimising the capability gap and de-risking new technology before introducing them on a new platform. This resonates with a core Lesson From Experience (LFE) taken from the Type 45 destroyer where numerous new capabilities, including the power and propulsion architecture, were introduced all at once leading to challenges with initial platform availability and reliability.

The Type 26 will be one of the key units of the RN Surface Fleet and will deliver inherent political flexibility offered by a warship's ability to change roles and capabilities depending on strategic circumstances. (Cm 9161, 2015) It will be capable of working in complex operations whilst contributing to a Task Group or Task Force, the Type 26 GCS will also be adept as an independent deployer and as an Advanced Force projection platform. The incorporation of a dedicated Mission Bay in its design, together with a flightdeck that can operate Chinook helicopters, provides greater flexibility, utility and growth potential above that of previous maritime platforms. This flexible operating space, together with sufficient electrical margin, offers a platform that can support new and developing capabilities and the most 'open architecture' to date on a warship.

It is for these reasons that the Type 26 GCS platform became an attractive option for other countries' acquisition programmes. Both Australia and Canada were looking for a new surface combatant that could perform the highly specialised task of ASW operations, given the proliferation of sub-surface threats, as well as perform other Task Group or independent roles. They were ideally seeking an existing design that could be manufactured in-country to support national strategic capability. Moreover, selecting an existing versatile warship design was a critical advantage to de-risking their own complex surface combatant programmes. Although there are several warships that could have been modified, the Type 26 GCS was the strongest contender as it provided a design that was inherently flexible, offering the greatest choice now and in the future. As Five-Eyes membership nations the RN, RAN and RCN inherently have similar strategic security imperatives and capability requirements. Utilising the GCS as the core platform provides considerable opportunity to refocus and enhance this relationship.

4. HUNTER PROGRAMME

4.1. *Hunter Class Frigates*

The Hunter class frigate will be the RAN's primary surface combatant, replacing the eight Australian Anzac Class frigates. In 2009, the Australian government announced its intention to construct a class of 'Future Frigates' optimised for Anti-Submarine Warfare (Commonwealth of Australia, 2009, pp. 64, 71–72). The focus on Anti-Submarine Warfare is based on the forecast that half of the world's submarines will be operating in the Indo-Pacific region by the mid-2030s (Commonwealth of Australia, 2016, p. 50). In 2015, the program was advanced by three years as part of a broader Government commitment to establishing a permanent naval shipbuilding industry in Australia (Andrews and Abbott, 2015). Defence conducted a competitive evaluation process to compare tenders by several shipbuilders. This process resulted in the Government selection of the 'Global Combat Ship – Australia' based on the Type 26 design as the basis for the design of the Hunter class frigate (Commonwealth of Australia, 2017, p. 29; BAE Systems, 2018). The Hunter class designers will incorporate several changes from the Type 26 reference ship design to meet Australian-specific requirements as directed by Government. Those changes include elements of the renowned Aegis Combat System (a variant of which is in service in the Australian Hobart class destroyers), combined with an Australian interface, the Australian developed CEAFAAR2 Phased Array Radar (an evolution of the system in service in the Anzac class frigates) and adaptation of aviation facilities to support the in-service MH-60R 'Romeo' Seahawk helicopter (Goldrick, 2018, p. 46; Scott, 2018, p. 47).

4.2. *Continuous Naval Shipbuilding*

The Hunter class frigates are just one component of a broader strategy to achieve continuous naval shipbuilding in Australia. The strategy also includes construction of the offshore patrol vessels and future submarines. The strategy seeks to produce 'a sustainable, long-term Australian naval shipbuilding industry with a sovereign capability to build and sustain its naval vessels' (Commonwealth of Australia, 2017, p. 15). The approach of using continuously rolling shipbuilding seeks to end the previous 'boom-bust cycle' of ship construction (Payne and Turnbull, 2017). That cycle had resulted in low productivity, and inefficiencies, such as those evident through mobilising and dispersing a workforce as each major project came and went (Commonwealth of Australia, 2017, p. 106). The development of a sustainable naval shipbuilding industry requires more than just a government commitment to fund warship construction continuously, it also requires four key program enablers – infrastructure, workforce, the industrial base and a national approach (Commonwealth of Australia, 2017, p. 12; Australian National Audit Office, 2018, p. 8). As such, the Australian government has purposefully invested in all four areas.

4.3. Infrastructure

The most visible early investment is in the development and expansion of the Osborne Naval Shipyard near the city of Adelaide, South Australia. The existing facilities were used for the construction of the three Hobart class destroyers and the first two of a class of offshore patrol vessels. The South Australian government transferred ownership of adjoining land to support an expansion of the capability (Australian Naval Infrastructure, 2020). The northern portion of the yard will be purpose-built for the construction of 12 future submarines to replace the RAN's current fleet. The southern portion of the yard has been redeveloped to accommodate the construction of the Hunter class frigates. It includes a 50m tall Ship Assembly Hall and a range of cutting and robotic welding equipment (Australian Naval Infrastructure, 2019). A smaller-scale redevelopment is taking place at Henderson, Western Australia, to build the remainder of the class of offshore patrol vessels (Commonwealth of Australia, 2017, p. 111; Department of Defence, 2020). Prototyping to support the Hunter class will commence at the Osborne shipyard in late 2020 (Royal Australian Navy, 2020). However, these facilities are meaningless without a skilled workforce to use them.

4.4. Workforce

The previously described 'boom-bust' character of earlier shipbuilding endeavours do not provide consistency for the workforce and result in paying (and repaying) for the cost to find and train skilled personnel, and for inefficiently 'relearning' lessons only to forget them again (Commonwealth of Australia, 2017, p. 106). To address these concerns, the government established the Naval Shipbuilding College as a method to improve the recruitment and training of personnel and support the industry, rather than any particular employer within that industry. The 'virtual' college seeks to connect potential employees with training pathways aligned to the needs of the industry (Naval Shipbuilding College, 2020). These activities support the creation and sustainment of a skilled workforce, which is necessary for both the direct shipbuilding activities and the broader industrial base.

4.5. National Approach and Industrial Base

The government has emphasised a national approach while acknowledging that the two major construction projects are both based at Osborne, South Australia. Partly, this approach reflects that the shipbuilding industry draws on an industrial base of suppliers that are distributed across the country. These suppliers are necessary both for the in-service sustainment of the Hunter class and for the construction of any subsequent classes of surface combatants. As such, the project has allocated a proportion of funding to the development of Australian industry content (Scott, 2018, p. 49). Also, the federal government has taken the lead on many of the initiatives rather than expect that market forces would produce the desired outcome. They have supported liaison between the individual state and territory governments (Commonwealth of Australia, 2017, p. 76). The Osborne shipyard is owned and operated by Australian Naval Infrastructure, a wholly government owned company (Hellyer, 2019, p. 78). The Naval Shipbuilding College is an Australian government initiative (Naval Shipbuilding College, 2020). ASC Shipbuilding, a subsidiary of BAE Systems Australia, will construct the Hunter class frigates. The government transferred ownership of ASC Shipbuilding to BAE Systems as an outcome of the successful tender by BAE Systems. BAE Systems have obligations to develop an Australian-based shipbuilding capability resident in ASC Shipbuilding, and the government has the option to reacquire ASC Shipbuilding for a peppercorn fee (Hellyer, 2019, p. 74; Kerr, 2019).

The Hunter Class Frigate project will deliver an essential ASW capability and contribute to a range of other functions. More importantly, it is also a means to deliver an even more important capability – an enduring shipbuilding industry, able to design, construct and sustain ships in Australia.

5. CANADIAN SURFACE COMBATANT

5.1. Canadian Surface Combatant Project

Canada's defence policy, 'Strong, Secure, Engaged' (Government of Canada, 2017), has committed to investing in 15 Canadian Surface Combatant (CSC) ships to replace both the retired Iroquois-class Destroyers and the Halifax-class frigates, with an estimated cost of \$56-60 billion CAD. These ships will be Canada's major surface component of maritime combat power with the final CSC being delivered in the 2040s. The CSC project will deliver a class of ships capable of meeting multiple threats in both the open ocean and the highly complex coastal environment. The CSC will ensure that Canada can continue to monitor and defend its waters and make significant contributions to international naval operations. In addition to the ships, the CSC project will also deliver the necessary ammunition, infrastructure upgrades, initial training and integrated logistic support (Government of

Canada, 2020). All of the CSC project work will be conducted under the umbrella of the National Shipbuilding Strategy

5.2. *Continuous Naval Shipbuilding*

The National Shipbuilding Strategy is a long-term project to renew Canada's federal fleet of combat and non-combat vessels. The Canadian Government formed partnerships with two Canadian shipyards to deliver much-needed vessels to the Royal Canadian Navy and the Canadian Coast Guard (Government of Canada, 2020). In 2019, Canada announced the expansion of the National Shipbuilding Strategy to include a third shipyard, increasing the nation's overall shipbuilding and repair, refit and maintenance capacity. From the mid-1990s to 2010, Canada's shipbuilding industry had slowed down significantly. There had not been any substantial new orders to construct vessels for many years and compared to other countries, Canada's shipyards were outdated with limited access to equipment, supply lines and skilled workers (Government of Canada, 2019). In 2010, the government initiated the National Shipbuilding Strategy to facilitate the restoration of Canadian shipyards, rebuild our marine industry and create sustainable jobs in Canada while ensuring our sovereignty and protecting our interests at home and abroad (Government of Canada, 2019). The strategy allows the government and the shipyards to make significant investments in Canada's marine industry, such as developing and maintaining expertise and creating sustainable employment across the country. It brings predictability to federal vessel procurement and aims to eliminate the 'boom-bust' cycles of vessel procurement that slowed down Canadian shipbuilding in the past (Government of Canada, 2019). Additionally, the National Shipbuilding Strategy aims to enhance Canadian shipyard productivity by implementing an established performance management framework to formally encourage continuous improvement throughout the various shipyards.

5.3. *National Approach and Industrial Base*

To ensure that Canadian industry benefits from Canada's defence and security purchases, the government's Industrial and Regional Benefits Policy (IRB) and the Industrial and Technological Benefits Policy (ITB) are tightly coupled to the work being conducted under the umbrella of the National Shipbuilding Strategy. Under these policies, shipyards and their major suppliers are undertaking business activities in Canada and are required to produce value equal to the value of the contract and provide important investments into targeted areas, such as work in Canada directly related to the National Shipbuilding Strategy procurements. Other opportunities aligned with the ITB/IRB policies encourage the use of innovation through research and development activities in Canada and skills development with new business export opportunities.

Since inception of the National Shipbuilding Strategy, there is evidence to suggest that 'the average salary in Canadian shipyards is 30% higher than the manufacturing average. Overall, the Canadian marine industry is innovative, and supports skilled workers, with a 2.5-times higher share of employment in science, technology, engineering and mathematics (STEM) than total manufacturing' (Government of Canada, 2019). The National Shipbuilding Strategy, in partnering with the three large vessel shipyards, federal departments, academic institutions and research organizations, prioritises ventures that increase participation of under-represented groups in the shipbuilding sector including women, Indigenous Peoples and persons with disabilities.

5.4. *Canadian Surface Combatant Capability*

The Canadian Surface Combatant project is the largest, most complex procurement undertaken by the Government of Canada and represents the vast majority of the funding associated with the National Shipbuilding Strategy. Although the CSC project has been ongoing for over a decade, 2013 initiated the period of close interaction with industry as the project conducted a series of formal engagements with industry to assist Canada with the development of both the CSC technical requirements and procurement strategy. As the process matured, in October 2016 the Request for Proposals were sent to 12 pre-qualified bidders that included both warship designers and combat system integrators from around the world.

In February 2019, the Government of Canada announced it had officially selected Lockheed Martin Canada as lead designer with BAE Systems as the platform systems and warship designer. Lockheed Martin Canada was selected based on the use of the Type 26 Global Combat Ship as the baseline design. As the CSC will be Canada's only surface combatant, the total ship set of requirements will enable a broad range of tasks, including delivering decisive combat power at sea; supporting the Canadian Armed Forces, and Canada's Allies ashore; conducting counter-piracy, counter-terrorism, interdiction and embargo operations for medium intensity operations; and delivering humanitarian aid, search and rescue, law and sovereignty enforcement for regional engagements. In order to meet these mission requirements, the Request for Proposals required the selected bidder to meet or provide sufficient evidence that the baseline design could meet Canada's high-level set of discriminating requirements.

In order for the Type 26 to meet Canada's set of requirements, Lockheed Martin Canada proposed a number of changes to the baseline BAE Systems Type 26 design. The CSC will very much have the same platform systems and some underwater systems as the Type 26 to maintain the ASW capability pedigree, but it will be outfitted with an almost new combat systems suite. The significant changes to the CSC can be summarized by a new Lockheed Martin AN/SPY-7 3D AESA radar, additional strike length VLS, degaussing, a different command and control capable suite of communications and the adaptation of the aviation capability to house and operate the CH-148 Cyclone helicopter. The changes that will be incorporated into the CSC from the Type 26 align nicely with the changes proposed in the Hunter class therefore creating a unique trio of ships that remain tightly coupled from a platform and operational perspective.

6. COLLABORATIVE ENDEAVOUR

The RN, RAN and RCN have a long history of mutual respect and cooperation, combined with the fact that all three nations had a simultaneous requirement that was to be fulfilled around the GCS, this has created a unique opportunity. Each nation was mindful that these are three distinct and separate national programmes with sovereign requirements, however there are significant shared interests and mutual benefits in optimising the GCS variants (Type 26, Hunter and Canadian Surface Combatant), operational effectiveness and cost of ownership. To that end the United Kingdom, Australia and Canada formed a GCS User Group to enhance understanding and situational awareness of strategic initiatives. This enables the three nations to make informed decisions for their respective programmes to exploit the advantages available in being part of a collaborative programme that will deliver a world-class capability as part of their respective warfighting and shipbuilding strategies.

To respect the independence of each programme, the User Group that has been formed is not a legally binding construct, nor does it form part of any programmes' management or governance structure. It works within and alongside existing Navy to Navy and Government to Government relationships, informing and remaining responsive to those forums. It meets twice a year with the Chair and secretariat rotating with the host nation. The intent is for the User Group to develop cohesive, strategic relationships aimed at delivering improvements to GCS delivery and development. Separate arrangements may be entered between some, or all, of the members of the User Group where required, to meet the objectives and support their programme delivery.

6.1. User Group Goals

The goals of the User Group are to:

- a. Broaden our tri-lateral relationship through a more collaborative approach leading to increased interoperability between the RAN, RCN and RN.
- b. Maintain capability superiority through an agile, innovative relationship between respective Navies, acquisition, science and technology organisations, industry and our partner nations.
- c. Assist our respective shipbuilding industries to deliver capability, on time, on budget, against evolving threats.
- d. Contribute to the long-term future of Australian, Canadian and United Kingdom defence industry.

The User Group will deliver these strategic goals through a number of guiding principles. It will be proactive and responsive through a relationship that fosters collaboration between all stakeholders. When developing or responding to challenges, such as managing information exchange across industry and multiple governments, the right people, with the right skills and resources will be allocated from all stakeholders including defence, industry, academia and the science and technology community with clear accountability between members. This will be underpinned by reviewing and demonstrating affordability, viability and sustainability for each respective programme, through the full acquisition life cycle.

7. CONCLUSION

All three GCS programmes; Type 26, Hunter class frigate and the Canadian Surface Combatant, are due to run for a long duration, especially when considering the length of each build programme and that each ship will be in service for no less than 25 years. This means that the timeframe for this collaborative venture could potentially run until around 2070. The participating nations are still in the early phases of this venture and are therefore initially focussing efforts on enabling processes such as information exchange; be it between governments, government to industry or industry to industry, ensuring that commercial or sensitive information is transferred securely and efficiently. Another early process is the transfer of shipbuilding lessons; initially lessons from the parent design but expanding as each programme commences their build phase including core areas such as safety, engineering and production techniques.

As the programmes mature and gain a better understanding of synergies, the intent is to increasingly look at how to deliver the capability together; exchanging people, skills and training while potentially working up common support methodologies and operating doctrine. This work will be in parallel to that of optimising the supply chain, working with all three nations and industry to encourage resilience, providing economies of scale and avoiding commercial fratricide. Moving further ahead, the participating nations will consider how to develop the capability together, whether this be obsolescence management or upgrades via Batch build strategies or the technical and intellectual sharing of ASW battle and broader capabilities, such as Air Warfare, necessary to fight in an evolving, complex, multi-threat environment. Regardless, the benefits that this collaborative programme present are considerable and will only unfurl and expand as each programme matures and continues to share its knowledge.

Authors' note

The views expressed in this paper are those of the authors and do not necessarily represent the views and opinions of their respective Navies or Ministries/Departments of Defence or Governments.

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