PROJECT SEA 1180

PATROL BOAT, MINE HUNTER COASTAL AND HYDROGRAPHIC SHIP REPLACEMENT

OFFSHORE COMBATANT VESSEL (OCV) INITIAL CAPABILITY DESCRIPTION

Sponsor:

Director-General Maritime Development (DGMD)

Capability Development Group (CDG)
R3-1-123

Capability Manager Representative:

Director-General Navy Capability Plans & Engagement (DGNCPE)
Navy Strategic Command (NSC)
R1-4-B157

Version 1.0 (xx July 2011)

INITIAL CAPABILITY DESCRIPTION
OFFSHORE COMBATANT VESSEL (SEA 1180)

Introduction

1. It is the Government's intent[1] to ***'realise potential operational efficiencies and reduced cost of ownership'*** of Navy's Patrol Boat, Hydrographic, and Mine Countermeasures (MCM) forces through rationalisation of the current mix of 26 specialist role vessels into a reduced force of around 20 modular multi-role Offshore Combatant Vessels (OCV). Project SEA 1180, with a total acquisition budget provision in the middle of the $3-$5 Billion band, plans to deliver the OCVs from the beginning of the next decade (2020s).

Purpose

2. This Initial Capability Description (ICD) of the OCV System will provide the basis for further industry solicitation, feasibility studies, development of initial capability options, and subsequent generation of preliminary Capability Definition Documentation to support the SEA 1180 1st Pass submission. It is deliberately not prescriptive in order to not constrain innovative systems solutions being offered. Furthermore, the system boundaries are not intended to be rigid or clearly defined at this stage while ongoing development activity determines the cost and capability drivers, and subsequently inform cost and capability trade-off decisions.

The Current Force and its Limitations

3. The current Patrol, Hydrographic, and MCM force comprises 26 vessels of four Classes; 14 *Armidale* Class Patrol Boats (PB), 2 *Leeuwin* Class Survey Ships (AGS), 4 *Paluma* Class Coastal Survey Vessels (AGSC), and 6 *Huon* Class Coastal Mine Hunters (MHC). Each Class of vessel was purpose designed for specific primary roles: the PB for Maritime Law Enforcement, the AGS/AGSC for Coastal and Inshore Hydrographic Survey, and MHC for Port and Channel Route Survey and Mine Clearance. This means that while designed and built to maximise specific capability effects, each Class have limited abilities to adapt to strategic circumstances that have changed since their development and acquisition. The speed and endurance limitations of the MHC do not enable it to provide deployed Mine Countermeasures (MCM) support to a Maritime Task Group (TG) seeking to avoid or access waters potentially denied by mines unless deployed well before and ahead of that TG. Similarly, the AGS are unable to provide direct Rapid Environmental Assessment (REA)[2] support to a deployed Maritime TG because of speed (AGS/AGSC) and endurance (AGSC) limitations. Additionally, due to their very modest level of integrated platform survivability[3] the AGS/AGSC are constrained in their ability to operate where Sea Control is not assured. The PB are also designed and built to modified commercial standards explicitly for lower threat constabulary operations where integrated platform survivability requirements are only modest. It should be noted however; that recent experience in Operation RESOLUTE[4] has shown that both the MHC and AGS were able to adapt and deliver the capability effects required in border protection operations, albeit at the lower level of the operational and threat spectrum.

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[1] Defence White Paper (DWP) 2009 paragraphs 9.19-9.22

[2] REA is the collection, collation, analysis, prediction, exploitation, and timely dissemination of environmental and geospatial data (hydrographic, oceanographic, topographic, and meteorological) to enable manoeuvre and optimal performance of sensors, countermeasures, and weapons.

[3] Integrated Platform Survivability involves design and construction attributes to reduce susceptibility and vulnerability to attack, combined with defensive systems, to achieve a desired Residual Capability after attack. A high level will enable a RC of 'Continue Mission' which is the norm for Surface Combatant and Mine Countermeasures Vessels.

[4] RESOLUTE is the ADF Operation in support of the Border Protection Command mission

4. Government also requires the OCV to potentially undertake additional roles to that of the current Patrol, Hydrographic, and MCM Force; namely Maritime (Littoral) Warfare, Counter-Terrorism, Counter-Piracy, Special Forces Support, and Support to Regional Security and Stabilisation Operations. The level and extent to which these roles can be undertaken and in what threat scenarios requires more detailed analysis and will impact on the eventual capability solution.

Assumptions

5. Until otherwise determined as facts, this ICD assumes:

a. OCVs will be a single modular multirole Class of *around* 20 vessels; [5]

b. OCV will be larger than the current *Armidale* Class Patrol Boats[6], with an anticipated [*maximum*] displacement of *up to* 2000 tonnes;[7]

c. OCV will rely on the use of modular unmanned underwater systems for both mine countermeasures and hydrographic tasks, envisaged to be containerised and portable, and capable of being used in any port or loaded onto any of the OCV or other suitable vessels;[8]

d. OCV may potentially embark a helicopter or UAV to allow a surge in surveillance and response capabilities without the need to deploy additional ships;[9]

e. ADF peacetime commitment to Border Protection Command will remain at *around* current levels;

f. there is no Government requirement for the OCV to be capable of Southern Ocean operations (below Latitude 48°South);

g. OCV will be home-ported in at least two locations across Northern Australia and possibly in another East Coast location, subject to outcomes of the ADF Force Posture Review; and

h. infrastructure funds identified within the project budget cater for minor upgrades to existing Basing arrangements (i.e. no major new work'), therefore any Base re-development to increase capacity in existing or new locations as a result of the ADF Force Posture Review will require separate projects and funding..

The OCV and the Principal Tasks for the ADF

6. ***Deterring and Defeating Attacks on Australia (Task 1)***. As highlighted in the DWP[10] the ADF has to '*be able to control our sea and air approaches to the extent required to safeguard our territory, critical sea lanes, population, and infrastructure, and to enable the manoeuvre and employment of joint ADF elements in our primary operational environment, and particularly in the maritime and littoral approaches to the continent*'. This means that Maritime MCM systems will need to be concurrently deployed as required to ensure select Fleet Bases, Mounting Bases, strategically vital ports, Forward Operating Bases (FOB), and Sea Lines of Communication (SLOC) are not denied by Sea Mines, and that deployed maritime elements are not denied littoral

[5] DWP09 paragraph 9.20
[6] ACPB are 56m in length and 270 tonnes of aluminium construction
[7] DWP09 paragraph 9.20
[8] DWP09 paragraph 9.21 – however, 'use in any port' is not considered a prime capability driver
[9] DWP paragraph 9.22
[10] Defence White Paper 2009 paragraphs 7.2-7.3

access for manoeuvre and projection of force. REA is a key enabler for MCM and all other maritime warfighting functions. Therefore, complementary Military Geo-Spatial Information (MGI) systems will need to be similarly deployed. MCM Route Surveys, Beach Surveys, Hydrographic Surveys, and Oceanographic Data Collection are also necessary, ongoing activities of MCM and MGI systems during peacetime. These activities populate strategic data holdings for MCM and REA undertaken in preparation for this Task (i.e. 'Shaping the Battlespace'). When Major Surface Combatants are deployed beyond the strategic centre of the Primary Operational Environment (POE)[11] - the 'Sea Air Gap' in the Northern Approaches - the OCV is envisaged to undertake combat operations such as Harbour Defence and Vital Asset Protection against adversary raids on Australian continental and offshore territory and installations.

7. ***Supporting Domestic Security and Emergency Response Efforts (Tasks 1A/1B).*** This is an enduring task and major policy changes to the support arrangements for Border and Resource Protection, Counter-Terrorism, Maritime Search and Rescue, and Disaster Relief are not anticipated to change. The RAN is also the national charting authority in the Australian Charting Area (ACA). Routine survey activities by the OCV force (and other Geospatial force elements) will contribute to maritime safety and security. OCVs in MCM and MGI role configuration would remain important assets for re-tasking from military peacetime activities to Disaster Relief and other similar 'Defence Aid to the Civil Community' type activities. While Task 1A (*Supporting Domestic Security*) would be undertaken in peacetime it is envisaged that it would also be undertaken concurrently with Task 1.

8. ***Contributing to Stability and Security in the South Pacific and East Timor (Task 2).*** The domestic constabulary and diplomatic operations undertaken by the OCV for *Tasks 1A/1B* translate readily to this Principal Task, i.e. Maritime Law Enforcement and Disaster Relief.

9. ***Contributing to Military Contingencies in the Asia-Pacific Region (Task 3).*** The roles required under the auspices of *Tasks 1 and 1A* would have utility for this Task in the vast littoral areas in the South East Asia region where SLOC security is so important to Australia's national interests.

10. ***Contributing to Military Contingencies in Support of Global Security (Task 4).*** Although possible, it is unlikely that OCVs would deploy too far beyond the APOE because of their utility and likely higher priority for *Tasks 1, 1A, 2, and 3*.

The OCV Region and Areas of Operation

11. Based on the likely involvement of the OCV in the ADF's Principal Tasks, National Hydrographic Tasking, and Australia's Search and Rescue Region, the OCV Principal Region of Operation would extend north from 48°South latitude (Sub-Antarctic boundary in the Southern Ocean) to approximately 5° North latitude, and from approximately 95° East longitude eastwards to 180° East longitude (International Date Line). The majority of tasking would be expected to occur in the Northern half of this Region, above the Tropic of Capricorn. Operations in the Sub-Antarctic and Antarctic would require sea frames with appropriate ice-rating and sea-keeping capabilities. The cost of this would not be an economical investment across the whole OCV Class and would be at the detriment of mission capabilities required more regularly and frequently for operations closer to the strategic centre of the APOE. Notwithstanding, MGI systems could still be deployed in mission modules embarked on appropriate vessels owned or chartered by other

[11] Defence White Paper 2009 paragraphs 6.38-6.39 – 'Sea Air Gap' is defined as the strategic centre of Australia's Primary Operational Environment (APOE). The APOE covers the Southern Ocean to the Equator in latitude, and from the Eastern Indian Ocean across to the Mid-Pacific Ocean in longitude.

Government Departments to enable the RAN Hydrographer to meet charting responsibilities. This Region incorporates the following likely Areas of Operation:

a. Australian Economic Exclusion Zone and Continental Shelf,
b. Australian Search and Rescue Region,

c. Vital Northern Ports and Offshore Infrastructure,

d. Sea Air Gap,

e. Northern Approaches and Strategic SLOC,

f. Australian Charting Area, and

g. South-West Pacific Island Countries.

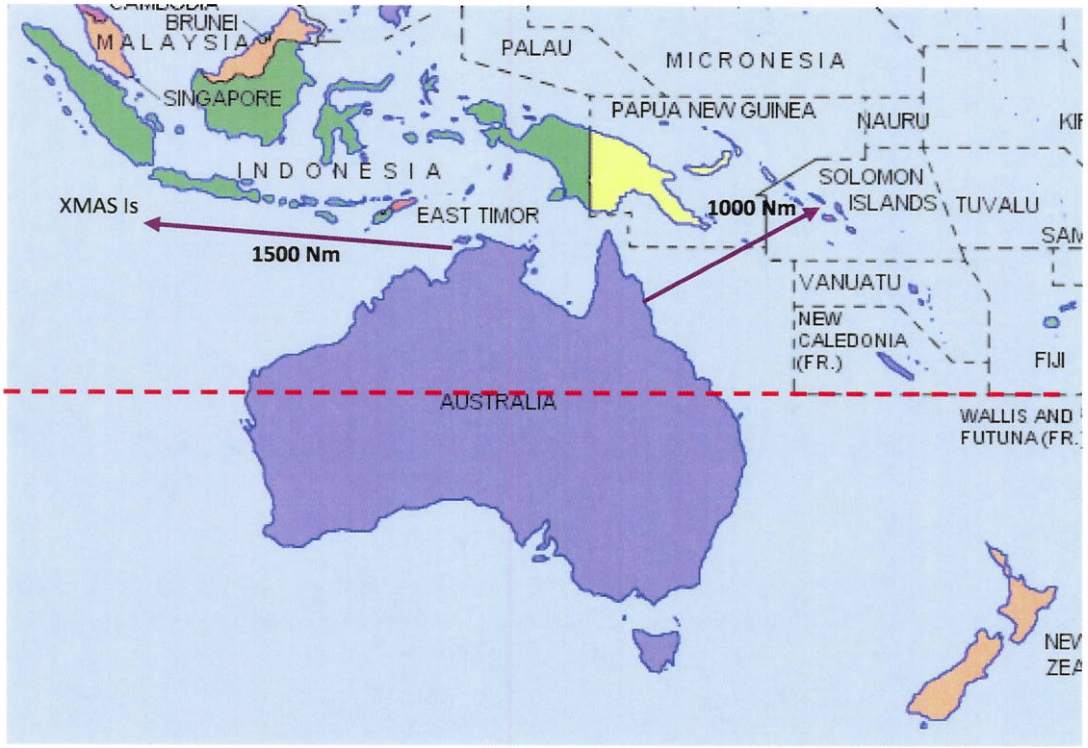

Fig 1 – OCV Principal Region of Operation

Broad OCV Concept

12. **General**. Central to the capability provided by the OCV will be the ability to readily adapt and enhance baseline sea frames with modular 'capability brick' combinations of systems, both materiel and support, with appropriately trained personnel embarked to undertake one or more primary roles during periods of operational availability. This '***Role Adaptability***' might allow greater flexibility for scheduling and tasking by minimising the need for immediate role re-configuration. This is a potentially complex undertaking involving coordination of logistics, training, transport and materiel support - at the least within Defence and potentially across several areas of Government, depending on the nature of the operation. Role reconfiguration of OCVs is envisaged primarily as a deliberate, pre-planned activity at dedicated support bases; however, such activity when deployed in response to immediate tactical circumstances might be possible subject to availability and synchronisation of the comprehensive logistic support that would be necessary.

In broad terms, the total mission system requirements, both permanent and modular elements, will likely dictate sea frame requirements, so as not to limit the functionality of the OCV. Projects SEA 1778 (Task Group Mine Countermeasures) and JP 1770 (Rapid Environmental Assessment) intend to deliver precursor and enabling modular system capabilities for SEA 1180. Notwithstanding specific mission system requirements, other capability and operational aspects such as speed, endurance, range, sensor and communications fits, and integrated platform survivability characteristics will be significant drivers of the eventual sea-frame solution. In order to reduce Navy's overall support costs, such as for training and maintenance, equipment commonality will be a key development and acquisition consideration.

13. **Aggregated Roles.** To simplify development of more detailed operational concepts, capability requirements, and functional performance specifications the current enduring and future roles have been aggregated into four fundamental roles, based on maritime doctrine and identified synergies, as follows:

a. ***Maritime Constabulary (Role A)*** – encompassing Maritime Law Enforcement, Counter-Terrorism, Counter-Piracy, and Support to Regional Security and Stabilisation Operations;

b. ***Maritime (Littoral) Warfare (Role B)*** – encompassing some functions of Surface Warfare (Surveillance and Interdiction) as an extension of Role A, Amphibious Warfare (Advance Force/Combat Team Mobility), and potentially Undersea Warfare (e.g. Barrier Surveillance).

c. ***Mine Countermeasures (Role C)*** – encompassing Route Survey and Mine Neutralisation in Ports, Channels, Harbour Approaches and Traffic Routes, and Direct Support to Task Group Littoral Access and Manoeuvre; and

d. ***Maritime Geospatial (Role D)*** – encompassing deliberate Coastal and Inshore Hydrographic Survey, Beach Survey, and REA, with the latter complementary to Role C.

14. **Permanent Mission System Elements**. Given the probable high operational demand for *Role A* configured OCVs, it may be more efficient and cost-effective if the necessary mission system elements related to this role are permanently fitted as the baseline capability in all sea frames. This might include a core C4I and EW suite with appropriate capacity and interfaces that enable expanded 'plug in' capability needed for *Roles B, C*, and *D*, sensors for navigation and local area surveillance, basic armament, and multi-purpose boats. Core to all roles is the requirement for effective and efficient launch and recovery systems for all potential watercraft and aircraft, by day or night in challenging environmental conditions. Other core elements include cooling, power, communications, navigation systems, bandwidth and decoys.

15. **Modular Mission System Elements** Enhancement from *Role A* to *Role B* may require additional joint C4ISREW, watercraft, point defence system, and torpedo countermeasures. Modular Point Defence and Countermeasures systems can be managed as part of a broader Fleet pool, with the sea frame 'fitted for but not with'. The Phalanx Close in Weapons System (CIWS) and AN/SLQ 25C NIXIE towed torpedo decoy are *potential* examples of this and may be applicable for *Role C* also. The *Role C* and *D* variants will utilise off-board systems as envisaged in the DWP[12] and, by being transportable for lift and movement by Sea, Air, Road, and Rail, could also be able to operate independent of OCVs from strategically vital ports (to be defined). While not envisaged as essential the transportability of *Role C* and *Role D* modular systems would provide for greater flexibility and compensation for the reduced number of sea frames (i.e. around

[12] see Assumptions at paragraph 5

20 in comparison to the current Force of 26) to sustain concurrent operations in *Role A* and *Role B* configurations. This portability would also provide greater flexibility to deploy *Role D* system elements from other government or leased vessels for HYDROSCHEME tasking in areas beyond the priority OCV operating areas, particularly below 48° south latitudes. By being able to create an independently deployable mission system opportunities are also provided to train mission teams from designated ports without reliance upon the availability of sea frames. While modular systems could be containerised for the purpose of storage and movement they do not necessarily need to be embarked as so in the OCV sea frame. SEA 1778 prototyping and trials have already demonstrated that embarking mission sub-systems such as Boats and Unmanned Underwater Vehicles as discrete elements is more economical for space and ease of movement within a mission bay. Figure 2 provides a pictorial representation of the OCV mission system concept.

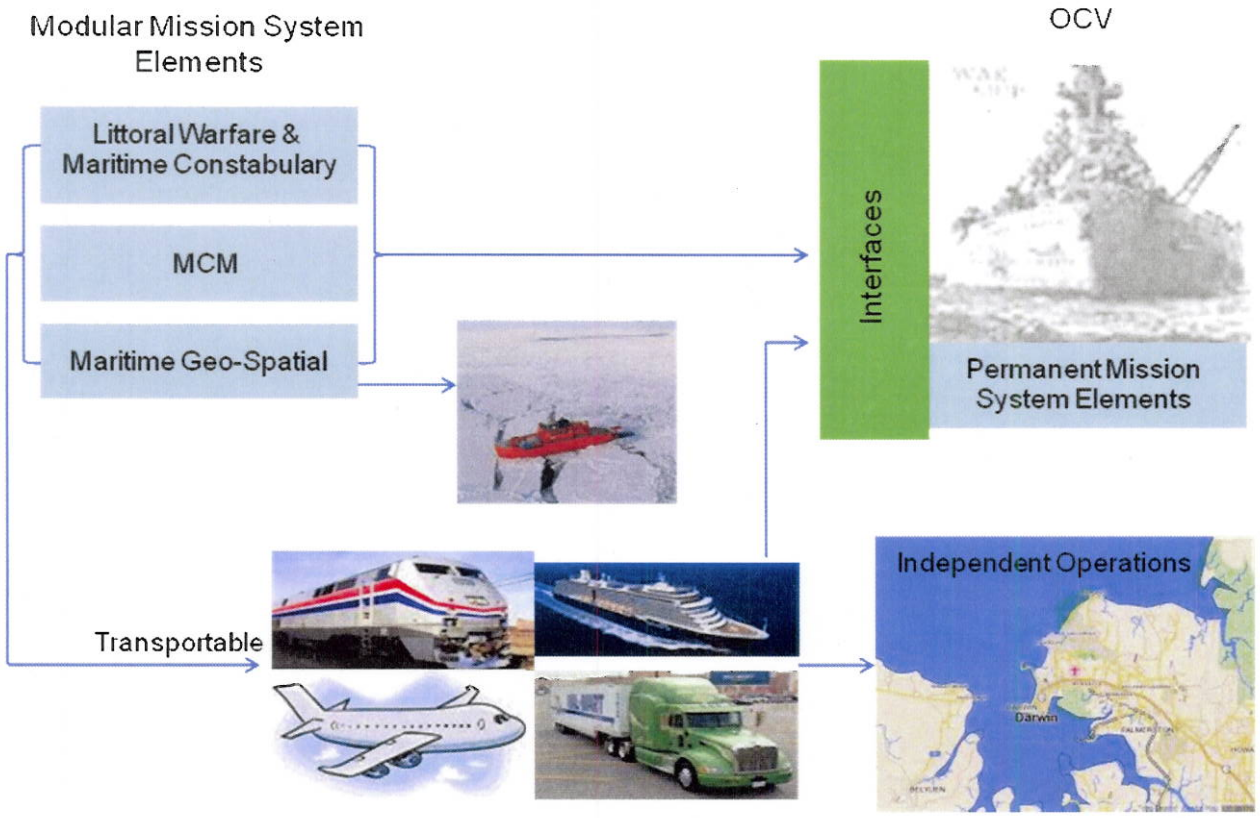

Fig 2 – Mission Systems

Concept of Employment - Role A (Maritime Constabulary)

16. Little, if any change to the current paradigm is expected. Based upon intelligence and wide area surveillance an OCV would be tasked to patrol a local area to intercept Vessels of Interest (VOI) or respond to reported, suspected, and potential unlawful/unauthorised activity. This Role provides some of the foundational capabilities for Role B and, depending on the mission and legal framework, requiring the ability to undertake one or more of the following tasks:

a. high speed interception, interdiction, or pursuit,

b. covert shadowing, surveillance, and reporting, including low speed loitering for prolonged periods,

c. close quarters manoeuvring and station-keeping on vessels ranging from slow, small, but highly manoeuvrable fishing vessels to ocean-going cargo vessels, to apply graduated force in order to halt or slow them for boarding (unless emerging USV technology can enable an OCV to stand-off at a safe distance);

d. application of graduated force to halt or slow a vessel for boarding, including visual signalling, verbal orders, warning shots, non-lethal weapons, and disabling action;

e. board a compliant or non-compliant vessel, by boat, to search and potentially apprehend (non-compliance may include aggressive manoeuvring and obstructions);

f. transport apprehended and potentially belligerent or violent personnel to a safe haven or appropriate place of detention; and

g. tow apprehended vessels to a safe haven.

Concept of Employment - Role B (Maritime (Littoral) Warfare)

17. For this role the ability to securely receive third party[13] intelligence and surveillance information, patrol, and respond via high speed interception and interdiction, covert shadowing, surveillance, and reporting is common with *Role A*. This role though involves responses to increased threats during operations of a combat (*Task 1*) rather than constabulary (*Task 1A*) nature with offensive operations potentially against comparable sized and lightly armed vessels interdicted such as Mine-layers, small to medium sized Amphibious Vessels, and Patrol Craft. The ability to embark and operate a Helicopter or UAV would enhance the OCVs capability for this role; however, the costs and any necessary capability trade-offs with arguably other more important mission system elements would require careful consideration. The OCV may have the potential to contribute to the Force ASW effort by deploying and monitoring remote underwater sensors in a Defended Area or for a Barrier. With an ability to operate covertly when close inshore the OCV will enhance Land Force Mobility and Manoeuvre in remote areas by deploying and sustaining Sections of Dismounted Soldiers for short durations, and being able to insert and extract them by Boat over the shore.

Concept of Employment - Role C (MCM)

18. The OCV will exploit emerging robotic technologies and the application of autonomous systems - potentially surface, underwater, and airborne - to work in a 'stand off' mode rather than within a Mine Danger Area as traditional MCM vessels do. Traditional MCMVs utilising hull-mounted and towed sensors are able to operate in close proximity to mine threats because of their low magnetic, electro-magnetic, and acoustic signatures and high resilience to shock. The concept of a lower cost, general purpose sea-frame standing off at a safe distance deploying a combination of manned and unmanned systems into the Mine Field constitutes a significant paradigm shift that is expected to improve the effectiveness and efficiency of the ISR, REA, Mine Hunting, Influence Minesweeping, Mine Jamming, and Mine Neutralisation aspects of MCM. However, the concept has potential limitations, namely the inability of an OCV to undertake Mechanical Minesweeping (against floating and buoyant mines), Immediate Break Out/In, and Lead Through[14] aspects of MCM, and support to the rescue of ships that have interacted with a Mine. To meet these objectives, the OCV shall be able to deploy and operate independently, or with other OCV, to

[13] Third Party ISR could be from strategic space-based assets, theatre MPA and Global Hawk assets, and tactical air and surface assets organic to a Maritime Force.

[14] The ongoing operational/tactical relevance of MCM Lead-through would be re-assessed as part of a broader MCM Concept

remote or developed locations for Mine Survey and Clearance of ports and their approaches and entrance channels, as well as being able to deploy in support of a Maritime/Amphibious TG.

19. In the TG scenario the OCV would either self-deploy or detach from the TG[15], operating ahead to undertake MCM activities (ISR, REA, Counter-Mining, Mine Hunting, Influence Minesweeping, and Mine Neutralisation) in access routes and manoeuvre areas to reduce the threat to acceptable levels of risk for the following TG. It is important to emphasise that Australia's Amphibious Concept is centred upon the supporting concept of Littoral Manoeuvre (LM). LM seeks to exploit the agility of an amphibious force to apply concentrated strength on an adversary vulnerable to having to hold a length and depth of extensive coastlines at risk. Therefore the MCM concept of employment is meant to support this requirement for agility and aims to assist the Joint Commander to exploit an adversary's geographic vulnerability rather than undertaking prolonged and intensive MCM effort to break into a Defended Area. The CONEMP for TG MCM is therefore based upon the OCV determining whether a Choke Point or Manoeuvre Area is accessible, if it can be made accessible at acceptable risk in acceptable time frames, or maintained as accessible. The Counter-mining activity is aligned with *Role B* and inherent Surface Warfare capabilities and attributes. 'Standing off' also reduces the risk from some surface and shore based threats in the littoral. The highest risk to this concept though is that the location and extent of a Mine Threat Area may not be accurately or reliably known. Therefore, to mitigate this risk the OCV may need to have the ability to deploy airborne (Helicopter/UAV) MCM ISR and REA sensors (or at least make use of such assets embarked in other TG Force Elements) as a precursor to UUV/USV deployment and any clandestine advance force operations.

20. A necessary element of each MCM/REA modular mission system would be a command support system that enables planning and UUV/USV/UAV post-mission analysis. Clearance Divers are expected to remain relevant to Clandestine Beach Survey, Reconnaissance and Clearance operations because of their ability to operate where UUV cannot (now and in the foreseeable future) in the very shallow water and surf zones to the back of the beach. Swimmer Delivery Systems (SDS) would deploy Clearance Divers from the OCV to operate clandestinely in preparation for the arrival of an Amphibious Force.

Concept of Employment - Role D (Maritime Geospatial)

21. Similarly to *Role C*, the OCV shall be able to deploy with a TG or ahead of it, and operate independently (or with other OCV), to a remote or developed location to undertake offshore and inshore surveys (from the drying line to depths of up to 6,000 metres). Bathymetric, oceanographic, and seabed data (to IHO[16] standards) will be collected for storage or initial processing on board into formats required by the AHS[17] for subsequent strategic data-basing and production of charts and navigation publications. Initial processing is currently undertaken in situ to determine if the quality of data collected is appropriate and whether additional collection effort is necessary. However, should affordable and effective C4I systems be available with the necessary bandwidth it may be more efficient to have the initial processing undertaken remotely from the Australian Hydrographic Office (AHO),

22. The deployment of UUV, boats, and possibly UAV for data collection will enable the OCV to safely stand-off from poorly charted and constrained inshore waters. It is unlikely that an OCV would deploy in support of Maritime/Amphibious operations solely for the purposes of REA. Rather, it is envisaged that scalable REA mission elements - Deployable Geospatial Support

[15] This implies an essential requirement for the OCV to be able to sustain the Routeing Speed of the TG
[16] IHO – International Hydrographic Organisation
[17] AHS – Australian Hydrographic Service

Teams (DGST) and Mobile Meteorological Teams (MMT) - might supplement deployed *Role B* or *Role C* OCVs or other TG Units.[18] These Teams could deploy with portable and remote sensing equipment (including UUVs), support craft, Command Support Systems to facilitate reach back into strategic databases, coordinate and direct collection, analyse collected data, and disseminate products.

Influence of the Threat Environment

23. Threats to surface ships are multi-dimensional and originate from sea, air, or land and with a variety of weapons deliverable with minimal warning from a variety of host platforms. The range of possible threats are generalised as follows:

a. **Above Water.** Anti-Ship Cruise Missiles (ASCM) launched from aircraft, ships, submarines, or ground-based systems continue to evolve in terms of improved range, speed, manoeuvrability, targeting, counter-detection, and lethality. Less technologically advanced Gun Projectiles, Bombs, and Rockets delivered from aircraft, ships, fast attack craft, or ground-based systems remain as threats, particularly in littoral areas where the physical environment can be exploited to overcome target sensor and weapon range disadvantage. The littoral, particularly in harbours, also provides a haven for asymmetric threats such as bomb-laden water-craft, non-military light aircraft, and boarding by armed intruders. Weapons may not only deliver conventional kinetic effects but also be non-conventional such as chemical, biological, radiological, and nuclear (CBRN). Non-combat constabulary operations may also pose dangers from belligerent and violent behaviour such as attempted ramming and small arms fire when at close quarters.

b. **Under Water.** Torpedoes launched from increasingly stealthy submarines are also evolving in terms of improved range, speed, manoeuvrability, targeting, counter-detection, and lethality. Sea-mines are a relatively cost-effective sea denial capability and can be readily laid from aircraft, dedicated or opportunity mine-laying surface vessels, and submarines. They are also increasing in their sophistication in terms of sensitivity to influence, counter-detection, means and selectivity of targeting and activation, autonomous mobility, and lethality. Harbours and anchorages also provide a haven for diver or swimmer delivered improvised explosive devices.

24. **Countering Threats.** A combination of broad options could be considered for further capability and cost analysis during the development process, namely:

a. ***Avoid Threats*** – while this approach will reduce the risk of attrition and reduce acquisition costs it will limit the OCV to *Tasks 1A, 1B, and 2* (*Roles A* and *D*), i.e. constabulary and diplomatic operations. During military operations in contested littoral waters (*Tasks 1* and *3*), particularly *Roles B* and *C*, this option may only be applicable to CBRN threats, thereby removing the requirement for Collective Protection Systems such as Gas Citadels and Cleansing Stations.

b. ***Defended from Threats*** – if operating in a Defended Area, or if Major Surface Combatants and Combat Aircraft are in mutual support (*Tasks 1* and *3*/*Roles B* and *C/D*), this approach alone will reduce the risk of attack and reduce acquisition costs for the OCV but also reduce operational flexibility of the defending force.

[18] This is the concept underpinning JP 1770 (Maritime REA) which will deliver enhanced DGST/MMT capabilities (number of Teams and their equipment) in approximately 2015

c. ***Reduced Susceptibility to Threats*** – by designing, constructing, and operating the OCV such that it produces low level acoustic, magnetic, electro-magnetic, infra-red, and radio frequency emissions, the probability of being detected, identified, targeted, and engaged (*Tasks 1* and *3/Roles B* and *C*) can be reduced. However, signature reduction and enhanced survivability will add to the cost of the sea frames so the degree to which it is required needs to be carefully considered as part of a balanced and integrated solution.

d. ***Self-Defence*** – if conducting military operations in contested littoral waters (*Tasks 1* and *3/Roles B* and *C*), whether or not in a defended area or in close company, the OCV would need to be able to provide for its own close range defence or countermeasures against ASCM, Aircraft, Torpedoes, and Fast Attack Craft, as well as contribute to force-level layered defence. Such systems might be modular, self-contained, and part of a small rotatable pool only fitted to select OCV when needed. In terms of MCM this might include deployable Mine Jammers.

e. ***Reduced Vulnerability to Attacks*** – varying degrees of collective protection can be provided for equipment and personnel against blast, shock, ballistic, electro-magnetic, and CBRN effects, but at a cost. For the lesser likelihood operations in a high threat area (ASCM, Torpedoes, and CBRN) it would be expected that a combination of the other broad options would be sufficient; however, some limited degree of armouring, passive fire protection, zoning, redundancy and separation of vital equipment might be necessary to reduce the risk of attrition against the less technologically advanced threats and belligerence described, as well as contributing to the effectiveness of Damage Control and Fire-fighting systems.

Operations Profile

25. The OCV force is expected to be flexible and adaptable to three operational states, as follows:

a. **Routine Peacetime**. A continuous level of commitment to Border Protection Command *(Task 1A/Role A)* is assumed. This is currently 7 PB available for tasking with a surge capacity to 9. The remaining operational availability of the force will provide a balanced level of commitment between the HYDROSCHEME[19] *(Tasks 1* and *1A/Role D)*, international engagement activities[20] *(Task 2/Role A)*, and raise, train, and sustain (RTS) activities[21] *(*for *Tasks 1, 1A, 1B, 2,* and *3/Roles A, B, C, D)*. Concurrently, the OCV force will remain responsive to requests for diversionary short-term emergency assistance to the civil community *(Task 1B/Roles A, C,* and *D)*.

b. **Regional Contingency**. In this circumstance it is envisaged that the Routine Peacetime commitment to Border Protection would be sustained *(Task 1A/Role A)*, with remaining operational availability potentially re-prioritised to force generation, preparation and deployment *(Tasks 2, 3/Roles A, B, C, D)*.

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[19] HYDROSCHEME – the rolling 3-year programme for national hydrographic survey and charting to meet current and forecast requirements of both the Defence and Civil maritime communities.

[20] Fleet International Engagement Activities include port visits and exercises that provide a presence and promote confidence building for regional maritime security.

[21] RTS incorporates collective training and exercises to re-generate forces following extended maintenance and maintain operational readiness

c. **National Defence Emergency**. In the event of Australian national security being threatened by an aggressor the OCV force would transition to a state of sustaining maximum possible operational availability for *Tasks 1/1A*, balanced between *Roles A, B, C* and *D* (REA).

Common Role Adaptable Sea Frames

26. Traditional single role Patrol, Hydrographic, and MCM vessels have quite differing design and construction needs regarding reduction of vulnerability to detection and targeting, as well as shock, blast and ballistic protection. This not only applies to the hull but to all mission critical systems, including propulsion, power generation/distribution, and damage control. These differences have an associated disparity of cost.

27. Hydrographic Survey vessels are at the lower end of these needs and can be built to lower cost commercial standards without magnetic and acoustic signature reduction and collective protection, whereas traditional shock hardened MCM vessels can operate in close proximity to mine and other littoral threats and are at the high end of costly military build standards. Application of the high end military build standards across all sea frames would likely be cost-prohibitive; hence the *Role C* CONEMP aims to maximise the use of emerging robotic technologies in MCM to reduce the reliance upon self-protection and thereby operate at a safe stand-off distance. However, the rate of technological advancement may have an impact on the efficiency and effectiveness of systems such as UUV/USV in terms of time and rate of effort and an effective OCV 'stand off' distance for MCM. Therefore, the cost and capability trade-off between magnetic and acoustic signature reduction, self-protection, and airborne MCM ISR and REA capability, will require rigourous study and careful consideration. Otherwise, the amount of deployable MCM Minehunting and Minesweeping systems required to compensate for longer stand-off distances will increase mission time and rate of effort and may consequently increase the size and cost of the OCV sea frame. This might be mitigated though by operating *Role C* OCVs in pairs, although this then either limits the number of concurrent MCM tasks or other Roles that can be undertaken.

28. The *Role C* CONEMP also removes the need for auxiliary propulsion systems that enable a traditional MCMV to be highly and quietly manoeuvrable while mine-hunting. Reduced susceptibility to detection and targeting by radar and infra-red sensors, and collective protection from blast and ballistic effects would also reduce the risk of littoral operations (*Roles B/C*) when operating forward of a TG or independently. The optimum degree and means of signature reduction and collective protection for *Roles B/C*, balancing risk and cost, needs to be determined via further studies.

29. Should the cost of signature reduction, collective protection, and possible aviation support capability (flight deck, hangar, services) across the entire OCV force be potentially prohibitive, options to preserve the notion of identical sea frames include reduction of the force size, reduction of the breadth and/or level of capability effects that can be delivered, or introduction of two OCV variants (A/D and B/C or other permutations) with maximum possible systems commonality. The latter option might reduce the cost of investment in integrated platform survivability, and costs of supporting excess plant and domestic services capacity in a smaller Patrol variant when modular systems and personnel are not embarked. The viability of these options would be dependant upon the minimum threshold level of continuous operational availability that could be generated for RTS and operational tasking, dependant upon a combination of maintenance cycles and crewing arrangements.

Workforce

30. The number of seagoing OCV personnel is not to exceed the current PHM force personnel allocation of 936. Manpower savings are highly desirable though, to assist with generation of the workforce required for the expanded Amphibious force being delivered in similar timeframes (JP 2048 Phases 4C and 5). Therefore, there is an expectation the OCV will utilise modern automation technologies and practices where operationally feasible for 'minimal manning'. The OCV concept presents unique opportunities for training of personnel. Through life savings are sought through the use of common core systems, such as engines, generators, galleys, and navigation and communications systems, compatible to those across the Surface Fleet to allow OCV trained personnel to be almost seamlessly integrated into other Fleet Units with minimal conversion training. Cost effective training delivery options to be considered may include, but not be limited to, use of the contracted mission systems provider. Modularity of the OCV mission system and the potential for independent operations by some elements means that a 'core crews and supplementary mission teams' crewing concept would be a logical start point. However, this flexible crewing concept may present challenges with achieving equitable personnel tempo arrangements. Therefore, further levels of flexible crew management may incorporate multi-crewing for core crews which, like the current ACPB and AGS models, facilitate increased operational availability, provided there is not an over-reliance upon contractor support for organic maintenance. Technical sailors will therefore require operator and maintainer training. The OCV design will need to provide sufficient accommodation and hotel services for the core crews and for mission teams, as well as a Troop Mess for a CDT Element, ADF Transit Security Element, or small Embarked Force. Some aspects of this could be achieved through use of a removable Accommodation Module that would free up deck space when these additional personnel are not required. The requirement for Austere Accommodation for the carriage and transfer of persons apprehended or rescued from illegal entrant vessels will be required ro be compliant with UNHCR transportation regulations.

Facilities and Support

31. Any emerging technology/capability which might be submitted to satisfy the project requirement must take into account existing infrastructure. Should the proposed project solution require significant infrastructure additions or upgrades[22] then this must be identified and quantified as a prospective cost driver. Conversely, should new Bases or substantial Base upgrades not result from the ADF Force Posture Review then the final OCV solution will be constrained in its dimensions (length, beam, draught)[23]. The solution will almost certainly include innovative sustainment (including technology refresh), maintenance, availability (as directed by Defence requirements), simulation and training solutions. All of these must be considered in light of the shore infrastructure and support aspects mentioned above.

32. The solution required by this project should include the training and strategic transportation of systems operators and managers, the maintenance of operator currency, technology refresh requirements and system certification.

[22] E.g. Dredging, Wharves, Shore Power etc.

[23] Force 2030, as prescribed in the DWP09, potentially grows HMA Fleet by 50-70% in terms of tonnage, which means the existing Bases might be outgrown.

Influence of the Geo-Physical Environment

33. The defined OCV Region of Operation is characterised by its remoteness, vast expanses of both open sea and littoral areas, and sparseness of logistic support infrastructure. By the very nature of its roles an OCV would be expected to mostly operate independently, or perhaps as a pair in this environment. Therefore, necessary attributes of the OCV will be long range, endurance, good fuel efficiency, and high levels of systems reliability and availability. This environment is also diverse, complex, harsh, and potentially hazardous in terms of navigation, sea-keeping, habitability, environmental sensitivity, and the performance of equipment and personnel. Sea surfaces span Tropical and Temperate latitudes where swell and sea states are regularly high because of cyclonic or frontal weather activity across open ocean expanses. Oceanographic and Meteorological conditions are also highly variable and will pose particular challenges for optimising sensors and weapons. Speed, endurance, and robustness will therefore be necessary attributes of the OCV sea frame to enable avoidance of potentially dangerous weather and protection of mission systems - from degradation, damage, and destruction and personnel - from fatigue, sickness, and injury. Robustness, sea-keeping, and endurance can be correlated to size, which also provides advantages for Modular Mission System Element capacity and the ability to operate rotary wing aircraft at sea.

34. The potential for accidents and emergencies at sea such as collision, grounding, and fire means that in the environment described it will be necessary for the OCV to have at least moderate levels of integrated platform survivability (protection and control systems for fire and flooding) because of the low likelihood of external assistance being readily available. This will enable a post-incident state of either '*Continue the Mission*' (for minor incidents) or '*Autonomous Withdrawal*' to a safe haven for mission recovery and repair (for more major incidents). In the event of a catastrophic accident or incident the OCV will require lifesaving systems that enable '*Safe Abandonment*' and subsequent survival and rescue of personnel. Compliance with International Conventions such as MARPOL[24] and SOLAS[25] will be mandatory. These non-Mission specific requirements will also impact significantly on the eventual sea frame. This is especially in terms of speed, range, endurance, survivability, growth margins and certification.

Key Characteristics – Indicative Threshold Requirements

35. Although this ICD is not intended to prescribe any requirements there are some key characteristics that need to have a quantitative indicative threshold indicated, based on characteristics of the existing Patrol, Hydrographic, and MCM Force, as follows:

a. Displacement – at least 60 metres in length

b. Economical Passage Speed – 11 - 14 Knots

c. Fast Routeing Speed – at least 18 Knots

d. Maximum Speed – at least 24 Knots sustained in Sea State 3

e. Loitering Speed – 4 to 9 Knots for at least 12 Hours

f. Range – no less than 3500 Nm at Economical Speed

[24] MARPOL – Convention for regulating the prevention of pollution from ships
[25] SOLAS – Convention for regulating requirements for the Safety of Life at Sea

g. Accommodation – no less than 35 crew and mission team bunks and capacity for between 20 and 30 additional austere bunks for an Embarked Force, Clearance Divers, or Transit Security Element

h. Endurance – at least 21 Days (80 Personnel) without replenishment

i. Growth Margins – at least 10%

Conclusion

36. SEA 1180 is a challenging and complex project which aims to realise potential operational efficiencies and reduced cost of ownership through rationalisation of four specialist role Ship Classes into a single multi-role Ship Class. Although essential to meet the capability provided by the current Patrol Boat, Hydrographic Survey and MCM Forces in Being, the OCV will also be required to potentially undertake additional roles such as Maritime (Littoral) Warfare, Counter-Terrorism, Counter-Piracy, Special Forces Support, and Support to Regional Security and Stabilisation Operations. Additionally, the likely OCV extended area of operations and requirement to deploy with a TG will necessitate a vessel with not only most of the combined attributes and capabilities of the Force in Being, but also incorporate long range, high endurance, good sea-keeping, fuel efficiency, an effective C4I suite for in-company and joint operations, and at least moderate levels of integrated platform survivability. The OCV concept will take advantage of role dependant modular, transportable, mission systems and crews, potentially including a selection from unmanned autonomous vehicles (surface, underwater, and air), boats, helicopters, weapons, countermeasures, C4ISREW, and accommodation.

37. The diversity of these roles, attributes, and required capability effects will be key drivers of the OCV system solution. However, this diversity may also present risks and challenges for the affordability and cost effectiveness of a single Ship Class solution as some attributes inherent in the design and construction of the sea frame are required for higher threat roles that occur infrequently. Therefore, options of mixed Classes of OCV variants, with mixed levels of capability and with systems commonality, and that avoids trading off capability, cannot be completely discounted at this early stage of development if the overall intent – '***realise potential operational efficiencies and reduced cost of ownership***' – can still be achieved. Regardless of hull shape, size, materials, numbers, and whether ultimately single or mixed Classes, the integration and interfacing of modular mission systems into the sea frames will be key, while Fundamental Inputs to Capability such as personnel, training, facilities and supplies will need to be carefully planned prior to realising the benefits that the OCV capability may provide.

Approved By:

J. Harvey
AIRMSHL
Chief Capability Development Group (CCDG)
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R.J. Griggs
VADM, RAN
Chief of Navy (CN)
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