

## Giving ex-Royal Navy platforms a new lease of life

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### Synopsis

When a naval ship is no longer required for active service with the Royal Navy a considerable amount of engineering activity is required to achieve a successful decommissioning date. The groundwork ensures the materiel condition of the platform is maintained to prevent the degradation of equipment availability in the lead up to out of service date.

This decommissioning date however, is increasingly seen as not being the end of the operational life of the platforms. There are several notable recent examples of the sale of RN assets including the Brazilian purchase of HMS Ocean and the handover of the two Royal Navy Sandown class platforms to the Ukrainian Navy.

This paper considers the preparation prior to decommissioning, support during the transfer of title and transition to new ownership and the sale support activities which take place in the longer term.

Engineering aspects covered are:

- The management and configuration of big data, specifically how this can be managed for a decommissioning platform to inform engineering decision making and identifying any sensitivities for future sales.
- The scenario of a protracted period between decommissioning and future sale may result in the requirement for equipment removals to support the remaining platforms or the introduction of emergent technology entering the market. As these capability upgrades may be requested by future owners this paper also covers how to successfully integrate them within the available design margins to ensure supportability and maintainability targets are achieved.
- With any aging legacy platform reaching a decommissioning date equipment obsolescence is likely to be a key challenge. How this is managed throughout this period is discussed.
- Any disruption on maintenance activity during decommissioning will have a detrimental impact on equipment reliability. To ensure smooth transition the ongoing management of maintenance and logistics activities are reviewed.

With a potential global market for decommissioned naval platforms, the activities listed above need to be tailored to meet the needs of the customer knowledge base, in-county supplier network and support philosophies compared with UK practice. In addition, there is likely to be differences in the stakeholder network, design authority responsibilities and toolsets.

These topics are explored from a perspective of an industry participant being directly involved undertaking these engineering decommissioning and future sale support activities, together with the ongoing support for the new owner. The paper provides a balanced view from this lived experience throughout this route to transfer and beyond, highlighting the positive experiences alongside how the emergent challenges are overcome. It is hoped that the information provided by this paper will provide guidance for future stakeholders who will contribute to the decommissioning of future Royal Navy platforms.

Keywords: Decommissioning, Second Owner, Requirement Setting, Global

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## 1. Introduction

A recent study (SIPRI 2022) shows the global market expenditure for military equipment reached an all-time high of \$2240 billion in 2022. As larger nations bring new capabilities into service there is a corresponding potential for selling or gifting on legacy capabilities which are being replaced. Smaller nations with urgent operational needs due to geopolitical tensions lack the time or budget to run a full capability acquisition life cycle. For these reasons the market for these second owners is growing.

With the high esteem the Royal Navy is held internationally we are seeing a resurgence in the UK of our desire to sell platforms to satisfy the world-wide interest. These sales generate additional revenue for the UK, which can be reinvested into the defence budget<sup>1</sup> and are an opportunity to stimulate relationships with future allies in a particular region, as well as providing further opportunities for British industry. This paper will seek to show some of the key aspects learned from supporting UK MOD in the sale of HMS Ocean to the Brazilian Navy, together with the current sale of Sandown Class Mine Counter Measures Vessels to second owners.

Preparing and selling warships is a combination of people, process and technology and the activities can be described in three phases – the preparation of the vessel for decommissioning and sale, the transfer and transition into second ownership and the steady state support to the new owner. This paper will consider each activity in turn providing a balanced view from a lived experience of being directly involved in the process.

## 2. Preparation for sale

### 2.1 *Preparing the vessel*

Preparing a ship for sale is analogous to the used car market. To garner the most interest and obtain the best sale price your asset must be in the best possible material condition, have the most up to date service history and offer the longest possible interval before a major invasive maintenance period. Selling an ill-maintained asset will not generate a positive reputation that you are an honest, trustworthy seller. There is also potential for a protracted period which will require additional preservation when the asset is dormant and additional preparatory work prior to sale.

To prepare for the sale and to ensure that the platform does not suffer from the effects of being laid up, UK MOD often partners with industry to undertake a docked maintenance period after the decommissioning date. During this maintenance period, and in addition to any outstanding repair activity, the scheduled Reliability Centred Maintenance (RCM)<sup>2</sup> is undertaken thus effectively resetting the service intervals of all the systems and restoring the functional state of the platform to the highest possible standard. Any cosmetic material state is reinstated. Depending upon the vessel's classification requirement, hull and machinery may be recertified giving the potential new owner assurance and the maximum time before the next costly docking. However, this is preparation for sale rather than just re-establishing the material baseline for the current owner. There are several differences in approach with the resulting challenges that must be dealt with at this point.

The first challenge is equipment removals. Elements of the vessel capability, hardware or software will have classification or licencing sensitivities. Licencing changes for the new owner will need to be applied for and granted. Another aspect is equipment ownership, with Government Furnished Equipment or Military Tasking Equipment having to be returned prior to sale. This results in capability gaps which need to be addressed if the second owner has a similar operational requirement.

As these are vessels at the end of their service life within the Royal Navy there will be equipment and systems that are obsolete in either supportability or operational effectiveness terms. If suitable priority was placed during the in-service phase, these capability refreshes may have already completed or have been in process of upgrading the capability across class. An example of this would be HMS Ocean (now NAM Atlântico) receiving the upgraded Artisan radar capability. Obsolescence may also need to be dealt with post-transfer of title via either Government-to-Government or Government-to-Industry arrangements. The former introduces complexity to the transfer process where the sustained UK MOD involvement can make the transition to full industry support difficult. The latter introduces new issues associated with maintaining full design authority and intent (explored in more detail later in this paper).

There are also design life considerations that must be accounted for. Hull life may be a potential concern for a new owner. In the case of the Sandown class, UK MOD commissioned research to ensure that the life of the GRP hulls would support the new owners' aspirations. Recent experience of Type 23 Frigate Life Extensions

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<sup>1</sup> The sale of HMS Ocean generated £84M for MOD UK's defence budget.

<sup>2</sup> RCM – Reliability Centred Maintenance – a systematic process to ensure overall system availability is preserved through the application of preventative maintenance derived from identification and mitigation of failure modes.

has shown that their hulls have achieved their original required design life but have required hull insert repairs to double their in-service life.<sup>3</sup>

UK MOD and industry shipyards have significant experience in bringing these well-used assets back to a high material state and this is what attracts many of the potential new owners to ex-Royal Navy vessels.

## 2.2 *Supporting the sale*

The sale of UK MOD's assets is handled by the Defence Equipment Sales Authority (DESA)<sup>4</sup>. For a major asset such as a warship, DESA negotiate the Government-to-Government sales agreement, often providing training for new crews to operate both the vessel and the systems safely and competently. This guidance and coaching for a new crew is provided by the Royal Navy Fleet Operational Standards and Training under the sales agreement. However, many customers are unwilling to enter into the sales agreement without a firm understanding of how they will undertake through-life support. The knowledge held by industry partners supporting the platforms whilst in-Service with the RN provides insights to support DESA during the sales process, providing a tailored through-life support arrangement alongside the sale that allows these new customers to move to an operational posture seamlessly.

Again, there are several challenges along this route.

With a history of supporting the platforms, the industry partners have knowledge and experience of where fragility and weaknesses lay. However, new owners can often be reluctant to acknowledge that the platform they are buying is not pristine and might not operate like a new ship, regardless of how well prepared.

The new owners will undoubtedly have different operating profiles and maintenance philosophies. Tailoring their support solution requires blending their needs with data and evidence driven understanding.

Most customers require a permutation of:

- planned maintenance (including spares and consumables)
- operational and emergent defect support
- initial optimised spares holdings
- replenishment of onboard and base spares
- technical support
- design management (including design intent, design margins and configuration baseline)
- supply chain management (including reverse supply chain)
- obsolescence management
- safety case maintenance
- capability upgrade or insertion
- bespoke or specific training to augment Royal Navy supplied training

There is a well-established relationship between industry partners and UK MOD on the boundaries of decision rights between Technical and Approving Authorities. These arrangements are not universal and early conversations need to be held to understand the second buyer's organisational structure for approval of design change.

The combination of buying a well-prepared vessel alongside contracting a long-term support partner(s) allows the new owner an optimal lower risk solution to meet their immediate and future operational needs.

## 3. **Transfer of Title and transition into new ownership**

To transfer the ownership title of the new vessel(s) and take safe possession of the asset, the new owner will often undertake a period of Royal Navy training to safely move onboard and then continue training to bring the ship's company to full operational capability. This is a very similar process to that followed by the Royal Navy with a notable exception. When a Royal Navy crew regenerates following a docked maintenance period, many of the Officers and Senior Ratings will already have significant experience of the vessel and its systems. However, the new crew, however seasoned, will not have that experience.

<sup>3</sup> For example, in 2023 HMS Iron Duke re-joined the RN fleet having completed a 1.7-million-hour life extension refit including 1700 hull inserts.

<sup>4</sup> Defence Equipment Sales Authority (DESA) is an organisation within the UK Ministry of Defence that is responsible for managing the sale and transfer of surplus UK Armed Forces military equipment to customers through UK Government contracts.

Bringing a recently refitted vessel and a brand-new crew to full operational state in parallel means that the transition from Government-to-Government support to Government-to-Industry is not straightforward. Many defects are likely to manifest. Some will be extant defects – where the UK MOD has liability. Some will be crew errors – where the new owner has liability. Some will be extremely difficult to categorise. The new owner's supply chain will be in its infancy and there may be added reliance on UK MOD spares support.

The new owner may have differing processes around the management of key safety critical items such as pressure vessels, hoses, lifting equipment and tag out. This can introduce risk during maintenance and repairs that needs to be carefully managed. Also, the reporting and management systems are in transition. The Royal Navy has a well-established mechanism for reporting and managing defects. The new owner may have something similar. Both are in play in parallel and the industry partner has a significant challenge to ensure that defect rectification is prioritised and managed.

This transition period can last many months and requires significant effort from everyone involved.

## **4. Through-life support**

Though described here as a separate entity, much of the planning and detail for through-life support occurs during the sales and transition stages.

One of the biggest challenges that occurs when supporting a new owner comes from moving from a support base that has been established for classes of ships and classes of systems and equipment. Much of the historic support analysis and infrastructure is predicated on higher numbers of ships, pan-class systems and different operational profiles. The new owner needs to generate the right level of through-life support which almost certainly is not a straight read across of the UK model. There are different levels of support available from a basic maintenance as a service package, through technical delivery and assurance, capability transfer and up to true long-term partnering.

### **4.1 Configuration baseline**

As part of the sales agreement, the new owner will receive much of the information in a configuration baseline containing drawings, specifications, manuals, together with the planned maintenance information held in the maintenance management system (MMS).

The first task is to identify suitable replacements for the UK MOD toolsets holding the configuration baseline information. For example, the ability to input and extract data, visibility of content to all stakeholders, and functionality which complements the tempo of the operational programme. Maintaining configuration control will also require a master database providing the ability to replicate from ship to shore. The information may require redacting to remove UK classified information before any handover. There are also the challenges of the original information being in the English language which may need to be translated.

With older assets the configuration baseline and data are unlikely to match the quality and availability of a more recent, digitally enabled platform. With data existing in legacy systems, spreadsheets and PDFs can be a challenge to a new owner and one where a long-term support partner can help correlate and navigate through the data and information to meet the new owners needs and processes.

### **4.2 Spares support**

One of the most challenging areas to address for new owners is spares support. During its life with the Royal Navy, a warship will have been subject to a combination of support philosophies. Systems and equipment will have been supported through a combination of traditional pan-class equipment authority mechanisms, class managed equipment and contractor logistic support. There may have been lifetime spares buys to offset obsolescence and an effective reverse supply chain in place to repair obsolescent elements.

Some elements may have been managed for many years through a combination of reverse supply chain and moving difficult to obtain items from ship to ship (STOROB<sup>5</sup>). This is particularly prevalent during a period between the RN decommissioning date and the future sale. Despite measures to protect the onboard equipment after decommissioning, this is regularly challenged depending on the operational need for the remaining RN platforms. Reaching a decommissioning date sometimes also triggers cancellation of outstanding support requests which needs clear communication with equipment authorities to avoid or resolve.

When platforms are decommissioned all perishable and consumable items are removed and placed within the lay apart facilities in the dockyard. Due to the potential for an extended duration between decommissioning and

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<sup>5</sup> STOROB (Stores Robbery) is the process of removing materiel from one unit to satisfy the operational priority needs of another.

sale the consumable items benefit from an asset tracking solution such as RFID or barcode scanning to ensure items are not misplaced.

The supply chain for a Royal Navy warship is as complex as the warship itself and is supported by a logistics system developed to ensure that the spares are stored and made available wherever and whenever. The new owner is unlikely to have access to the UK MOD supply chain and logistics system and must, at the beginning of their in-service support phase, rely on their chosen industry support partner to recommend (and often provide) a full suite of onboard and base spares matched to the new operating profile.

This spares recommendation must look at the combination of requirements for:

- planned maintenance – to support all levels of maintenance.
- onboard spares – an optimised, data driven allowance of spares.
- mission critical spares including those that are legislatively required.
- operational defect support spares – focussed on known system fragility but balanced with those with long lead times that would impact operations.
- replenishment stock – base held spares that match the supply chain drivers and analysis derived usage rates.
- consumables.

To provide the above recommendations requires a three-stage approach.

1. Data gathering and verification using historical usage data noting the original Royal Navy operational programme could be significantly different to the concept of use defined by the second owner.
2. Data optimisation which requires a specialised toolset to forecast inventory demands and therefore reduce cost by optimising the stock holding. The Red Cube toolset used by Babcock performs this analysis based on the cost of the item, past demand quantity and lead time to quantify and minimise risk in the stock holding.
3. Holding a technical review when the second owner brings in their lived experience over platforms in their own navy and any budget constraints when before endorsing the spares list.

### 4.3 *Maintenance delivery*

The next element to consider is the delivery of both planned maintenance and defects by the shipyard and industry partners to augment maintainer delivered maintenance/repair. As part of designing and delivering a through-life support package, it will be necessary to find and develop the capability of local shipyard(s) and understand requirement for OEM presence in-country, noting some will have wide global presence, whilst others may need to plan to fly forward field service engineers. There will be the need to balance a physical presence in-country with the back-up of deep subject matter expertise held in the UK.

Selecting a local shipyard partner requires a high level of diligence to ensure they have not only the required engineering capability, but also the long-term commercial viability, safety legal and regulatory procedures. The new shipyard will almost certainly not have the in-depth knowledge of supporting that particular class of ship that incumbent UK shipyards have built up during the service life of the vessels. This presents a challenge as the maintenance procedure documentation may not be fully up to a standard required to simply pass through with confidence to the new shipyard. In the early years, there will be a need to supplement documentation, together with undertaking knowledge transfer and augmenting oversight with UK expertise.

The aim is to upskill local shipyards over an initial support period (say 3 – 5 years) to a point of self-sufficiency. This is only achieved where the initial support solution is designed for capability transfer and partnering.

The supply chain that has been relied upon to obtain planned maintenance spares at short notice when the bill of materials data is incomplete or out of date will be absent and much more rigour in data management and supply chain planning is required.

One of the most common aspects of managing planned maintenance on older vessels is the need for flexibility in the emergent repair work that inevitably comes. This is often at odds with the new owner's perception of what they are buying, and the needs of a fixed/firm support contract arrangement common in early relationships with a new customer. It is not without reason that the UK has evolved a more industry partnership approach to complex warship support, but this is often unpalatable to a new customer. Mechanisms need to be in place to deal with this emergent work in a timely manner to avoid significant maintenance period overruns.

Owner surveys and assessments to support maintenance planning also require the deployment of UK expertise to help transfer the knowledge of key areas of fragility to the new owner. It is vital to pre-plan defect repairs early enough to ensure the spares, expertise and contract cover is in place to affect the repair at the right time. There can be far less reliance on reacting to emergent defects, especially during the early years of the new support arrangements.

The same is also true for operational defect repairs. Often, diagnosing and then planning for defect repair will need to be done at reach by UK expertise. This presents significant challenges and will require a digitally enabled and agile workforce to gather information, analysis and provide informed technical recommendations.

This is an area where there is a noticeable void left from the loss of the UK MOD support tools. when the vessel is transferred. Vessel information and materiel state data may not be fed back to the industry partner due to a lack of customer furnished tools. Allowing the new customer to contribute information into the selected digital application while operating the same ships but in a different manner needs to be considered when it comes to maintenance planning, stores/inventory management and configuration baselines.

In the long term, planned maintenance and defect repair settles into business as usual. However, during the early ownership phase, the industry support partner is required to go above and beyond to help the new owner build up the knowledge, experience and expertise required.

#### **4.4 *Capability insertion and upgrade***

When handing over ownership of a complex warship one of the primary tasks is to ensure that a comprehensive design pack is available at the point of purchase. This is likely to require an additional screening survey prior to sale to provide assurance of the accuracy of the information being provided. The pack will also need to redact any sensitive information held by the UK RN that is not appropriate for a foreign navy and a series of test forms to allow future capability upgrades.

Future design changes are likely to take a more commercial approach to the process. The drivers for design change through a Systems Engineering requirements-based approach should be encouraged if not already in place. It is critical that prior to any work commencing the design approach is outlined and endorsed by the customer which include the criteria of acceptability, referenced standards, assumptions, and applicability. Clear roles and accountabilities should also be established with any delegation recorded, as it may not be the traditional role of a government organisation holding Design Authority. During the development of the design pack, third party involvement should be encouraged at each of the gate reviews to provide independent assurance of the output.

For embodiment of design changes careful management will be required to maintain the configuration baseline of the platform. The procedure of recording design deviations and defects should be clearly stated within a wider Engineering Management Plan (EMP). Depending on the arrangement with the second owner it may also be beneficial to widen the scope of the EMP to include not only the technical output from the team but also the production practices for acceptance of spares, embodiment, commissioning, and any subsequent trials. Maintaining the configuration baseline is also important to support future certification surveys. In the UK these would be undertaken by the Naval Authority Group or delegated to an independent assurance organisation such as Lloyds Register. Understanding the cycle of these surveys with the second owner will be required to understand both defect reporting and delegated responsibilities. An offering of a steady state training package to familiarise the operators and maintainers on new or existing equipment and systems should also be considered.

#### **4.5 *Building the team***

Working collaboratively is critical to ensure a successful transfer of title and handover of a platform to the new crew. The first obstacle to overcome is the potential language barrier between the industry provider and the second owner, particularly technical language. Translators can assist but caution should be noted that any responses could be misinterpreted without themselves having a technical background. A more enduring approach is to develop a relationship with the senior crew members who have a good grasp of the English language to cascade the message. Depending on the cycle of crew changes on the platform multiple relationships may be required with this approach.

#### **4.6 *Cultural approaches to tolerating and managing risk***

Cultural differences between the two parties should be acknowledged. When the customer is initially seen as abrupt or confrontational, this is from a UK viewpoint and therefore cultural guidance should be provided to prevent any offence due to a false impression. Another cultural difference could be their level of uncertainty avoidance and reluctance to devolve accountability for decision making. This should be respected even if it takes longer than expected for decisions to be granted.

The second owners view on risk appetite with regards to safety is an aspect of the handover which cannot be compromised, and a baseline UK threshold should be communicated and maintained. This is to ensure the

platform is safe for members of the crew, the industry participant employees and RN personnel who are going onboard to support the handover. A safe systems of work approach should be demonstrated to a UK standard.

Although the safety protocols are about audit and adherence, other aspects of the technical handover are about informal mentoring and support. A presence on the platform to share best practice should be encouraged and it also helps build the working relationships between industry and the new crew. This underlines the importance of the industry partner team having existing knowledge and experience of the platforms. This knowledge should be shared internally within junior members of the team and codified in business processes to provide team resilience and development.

## **5. Conclusion**

Initially, continuing through-life support as vessels transition to new owners may appear straightforward. In reality, this transition is fraught with potential pitfalls and needs to be carefully planned and managed to ensure the requirements of the new customer are met. A combination of people, process and technology must be considered to provide a value for money solution that gives the new owner the operational capability required.

A well prepared and presented asset, supported during its transition to the new owner and underpinned with a through-life support solution from experienced industry partners maintains the UK's reputation as a supplier of choice for ex-Royal Navy platforms.

## **6. References**

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