LESSONS LEARNT FROM MANAGING ACQUISITION OF PRE-OWNED NAVAL PLATFORMS

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ABSTRACT

Acquisition of pre-owned military platforms can be a cost-effective solution to meet operational requirements but it also poses significant challenges. Besides typical project management and engineering management issues, acquisition of pre-owned military platforms also comes with some unique challenges.

While these issues can be partially mitigated through a well-crafted contract and close supervision during the acquisition, the challenge comes in handling the unexpected and resolving them swiftly in order not to impact the project schedule adversely. This article provides some insights into the challenges faced and suggests possible measures that can be used to refine the existing framework for the acquisition of pre-owned platforms.

Keywords: lessons learnt, military acquisition, pre-owned, life cycle management framework, challenges

INTRODUCTION

Pre-owned military platforms are opportunity buys that can be brought into service rapidly and cost effectively. Compared to the long lead time required to design, build and test new military platforms, pre-owned platforms typically only require country-specific modifications and refurbishment and therefore can be inducted into service in a short time. Such acquisitions are not new to the Singapore Armed Forces (SAF). In the formative years, pre-owned platforms such as the County-class Landing Ship Tanks, AMX13 light tanks and A4 Skyhawks allowed the SAF to build up military capabilities which are required urgently, in a quick and cost-effective manner. While the SAF has evolved over the years and many new systems have been acquired, the advantage offered by opportune pre-owned military platforms has not been completely dismissed. This is clearly demonstrated by the acquisition of the Challenger-class submarines as well as the Leopard 2 tanks in recent years.

This article draws from the experiences gained from managing the various pre-owned acquisition projects over the years. It attempts to share insights into the challenges faced and lessons learnt, which can in turn be used to refine the existing framework for acquisition management.

FRAMEWORK FOR ACQUIRING DEFENCE SYSTEMS

Over the years, the Ministry of Defence has developed a structured approach to manage the life cycle of defence systems. The framework, illustrated in Figure 1 (Ministry of Defence, 2012), serves to guide the management of systems through the system's life cycle. The framework has been useful in the management of new systems and capabilities.

While the process for the acquisition of new build military platforms is well defined and the challenges understood, the same cannot be said of the acquisition of pre-owned military platforms. Being opportunistic buys, such acquisition projects of pre-owned platforms tend to be ad-hoc purchases. They also come with unique project management and technical challenges that are different from new build acquisitions. As such, the existing framework can be adapted to better reflect the unique challenges of such acquisitions.

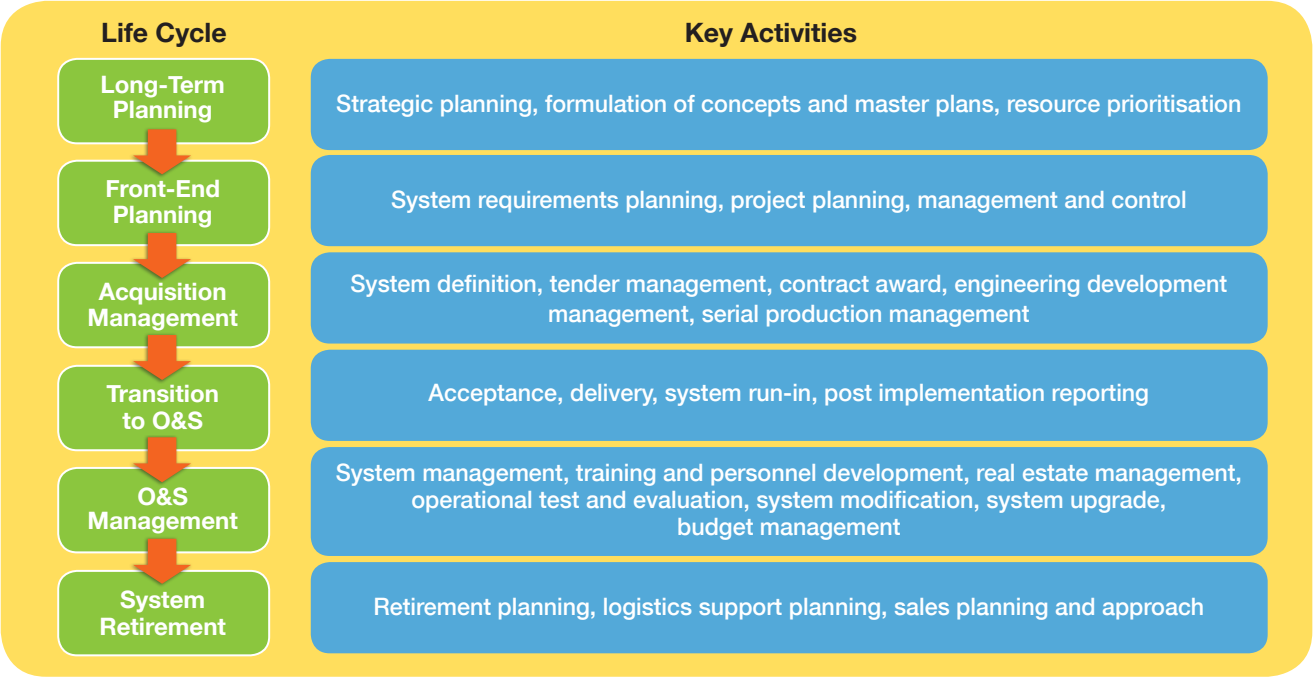

Figure 1. Life cycle management framework

UNIQUE CHALLENGES IN ACQUISITION OF PRE-OWNED PLATFORMS

Time pressure to conclude opportunistic acquisitions usually leaves the project team with little time to examine the state of the component systems on board the platforms thoroughly and properly, look out for defects or to validate the prevailing performance of the systems before contractual commitment. Without in-depth system knowledge, the project team will also face difficulty in specifying the modification and upgrades required to customise the platform for the new intended usage. As a result, besides the usual project management and technical issues associated with military acquisition, pre-owned military platform acquisition will also include the following unique challenges:

a) dealing with uncertainty in material condition
b) handling existing systems
c) managing the configuration control
d) dealing with obsolescence
e) implementing new systems
f) managing differences in standards
g) managing documentation
h) building relationships with the host country's armed forces

DEALING WITH UNCERTAINTY IN MATERIAL CONDITION

Normally, the material condition of pre-owned platforms cannot be fully ascertained prior to acquisition as it is not possible to strip the entire platform down to its component level. As it is impractical and too costly to order a complete overhaul and renewal of every component, it is not unusual to adopt the existing refurbishment scope of work of the host country since the project team may not be equipped with sufficient knowledge to specify the required scope of refurbishment accurately.

However, adopting existing maintenance scope of work is inadequate. It is not unusual for the existing owner to drop selective scope of work for overhaul to manage cost and availability. This is usually an acceptable practice for the existing owner since the platform's original equipment manufacturer (OEM) is able to provide timely support when defects occur due to their close proximity with their armed forces. The same would probably not be valid for the new owners of the pre-owned platforms as the OEM is most likely located at extended distances and thus unable to provide the required repair at short notice. In this case, there is a need to perform the additional overhaul scope of work not normally performed during the refurbishment, especially for safety critical systems, to mitigate potential future availability issues due to component failure. The additional scope of work would

be next to impossible to establish at such short notice under a normal contract situation.

Poor material conditions are picked up typically through close supervision of the refurbishment process. The presence of an on-site supervision team, otherwise known as the Resident Programme Office, enables the prompt identification of defects over the course of the refurbishment phase and helps to mitigate potential schedule delays. In addition, the availability of a fast-track process[1] will greatly facilitate the project team's engagement with the OEM to resolve issues expeditiously. The boundaries of such a fast-track process would have to be defined during the acquisition management phase of the system's life cycle.

HANDLING EXISTING SYSTEMS

Besides being unable to ascertain the exact material conditions of existing components, the project team would also likely be hard-pressed to provide the detailed modification and upgrade required to convert the pre-owned platforms to suit local needs due to insufficient system knowledge. Likely shortfalls will occur in areas such as adaptation to local conditions (different environmental conditions), safety (due to differing workflows and safety tolerances), monitoring system (different operating philosophies), host country laws and regulations. Additional modifications not included within the original scope of work will likely incur substantial cost and adversely impact the schedule especially if identified late in the project management when design has been finalised. To mitigate such issues, a checklist of potential modifications would be helpful. Such a list would be accumulated over time drawing from the lessons learnt from similar projects. The applicability and critical level of each lesson would have to be assessed during the front-end planning phase.

Another likely issue on existing systems relates to the performance of the pre-owned platform and the onboard system. While the refurbishment and upgrade would have rejuvenated and extended the service life of the pre-owned platforms, it is not realistic to expect the pre-owned platform and the onboard system to perform to the originally specified performance. This is especially so for electromechanical systems. In the event where the existing or modified system fails to meet specific performance requirements, disputes would arise between the OEM and the project team on the acceptability of the performance demonstrated and whether additional modification would be required to improve the performance. The resulting cost and impact on schedule would be another point of contention. To handle such issues, it is important to provide acceptable tolerance to handle the likely deterioration of performance due to ageing as well as a mechanism in the contract to handle the liability and responsibility in the event of such an occurrence. The mechanism should include cost-sharing formulae to handle situations where additional modifications of existing systems are required. Such a mechanism would have to be proposed during the acquisition management phase to gain the OEM's acceptance on the cost-sharing approach prior to contract signing.

MANAGING THE CONFIGURATION MANAGEMENT

Over the course of the project, it is not uncommon to note discrepancies between the documented information[2] and the physical configuration found on board the platforms. The most common observations are missing components, from items as minor as cable tags to major items like sub-assemblies as well as the mismatch between the actual component and its description as stated in the technical manuals (e.g. normal nuts were used instead of self-locking nuts). It is common to discover additional components fitted but not reflected in drawings (typical items are electrical sockets and storage boxes) as well as electrical connections in the drawings differing from physical connections on board. It is also possible to note discrepancies in configuration between different platforms of the same class (such as additional structural fittings, elbows and extensions on various piping). Ad-hoc corrective actions will be required to manage such discrepancies or to document the non-conformity.

Other than inaccurate configuration, it is also likely that the text on the labels, tags, gauges, instructions and warning signs are written in the language of the host country. Such a configuration could pose a dilemma. Enforcing blanket changes to English text would likely incur a substantial cost, bearing in mind that the related documentation such as drawings and technical manuals will need to be updated as well. In many cases, trade-offs will be necessary to achieve the right balance between operational efficiency/safety and cost effectiveness. Based on experience, all text with safety implications (such as warning signs, operational instructions and push buttons) should be replaced to reduce the likelihood of human error during operations. This would have to be imposed on the OEM during the acquisition management phase.

Unfortunately, it is impractical and impossible to identify all the text that need to be changed at contract signing. Hence,

the remaining[3] configuration issues would have to be resolved during the project implementation.

Since many configuration issues cannot be fully anticipated, it is necessary to set aside adequate budget to update the configuration to reflect actual conditions, and without compromising safety.

DEALING WITH OBSOLESCENCE

Equipment obsolescence is a key requirement to be addressed to ensure supportability and maintainability post-delivery. This is especially critical when the pre-owned platforms are expected to be supported for an additional service life of greater than 10 years. It is important to demand that the OEM provide evidence during the acquisition management phase to identify potential obsolescence issues upfront. It is also important to continue to keep a close watch during the refurbishment or upgrade to identify further occurrences of potential obsolescence and resolve them promptly. Solutions to overcome obsolescence include the following:

a) acquire the remaining spares
b) contract the OEM for extended maintenance agreement/ warranty
c) source for third party maintenance and supply support
d) redesign/replace/upgrade the existing components/ systems

To mitigate potential schedule delay, it is necessary to purchase the remaining available spares to ensure at least short-term supportability while efforts are taken to review the feasibility of options (b) to (d). Redesign and upgrade of obsolete components/systems are usually undertaken after a proper cost-effectiveness study is conducted since it will typically incur substantial cost and impact on schedule. Nevertheless, option (d) may be necessary during the course of the project implementation and it will therefore be important to address, if possible, how to manage such obsolescence issues in the contract.

IMPLEMENTING NEW SYSTEMS

To meet the operational demands, there could be requirements to implement and integrate new systems to the pre-owned platforms. This is especially true for combat systems which typically need to be replaced in order to meet unique operational demands or to manage obsolescence due to rapid advancement of technology. The typical problem associated with implementation of new systems, especially electronic systems, relates to the compatibility of the new systems with the existing services and support systems such as electrical power supply, hydraulic system and cooling system. In many cases, there may be insufficient electrical power, cooling capacity or hydraulic supply to support the system or the quality of the power supply may not meet the demands of the new electronic systems. The existing foundation may also be incompatible and require redesign. Therefore it is necessary to factor in the required upgrade to the foundation, the power supply and the supporting systems during the front-end planning phase to prevent costly modifications late in the projects.

MANAGING DIFFERENCES IN STANDARDS

Due to differences in the design standards between the pre-owned platform and the new systems such as electromagnetic compatibility and/or quality of power supply, issues such as interference and performance degradation can arise. To mitigate such issues, it is important to ensure that the new systems to be installed are sufficiently robust so that they do not become a source of interference or become affected by the existing equipment or system. However, such issues are difficult to identify beforehand and it is therefore necessary to cater for interoperability tests. This is to check for equipment interference so that corrective actions can be taken promptly.

For pre-owned platforms, the safety standards that were adopted back then to design the platform could be legacy standards that are probably obsolete and/or superseded by newer and more stringent standards. Therefore, efforts may be required to ascertain the gap between the legacy standards and the new benchmarks in areas such as explosives, system and workplace or occupational safety in order to identify corrective actions that can be implemented during the project phase. Such efforts have to be undertaken in the early phase of the project in order to prevent excessive cost and impact on schedule as a result of last minute modifications. In some instances, there may be no viable solutions available and residual risks will have to be managed via procedures.

MANAGING DOCUMENTATION

Similar to the configuration issue, much existing documentation would have been written in the language of the host country. Concise and precise translation of the documentation will be necessary to ensure effective operation and support in the future. Such translation may not impact the project schedule

but is nevertheless a costly affair which needs to be budgeted adequately.

BUILDING RELATIONSHIPS WITH THE HOST COUNTRY'S ARMED FORCES

With acquisition of pre-owned platforms involving two countries, it is pertinent to foster good relationships between the armed forces of both countries to promote the sharing of experiences and lessons learnt. In many cases, support like trial assets and safety clearances from the host country's armed forces would also be required during the acceptance trials for the pre-owned platforms. Interactions between the armed forces would also improve understanding of each other's culture and facilitate planning and discussions during the testing phase.

REFINING EXISTING FRAMEWORK

Drawing from the lessons learnt, it can be seen that the existing framework would need to be adapted to better serve the needs of managing the acquisition of pre-owned military platforms. Proposals to refine the framework are outlined in Table 1.

Life Cycle	Adaptations to Activities
Long-Term Planning	As part of the long-term planning process, the feasibility of using pre-owned platforms to meet the capability requirements should be explored.
Front-End Planning	With the acquisition of pre-owned platforms being opportunistic, the front-end planning cycle will be short. Typically, it consists of a quick assessment of the suitability of the pre-owned platform to meet the capability requirements. Project planning and control are difficult due to a lack of information. Multiple iterations with the OEM or foreign government will be needed to distil the information required for decision making. Bearing in mind the challenges highlighted, generous budget provisions and contingency planning are essential. It is also important at this stage to set the key performance requirements and acceptance criteria in order to facilitate downstream acceptance and transition to Operations and Support (O&S).
Acquisition Management	Other than the standard acquisition activities, it is critical at this stage to address the management of obsolescence and configuration prior to contract award. Emphasis should be placed on identifying potential obsolescence issues in order to secure the remaining available spares or initiate alternative options to overcome obsolescence. Configuration and documentation updates should also be imposed on safety critical systems to ensure operational efficiency and safety while maintaining cost effectiveness. Due to uncertainty in material condition, additional works would be required over the course of the refurbishment or upgrade. Setting up fast-track processes and cost-sharing mechanisms are critical to allow smooth project implementation.
Transition to O&S	Besides the normal challenges, the transition to O&S for pre-owned platforms will be hampered by obsolescence issues. It is therefore important to set realistic targets for obsolescence while not hampering transition to O&S.
O&S Management	No difference from new acquisitions.
System Retirement	No difference from new acquisitions.

Table 1. Proposed adaptations to the framework

CONCLUSION

While the insights shared in this article were derived largely from the experience of acquisition management of pre-owned naval platforms, the lessons learnt and the proposed adaptations to the acquisition framework are applicable to pre-owned land or air platforms as well. This acquisition approach remains pertinent in today's context as it enables new capabilities to be introduced into service rapidly and cost effectively. Awareness of past lessons learnt will help shorten the learning curve, placing project teams in a better position to handle the unexpected and resolve challenges swiftly to deliver capabilities to the SAF in good time.

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ENDNOTES

1 Such a process could set aside a predetermined amount from the approved budget with authority being delegated to the project team to give the go-ahead for unplanned scope of work identified by the Resident Programme Office.

2 Documented information includes system schematics, construction drawings and technical manuals.

3 Configuration issues without safety implications.

BIOGRAPHY

CHEAH Yew Jin is a Senior Engineer (Naval Systems) managing the platform systems for submarine programmes. He was posted to Sweden for the Archer-class submarine project for two years. Upon his return, he managed the technical operationalisation of submarines which led to the timely commissioning of the RSS ARCHER. Yew Jin graduated with a Bachelor of Engineering (Mechanical Engineering) degree with Second Class Honours from the National University of Singapore in 2007.

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