STUDY INTO THE BUSINESS OF SUSTAINING AUSTRALIA'S STRATEGIC COLLINS CLASS SUBMARINE CAPABILITY

Progress review – March 2014

Issued by Mr John Coles

Review Team
John Coles
Paul Greenfield
Arthur Fisher
Steve Davies

Ministerial and Executive Coordination and Communication Division

Defence

Russell Offices, R1-G-C052

Canberra ACT 2600

Contents

Foreword

My November 2012 Report made a number of recommendations to transform the availability of the Collins Class submarines from one that was seriously underperforming to one that could achieve a level of availability that matched the International Benchmark. The Commonwealth subsequently developed and implemented a comprehensive Transformation Plan in conjunction with its Submarine Enterprise partners to enable, deliver and sustain benchmark performance. Achieving benchmark availability will enable at least three of the six submarines to be materially available for sea at all times, of which two must be materially capable for deployment.

This progress review is an independent 'snap shot' of the performance achieved by March 2014 by the Enterprise, and an evidenced based assessment of the progress towards the benchmark in FY17 and the ability to deliver that level of output until end of service life.

Submarine availability has improved significantly with the submarine force currently achieving usually two and frequently three submarines materially available on any one day. This steady and measured improvement has provided the opportunity for three submarines to be deployed simultaneously at great distances from their home port during 2013, thus stress testing the robustness of the improving logistical support arrangements.

Progress towards achieving benchmark performance is equally impressive. From mid-2014 none of the Collins Class submarines will be in the old 8+3 operating cycle and are progressively moving into the new 10+2 operating cycle of 10 years in-service followed by a two-year Full Cycle Docking (FCD). This change to the operating cycle is a pre-requisite to reach and maintain benchmark availability. Once in the 10+2 Usage and Upkeep Cycle (UUC) steady state, time in maintenance will significantly reduce. To achieve this, planned maintenance is being comprehensively restructured, whilst ensuring that the design intent of the submarines is assured. The two-year FCD requires compressing the previous overhaul time by a factor of nearly two.

The first two-year FCD commences in July 2014 and preparations are well advanced. New facilities projects funded by the ASC, improved working practices and maintenance and material supply routines are collectively designed to deliver the required efficiency improvements. The capital projects are nearing completion and some process improvements have been trialled and verified on extant programs.

I have no doubt the two-year FCD should be able to be achieved, and note that the right initiatives to achieve it are being undertaken, but many are untried. There remains more than routine risk to be managed to achieve HMAS Farncomb's scheduled end date.

The availability of parts and the more timely execution of maintenance and repair activities at sea, at HMAS Stirling and at the ASC's WA facilities have delivered the improved level of availability observed. This has been achieved by reducing the time taken to rectify defects, and shorter-term planned maintenance periods now delivering on time. Much of the improvement can be attributed to closer working relationships between Submarine Force (SUBFOR), ASC and DMO staff – the Enterprise at work.

The achievement of the 25 recommendations in my Study and the supporting initiatives in the Enterprise's Transformation Plan will collectively deliver benchmark availability and sustain that performance. They reach into every corner of Defence and Industry covering all aspects of often complex and interdependent processes and activities. So far most of these recommendations and initiatives have been directed at enabling and delivering the short and medium-term functions.

However, the transformation program has yet to deal with the more enduring and challenging tasks to sustain benchmark availability; the transformation is not yet at the half way mark. Such a transformation is not a sprint it is a marathon. Only by embedding all the new arrangements at every level in every domain will enduring success be achieved.

There are a number of transformation activities, which put the program at some risk; one potentially puts it at serious risk. Recommendation 21 was "to develop a workforce strategy to specifically address skill shortages at the management level". It applied in equal measure to all parts of the Enterprise aligned with the new roles and responsibilities. The ASC has a workforce plan and we have seen evidence of implementation; the RAN has a number of plans, some of which have borne fruit, although progress towards a fifth crew is dependent on increased submarine availability and approval for the headcount increase; and the DMO needs to change its workforce the most, but is held back by the lack of flexibility in managing its workforce and does not have a plan of substance.

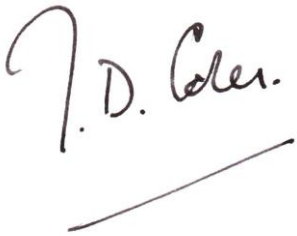
The Enterprise has rightly been focused on delivering the output and rather less on efficiency. This is understandable given the depths to which submarine availability had plunged. When availability reaches benchmark performance efficiency should be given far greater attention. Under the In-Service Support Contract, ASC will move from the benign transition period to one incentivised for performance (and in time efficiency) with commensurate risk and reward. There has been ample time to prepare for such a contract change and all parties should seize the opportunity.

It was all too clear to me that the lack of suitably qualified experienced personnel in the DMO to operate within and fulfil their role in an output focused Enterprise, may stall or even reverse the achievement of benchmark availability. It would be an astonishing outcome if the inability to sustain the knowledge and energy now evident in the Collins Class Transformation Program were to lead to its undoing – particularly given there is every indication benchmark performance could be achieved at a lower long-term cost with reduced DMO project oversight. This problem needs to be addressed urgently.

In summary, I have seen a lot to be admired in what is a remarkable transformation. Much has been achieved in a very short time, leading to improved availability which is on track to reach the International Benchmark in FY17. Ensuring personnel with the required skill sets in the breadth and depth necessary for Defence to discharge its more limited but essential roles and responsibilities is the most likely cause for the Transformation Program to falter or even fail.

What has been achieved to date is remarkable, delivering a level of performance that would not have been viewed as possible two years ago. It has been an enormous pleasure to observe the astonishing turnaround of a seriously failing project to one that should, within just two years, achieve or better International Benchmark performance. This has been

achieved with decisive leadership that has provided a clear direction of travel, clarity of roles and responsibilities, and empowered those charged within Industry and the Commonwealth to deliver the program. They have all risen to and above the challenge, releasing the latent talent and dormant energy and directing it to achieve the common goal.



John Coles CB, FREng.

March 2014

Acknowledgements:

My thanks and gratitude to Arthur Fisher, Paul Greenfield and Steve Davies who as members of my Review Team together with Michael Spark from Deloitte (Australia) undertook most of the detailed analysis during this study and subsequent synthesis necessary to compile this Report. Jonathan Woodman and Samantha Tait from BMT Design & Technology and Bob Platfoot from Covaris provided excellent support throughout I could not have carried out my Review without the co-operation of the many Commonwealth and ASC staff at HMAS Stirling, ASC in SA and WA, and the DMO staff at all sites.

Executive Summary

This report revisits the sustainment environment 15 months on from our November 2012 Report to gauge progress along the transformation path.

Previous phases of the Study were necessarily focused on the past much more than the future. The approach taken in this report is more forward-looking. It recognises that the sustainment business has embarked on a major transformation program towards benchmark performance as recommended in the Study, and that positive results have been achieved across the Enterprise. This report therefore investigates recent and projected future performance to make an assessment against the following themes:

i. **Current Collins Class sustainment performance**
ii. **Likely trajectory towards benchmark performance**
iii. **Prospects for making the transformation enduring.**

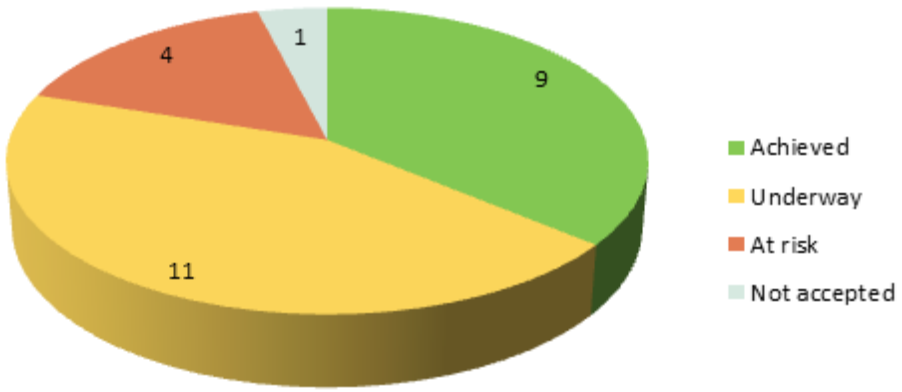
The review has also assessed progress against the 25 recommendations which we consider a necessary but not sufficient condition to achieve and then sustain benchmark performance. The Enterprise has developed a Transformation Plan to address the entirety of changes that support the transformation, including many 'tactical-level' but nevertheless important initiatives. This review has considered the 25 recommendations and the underlying factors that contribute to good practice sustainment and the results achieved so far, but it has not considered each Transformation Plan tactical initiative in detail.

Recommendation progress has been described in three broad categories:

- Implementation of the recommendation has been **completed** and the objective achieved (Green assessment)
- Implementation of the recommendation is **still underway** but is expected to meet on time the intent expressed in Phase 3 (Amber assessment)
- Implementation of the recommendation is **at risk** (Red assessment), because the intent of the recommendation has been misinterpreted; or implementation is too slow or has not commenced.

Figure 1 illustrates the implementation progress according to these categories.

Figure 1 – Progress on implementing the 25 recommendations



i. Current Collins Class sustainment performance

Our November 2012 Report identified four international benchmarks against which the Collins Class sustainability performance could be compared:

- Availability (days)
- Planned maintenance duration (days)
- Maintenance overrun (days)
- Percentage days lost to defects when not in maintenance (%).

Submarine availability is measured in Material Ready Days (MRDs):

"A Material Ready Day (MRD) is a day when a submarine is not conducting planned maintenance and is not encumbered by defects that prevent it from proceeding to sea."

The annual MRDs achieved and the Navy's target (CN10 Product Statement) as a proportion of the International Benchmark is illustrated in Figure 2. This demonstrates that the annual MRDs for the Collins Class have been steadily increasing since FY10 and this trend has continued since the Coles Study reported in November 2012. The Navy target for MRDs allows for a measured year on year increase until the benchmark is reached in FY17. Currently the Enterprise is exceeding the Navy target.

Figure 2 – MRD performance and targets

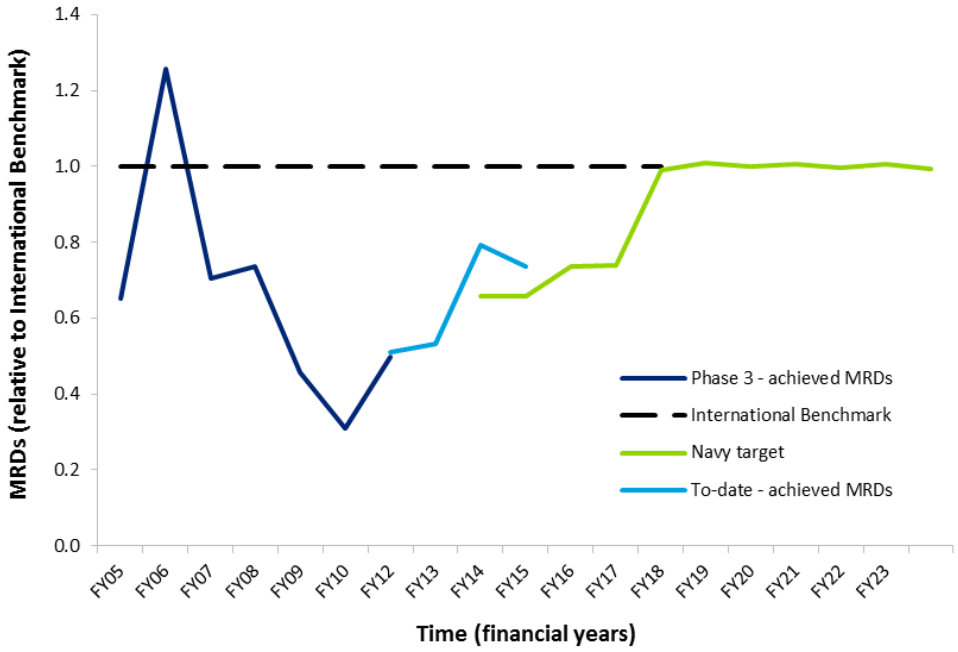
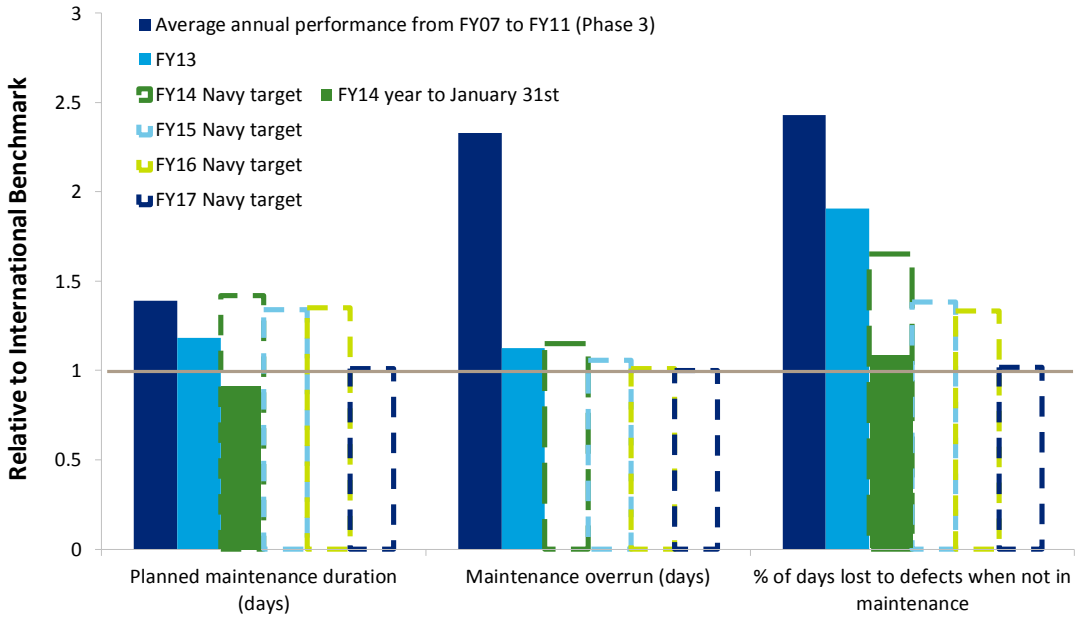


Figure 3 illustrates performance against the components of the International Benchmark which drive the overall availability performance, since our November 2012 Report. Planned maintenance duration is the time planned to be in maintenance that is shown in the extant Integrated Master Schedule (IMS), maintenance overrun is the number of days in excess of the plan that the submarines remain in maintenance, and time lost to defects is the ratio of the number of days lost to defects compared to the days the submarine is not in maintenance, expressed as a percentage.

Figure 3 – Performance against International Benchmarks



The improvements in performance shown in Figure 3 are driven by:

- **Planned maintenance** – as illustrated in our November 2012 Report the 8+3 UUC is cyclical in nature in that it contains peaks and troughs of periods of planned maintenance, with a trough in 2013. It is this that has driven the small improvement in planned maintenance performance seen in FY13
- **Maintenance overrun** – the maintenance periods conducted in WA have achieved timely completion, performing better than or very close to the benchmark consistently for the last three docking periods
- **Time lost to defects** – a reduction in number of P1 Urgent Defects (URDEFs) and the reduction in the time to repair. We suggest this improvement in repair time can be largely attributed to the timely delivery of spares to the submarine and more effective maintenance routines.

The Navy Requirement (CN10 Product Statement) for the Collins Class is to have:

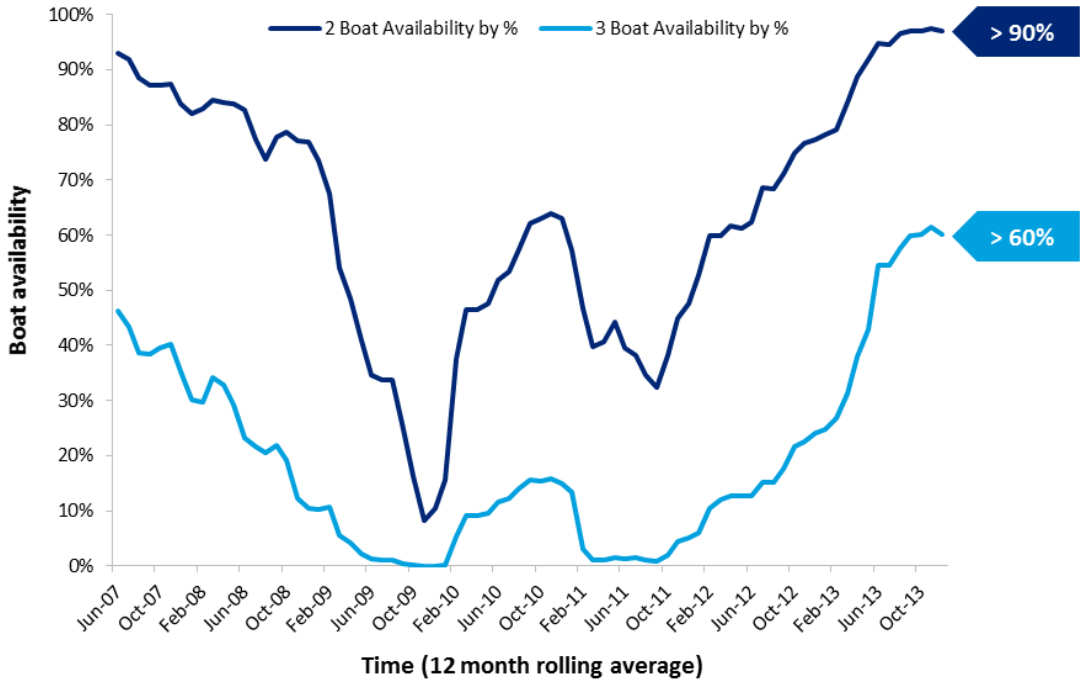
"two deployable submarines consistently available, with four submarines available to the Fleet Commander and of these four, three submarines consistently available for tasking with one in shorter term maintenance and two submarines in long term maintenance and upgrade".

The two and three submarine material availability achieved since June 2007 on a rolling annual average basis is shown in Figure 4. It shows the percentage of days that two or three submarines were materially available since FY07. Material availability of the submarines should not be confused with the deployability of the submarines as expressed in the Navy's Requirement. As well as having the submarines materially available many other features need to be in place before it is deployable, such as a trained crew.

The daily "two boat" material availability of the Collins Class was above 90% in FY07 and thereafter progressively worsened until December 2009 when two submarines were materially available less than 10% time. Two-submarine availability in June 2012 was around 60%, today it is well over 90%. As explained above, this does not mean that two Submarines were deployable for over 90% of the time.

To achieve two deployable submarines on an enduring basis it is necessary to have three submarines consistently materially available for tasking (more than 90% of the time). Whilst there have been significant improvements in three-submarine material availability to over 60% there is still some way to go to achieve the benchmark levels. The high level of material availability of three submarines is primarily necessary to train crews and work-up operational readiness to achieve two deployable submarines at all times – sustaining the Navy Requirement.

Figure 4 – Performance against Navy requirement



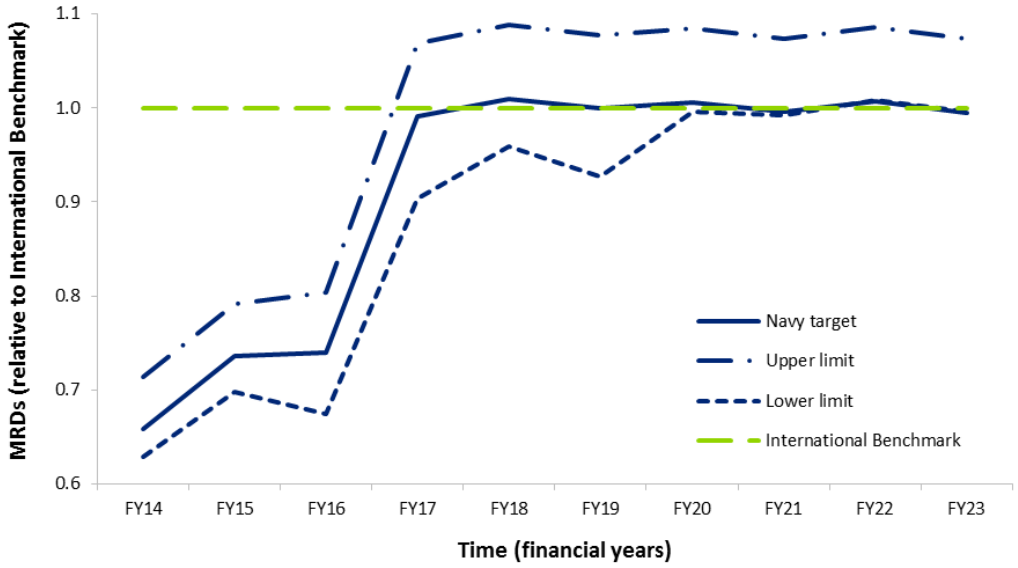
Underpinning this performance has been the completion of a number of our recommendations and good progress against some. Specifically, positive action in the following areas is assessed to have led to the improved performance:

- Better engagement by Navy as the intelligent customer setting clear requirements (Recs 2, 5, 14, 19)
- The establishment of collaborative Enterprise behaviour with clear roles (Recs 7, 9, 10, 20)
- Clear availability targets which flow down through the Material Sustainment Agreement (MSA) and IMS into the ISSC (Recs 1, 3, 13)
- Better planning processes at all levels (Rec 11)
- Far better supply support outcomes (Rec 16).

ii. The likely trajectory towards benchmark performance

We have also considered the potential trend of performance against the International Benchmark. Figure 5 shows possible upper and lower performance projections as shown by the dotted blue lines extrapolating forward to FY23. The upper projection is based on achieving (but not exceeding) the benchmark for days lost to URDEFs by FY17, the current IMS and continuing to finish maintenance periods on time (no days lost to overruns), that is a realistic 'best case'. The lower projection assumes that the current trend for days lost to URDEFs continues (benchmark achieved in FY20), that the timeliness of completion of IMAVs, IDs and MCDs is at benchmark levels and, that HMAS Farncomb's and HMAS Collins' FCD overrun by three months; something we consider to be not an unrealistic 'worst case'.

Figure 5 – Projected availability performance



Continued progress of our medium-term recommendations is necessary to maintain the momentum towards benchmark levels in the following areas:

- Continued Enterprise collaboration (Recs 4, 6, 7, 8)
- A strong asset management approach (Recs 12, 15)
- Continued improvements in planning (Recs 11, 18)
- Continued improvements in O-level maintenance (Recs 18, 23)
- Adequate staffing across the Enterprise (Recs 21, 22).

It will be important to continue the change process over the next two years and complete the medium-term recommendations that have been assessed to be on track, but not yet complete. Of concern, some of the recommendations in these areas have made little progress, putting the trajectory to benchmark at risk.

We have also assessed the Enterprise's efforts to establish a 10+2 UUC. We believe that the right initiatives to achieve a two-year FCD are being undertaken, but many are untried, so there remains more than routine risk to be managed to achieve HMAS Farncomb's scheduled end date.

iii The prospects for making the transformation enduring

Long-term continued performance is underpinned by the long-term change recommendations. Most of these have made little or no progress. Specific areas that will contribute to enduring performance are:

- Continued and broadened Enterprise collaboration (Rec 7)
- A strong and skilled workforce across the Enterprise (Recs 21, 22)
- Enabling IT systems across the Enterprise (Rec 24)
- A clear understanding of cost drivers (Rec 25).

The failure to progress the longer-term recommendations is of concern, as it is these deep changes that underpin the transformation program. Changes of this nature generally involve authorities outside the sustainment Enterprise and hence are more difficult to manage. They are vital to achieving an enduring Enterprise that does not have to rely on the heroic efforts of individuals to sustain benchmark performance.

Summary conclusions

i. The combined efforts of the Enterprise have delivered availability that exceeds Navy's current targets
ii. We believe that the right initiatives to achieve a two-year FCD are being undertaken, but many are untried, so there remains more than routine risk to be managed to achieve HMAS Farncomb's scheduled end date
iii. Benchmark performance may be delayed if reliability and obsolescence issues are not resolved
iv. The transformation is only half progressed, there are significant recommendations which are unlikely to progress without the Transformation Program Office (TPO) driving others to deliver as well as supporting when required and monitoring overall progress
v. An independent mapping of the functional competencies required within the DMO to discharge its responsibilities within an output focussed Enterprise should be undertaken. This needs to lead to the identification of any shortfalls and recruitment required and a mechanism to fill quickly any of these gaps
vi. If the Enterprise IT strategy is not progressed, the status quo will prevail and the Enterprise will not be able to drive efficiencies after benchmark availability has been achieved
vii. A sustainable and efficient Enterprise will not be established without a single Enterprise wide cost model being used to underpin financial decisions
viii. An opportunity exists to de-risk the Collins Class program by commencing the installation of outstanding capability upgrades into HMAS Collins prior to starting her two-year FCD. Not doing this threatens the ability of the Enterprise to meet Navy's requirement for two deployable submarines at all times
ix. An increased focus on cost effectiveness is necessary for enduring performance once benchmark availability performance is achieved.

1 Introduction

1.1 Background

Australia's submarines are undoubtedly one of this country's most strategically important capabilities. Collins Class submarines are sophisticated platforms that demand significant engineering and logistic support to deliver the desired capability at the required levels of reliability, availability and safety assurance.

In the past, the Collins Class came under heavy criticism for being unreliable and expensive. In 2011 the Department of Defence and the Department of Finance (represents the owner of ASC), initiated an independent study into the sustainment program supporting the submarines and to measure its performance against international best practice.

The '*Study into the business of sustaining Australia's strategic Collins Class submarine capability'* (the Study) was planned in four phases, namely:

- Phase 1: Mobilisation, scoping analysis and planning
- Phase 2: Data collection, analysis, option and implementation strategy development and interim recommendations
- Phase 3: Final report and recommendations (our November 2012 Report)
- Phase 4: Follow up review, analysis and recommendations.

From the outset it was acknowledged that the Study would not address broader support activities relating to ammunition and weapon availability, support facilities, operability of equipment, other key suppliers, submarine escape and rescue, and consumables such as fuel, lubricants, food and general supplies.

1.2 The approach to the Study

1.2.1 Phase 1

In Phase 1 of the Study, the review team visited the prime locations for submarine support in late 2011. The team conducted a series of interviews and limited investigations to determine the primary issues for further investigation in Phase 2.

In December 2011 the Phase 1 report identified the following 10 critical causes of poor sustainment performance:

- Poor availability caused by a crew shortfall, lack of spares and unreliable equipment
- Strategic leadership lacking cohesion
- Finance, DMO, Navy and Industry not acting collectively as an 'Enterprise'
- A lack of clarity of accountability, authority and responsibility
- Submarine domain knowledge thinly spread
- A lack of robustness of Navy's contribution to manning and sustainment
- DMO tending to seek direct involvement at the tactical level
- Performance based ethos yet to be embedded in the ASC
- No long-term strategic plan for efficient asset utilisation
- An unclear requirement and unrealistic goals.

1.2.2 Phase 2/3

In Phase 2 the team gathered evidence to measure performance and compare to best practice, identifying gaps and impacts. It answered the following questions:

- What is wrong now with the Collins fleet sustainment performance?
- What caused the current problems with sustainment performance?
- Will improvement initiative address these issues?
- What are the recommendations to resolve the remaining issues?

In Phase 3 the team developed international benchmarks for best practice of comparable submarine fleets worldwide, then measured the Collins Class sustainment performance against these benchmarks. The team also considered the Collins Class Service Life Evaluation Program and many other initiatives of the RAN, DMO and ASC that were underway at the time. Analysis identified 21 key issues leading to poor performance and traced them back to five root causes:

- **Unclear requirements** – that could not be translated into drivers for the sustainment program
- **Lack of a performance based ethos** – between the major parties in the Collins Class Sustainment Program (CCSP)
- **Unclear lines of responsibility** – resulting in blurred lines of accountability, duplications and gaps in responsibilities
- **Poor planning** – the lack of a clearly stated long-term strategic plan prevents accurate lower level plans and targets being established and achieved
- **Lack of a single set of accurate information to inform decision making** – means decisions are unlikely to be consistent or accurate.

The team made 25 recommendations to address these root causes.

Following the acceptance of the November 2012 Report an Implementation Strategy was developed to guide the implementation of the recommendations and supporting initiatives.

1.2.3 Phase 4

This phase reviews the progress of the Enterprise in its transformation towards benchmark performance. It is not designed to be a stand-alone document; rather, the reader should be familiar with the earlier report published in November 2012 (covering Phase 2 and 3 findings) to fully understand its context.

1.3 Approach to Phase 4

This report revisits the sustainment environment 15 months on from our November 2012 Report to gauge progress along the transformation path.

Phase 4 has been conducted by a small team over a six-week period and is by necessity a relatively high-level view of progress. The team visited Fleet Base West and the ASC facilities in WA and SA over the first half of this period gathering data and conducting initial analysis, with the remainder of the task completed in Canberra. Interviews were conducted with key personnel in the RAN, DMO, ASC and Finance.

Previous phases of the Study were necessarily focused on the past much more than the future. The approach taken in this report is more forward-looking. It recognises that the sustainment business has embarked on a major transformation program towards benchmark performance as recommended in the Study, and that positive results have been achieved across the Enterprise. This report therefore investigates recent and projected future performance to make an assessment against the following themes:

- Current Collins Class sustainment performance
- Likely trajectory towards benchmark performance
- Prospects for making the transformation enduring.

To answer these questions the team's work has broadly covered the following areas:

- The Transformation Program established to manage change
- The achieved and projected sustainment performance data
- Progress against the 25 recommendations
- Progress towards the 10+2 UUC
- Progress of reliability and obsolescence initiatives
- The balance between planned and corrective maintenance.

The current and likely future state of the Submarine Enterprise is examined under Sections 2 to 4 of this report.

The recent performance against international benchmarks is analysed at Section 2 and an assessment of the likely trajectory towards benchmark performance is made.

In Section 3 the progress against the 25 recommendations is reviewed. The impact of these recommendations on the trajectory to benchmark performance and the ability of the Enterprise to sustain enduring benchmark performance are also assessed.

A specific analysis of the move to the 10+2 UUC is at Section 4. This section discusses the importance of the 10+2 UUC to achieving benchmark performance and the risks inherent in this change. It also identifies some of the longer-term risks to enduring performance that arise from the 10+2 UUC.

In Section 5 a review of underlying value chain attributes is undertaken to make an assessment of whether the Enterprise is able to continue on its current trajectory to benchmark performance. Discussion on the overall state of the Enterprise and the team's consequent conclusions are at Section 6. The evidence base that supports the conclusions is at Annex 1.

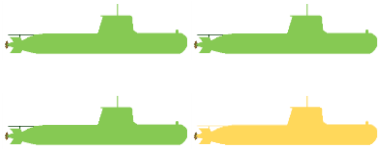
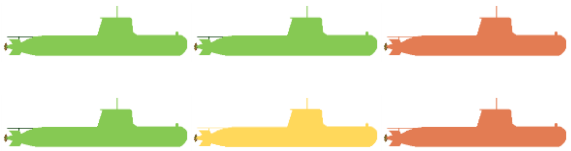
2 Current performance

2.1 Meeting the Navy Requirement

The Navy Requirement (CN10 Product Statement) for the Collins Class submarine is to have:

"two deployable submarines consistently available, with four submarines available to the Fleet Commander and of these four, three submarines consistently available for tasking with one in shorter term maintenance and two submarines in long term maintenance and upgrade" This is illustrated in Figure 6.

Figure 6 – The Navy Requirement

 Assured by…	Two deployable submarines consistently available.
 Underpinned by…	Four submarines in-service with the Fleet Commander. Three submarines consistently available for tasking, with one in shorter-term maintenance.
	Six submarines in the fleet. Two in long-term maintenance and upgrade.

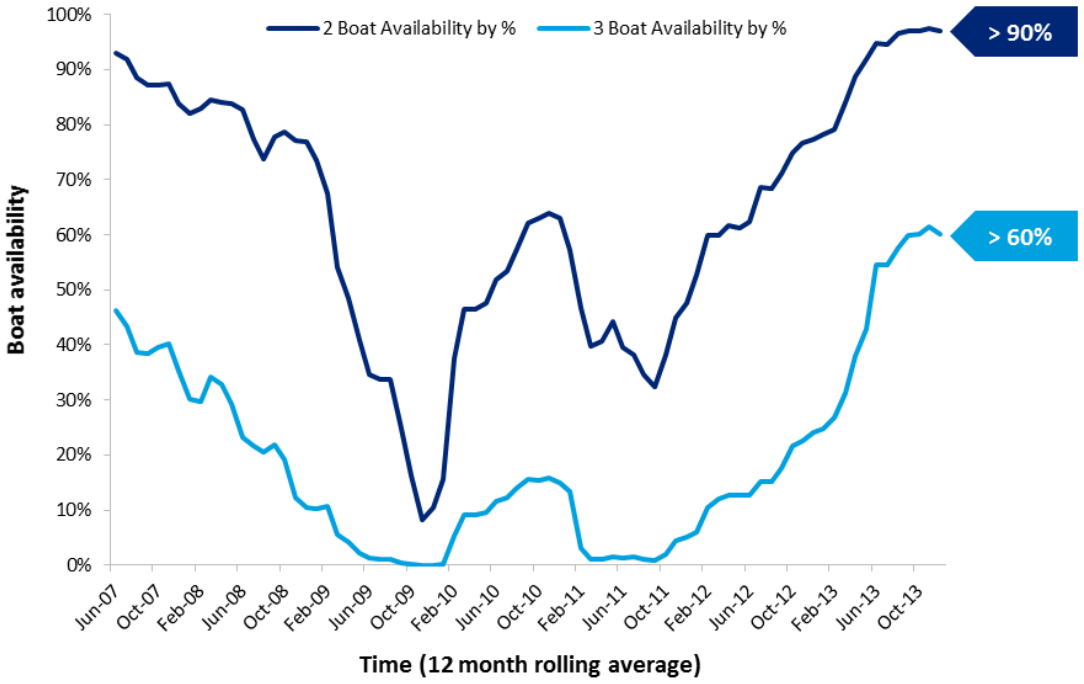
The two and three submarine material availability achieved since June 2007 on a rolling annual average basis is shown in Figure 7. It shows the percentage of days that two or three submarines were materially available since FY07. Material availability of the submarines should not be confused with the deployability of the submarines as expressed in the Navy's Requirement. As well as having the submarines available many other features need to be in place before it is deployable, such as a trained crew.

The daily "two boat" material availability of the Collins Class was above 90% in FY07 and thereafter progressively worsened until December 2009 when two submarines were materially available less than 10% time. Two-submarine availability in June 2012 was around 60%, today it is well over 90%. As explained above, this does not mean that two Submarines were deployable for over 90% of the time.

To achieve two deployable submarines on an enduring basis it is necessary to have three submarines consistently materially available for tasking (more than 90% of the time). Whilst there have been significant improvements in three-submarine material availability to over 60% there is still some way to go to achieve the benchmark levels. The high level of material availability of three submarines is primarily necessary to train crews and work-up

operational readiness to achieve two deployable submarines at all times – sustaining the Navy Requirement.

Figure 7 – Performance against Navy requirement



Significant achievement:

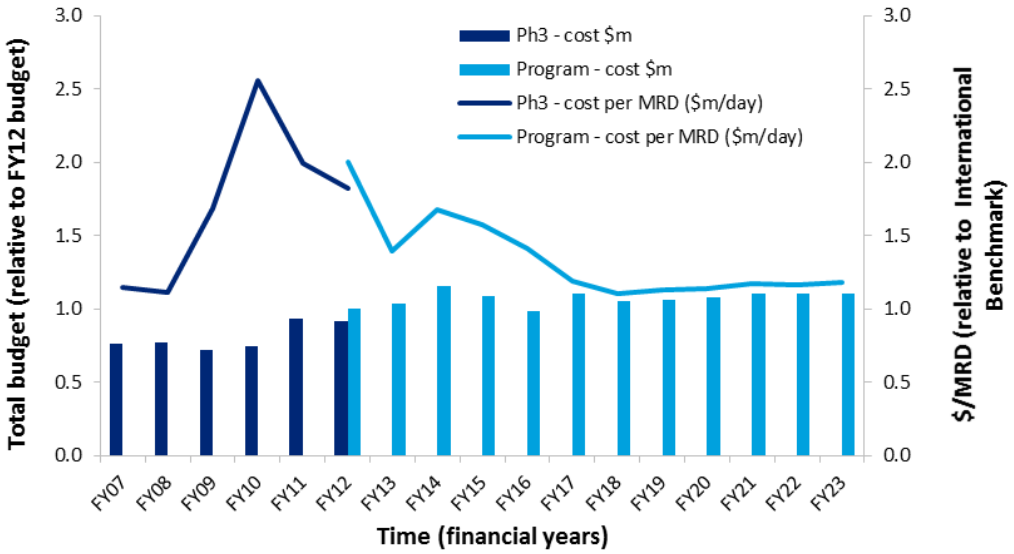
- Two boats materially available more than 90%.
- Three boats materially available 60%, but some way to go reach the 90%+ required to train crews and sustain the Navy requirement of two deployable submarines at all times.

2.2 Cost effectiveness

Figure 8 shows the cost figures that were extant at the time of our November 2012 Report (Ph3). The program costs take into account exchange rate variation and inflation differences. The base date for this data is 31st January 2014. The MRD data is based upon actuals achieved to-date and the predictions are based upon the Navy's availability targets.

The chart illustrates that the cost per MRD has continued to fall since 2012. This has been driven by the increase in MRDs and not a reduction in the budget.

Figure 8 – Cost effectiveness

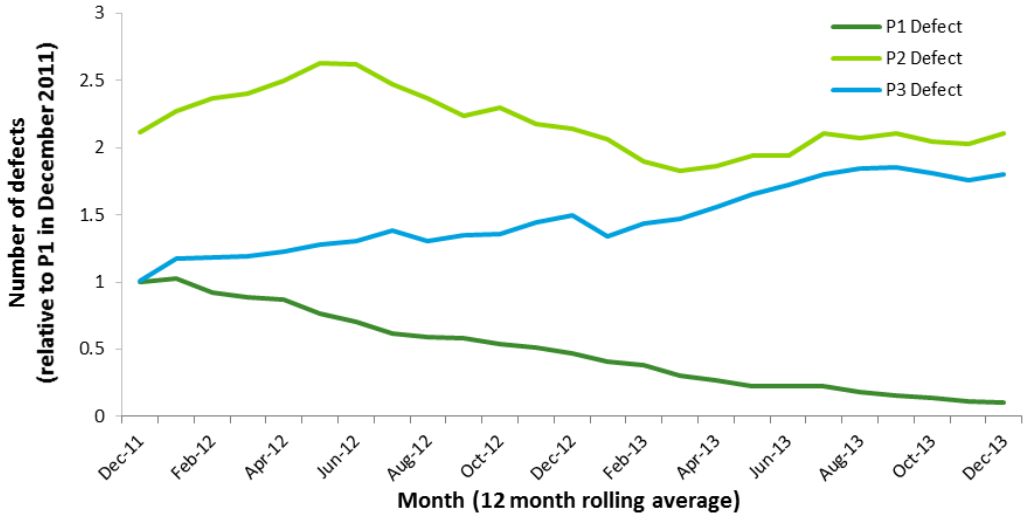


We consider that cost per MRD is an indicator of cost effectiveness. The number of MRDs and therefore cost effectiveness is expected to continue to improve up to FY17 when it is planned to have only one submarine in FCD in SA, five in WA and benchmark availability is achieved. The focus should be on increasing availability until benchmark is achieved, and only then attacking efficiency, otherwise this improving trend is in danger of being reversed.

2.3 Reliability performance

Figure 9 shows that the 12 month rolling average per submarine of URDEFS raised. P1 URDEFs show a consistent downward trend, reducing by some 90% since June 2012.

Figure 9 – P1, P2, P3 URDEFs raised[1]

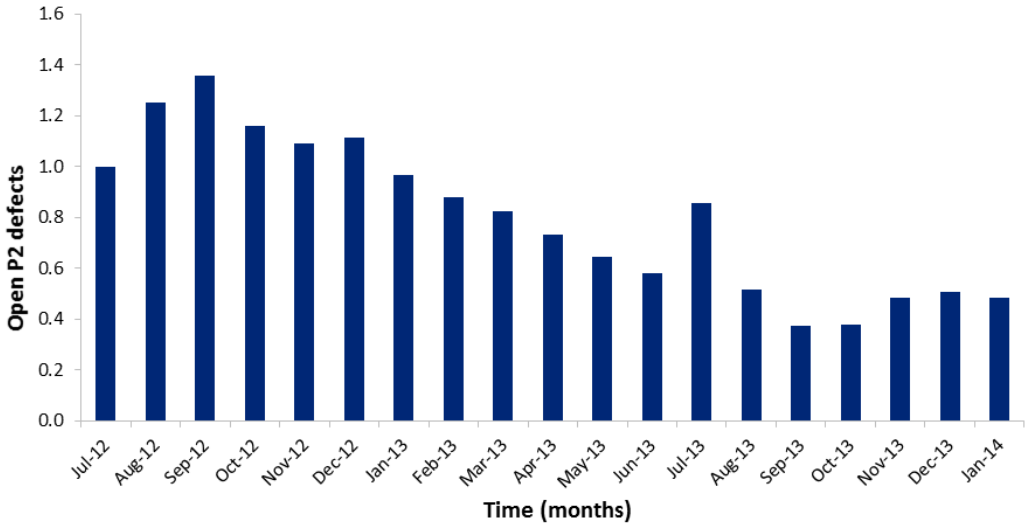


[1] Based on SIMS URDEF records from 2010 to 2013

We would attribute this to four primary reasons:

- **Reliability improvement initiatives** – Given the time it takes for reliability improvements to be designed, manufactured and fitted to the submarine at this time, this is likely to have only a small effect to date. It is these reliability improvement initiatives that will enable progress towards the International Benchmark for days lost to defects
- **On-board spares availability** – If the submarine holds the right spares and can fix the defect then an URDEF will not be raised. The Ship Allowance List (SAL), which includes the spares carried on-board, is subject to ongoing analysis and now more accurately represents the SAL that the submarine needs. This coupled with the responsibility for in-service platform spares being transferred to ASC and more funds being made available for purchasing spares is likely to have led to fewer URDEFs being raised
- **A greater focus on clearing P2 and P3 URDEFS** – P2 and P3 URDEFS if left unrepaired can accumulate to become P1 URDEFS. For example the C carry three diesels, if one becomes unserviceable then a P2 URDEF would be raised – if another becomes unserviceable before the first is fixed then a P1 URDEF would be raised. Figure 10 shows the average number of P2 URDEFs per submarine that have not been rectified (remain open). The average number of open P2 URDEFS has been progressively reduced over the last 18 months. It is now some 40% of the level in September 2012

Figure 10 – average number of open P2 URDEFS per submarine[2]



- **Clearer guidance on raising P1 URDEFs** – Introduction of the Material Capable Day (MCD) measure has led to much clearer guidance on the circumstances when Priority 1 URDEFs should be raised. P1 Ops URDEFs will not necessarily result in lost MRDs if repaired within readiness notice.

[2] Based on CN10 PdS KPI data for FY13 and FY14

Significant achievement:

- The overall material state of the submarines is improving.

2.4 Performance against International Benchmarks

Our November 2012 Report identified four international benchmarks against which the Collins Class sustainability performance could be compared:

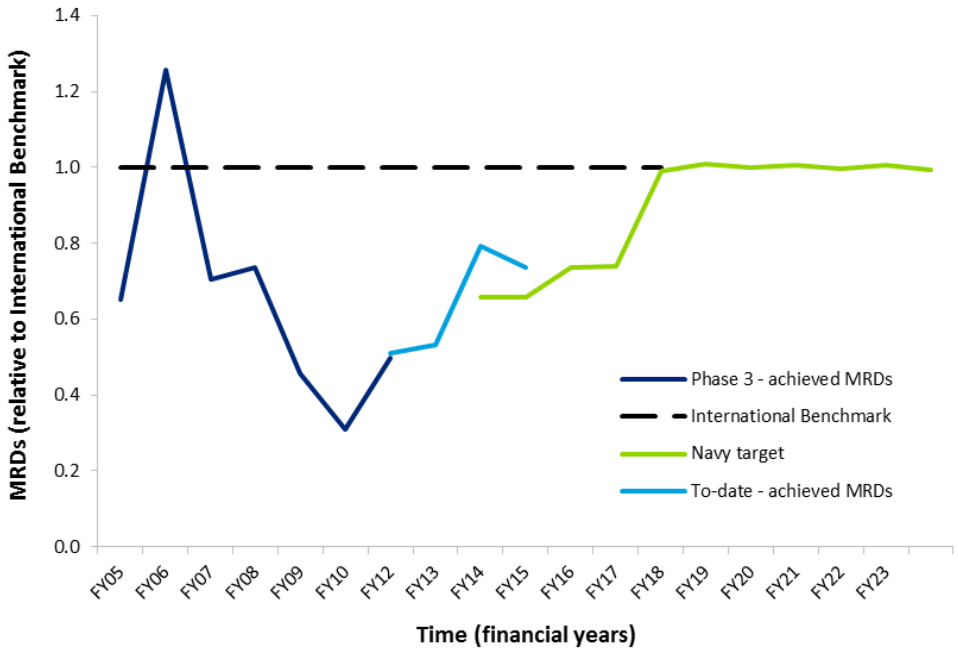
- Availability (days)
- Planned maintenance duration (days)
- Maintenance overrun (days)
- Percentage days lost to defects when not in maintenance (%).

Submarine availability is measured in Material Ready Days (MRDs):

"A Material Ready Day (MRD) is a day when a submarine is not conducting planned maintenance and is not encumbered by defects that prevent it from proceeding to sea."

The annual MRDs achieved and the Navy's target (CN10 Product Statement) as a proportion of the International Benchmark is illustrated in Figure 11. This demonstrates that the annual MRDs for the Collins Class have been steadily increasing since FY10 and this trend has continued since the Coles Study reported in November 2012. The Navy target for MRDs allows for a measured year on year increase until the benchmark is reached in FY17. Currently the Enterprise is exceeding the Navy target.

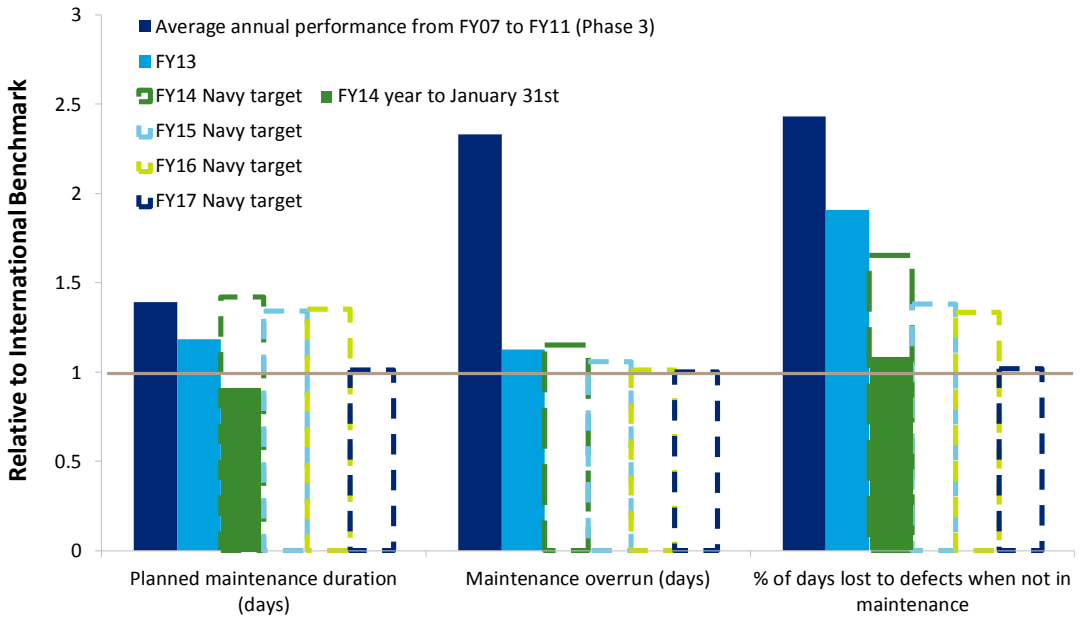
Figure 11 – MRD performance and targets[3]



[3] FY13/14 represents MRD achieved to-date based on Collins Class Program performance prediction at 31 January 2014

Figure 12 illustrates performance against the components of the International Benchmark which drive the overall availability performance, since our November 2012 Report. Planned maintenance duration is the time planned to be in maintenance that is shown in the extant IMS, maintenance overrun is the number of days in excess of the plan that the submarines remain in maintenance, and time lost to defects is the ratio of the number of days lost to defects compared to the days the submarine is not in maintenance, expressed as a percentage.

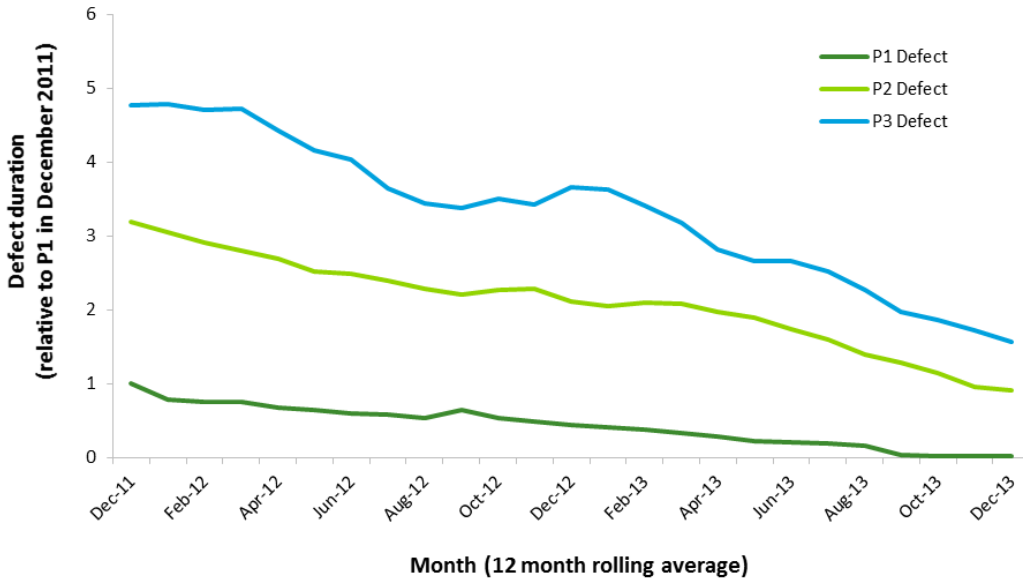
Figure 12 – Performance against International Benchmarks



The improvements in performance shown in Figure 12 are driven by:

- **Planned maintenance** – as illustrated in our November 2012 Report the 8+3 UUC is cyclical in nature in that it contains peaks and troughs of periods of planned maintenance, with a trough in 2013. It is this that has driven the small improvement in planned maintenance performance seen in FY13
- **Maintenance overrun** – the maintenance periods conducted in Western Australia achieving timely completion performing better than or very close to the benchmark consistently over the last three docking periods
- **Time lost to defects** – a reduction in number of P1 URDEFs and the reduction in the time to repair. Figure 13 demonstrates the average annual monthly time taken time from a defect arising to closing it (time from fault being reported to being rectified) on a rolling year basis. We suggest this improvement in repair time can be largely attributed to the timely delivery of spares to the submarine and more effective maintenance routines.

Figure 13 – Time taken to rectify URDEFs[4]



Significant achievement:

- The improved availability of spares and responsiveness to the submarine are having a significant effect on the time lost to defects.

2.5 Projected availability performance

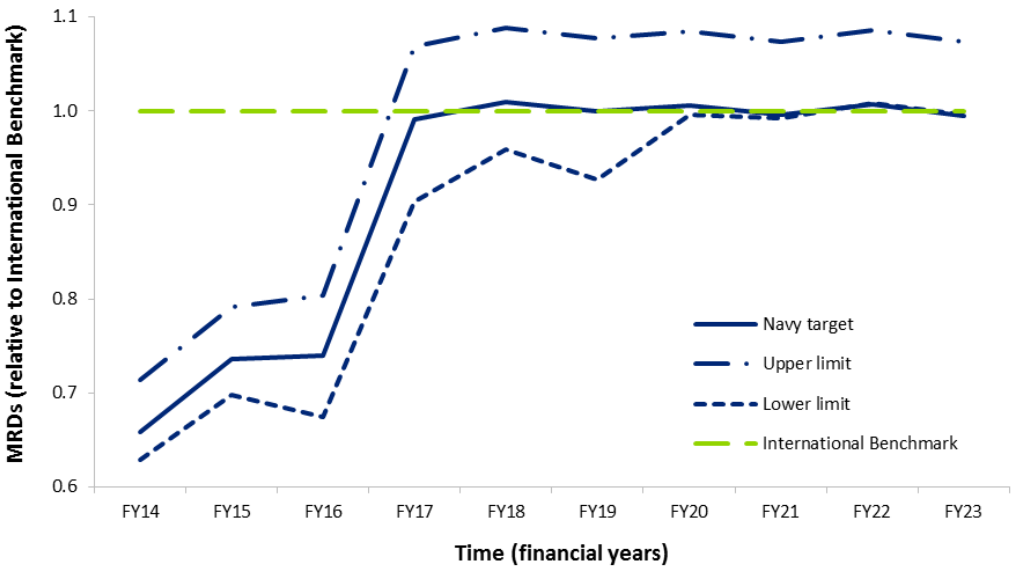
We have also considered the potential trend of performance against the International Benchmark. Figure 14 shows the possible upper and lower performance projections as shown by the dotted blue lines extrapolating forward to FY23. The upper projection is based on achieving (but not exceeding) the benchmark for days lost to URDEFs by FY17, the current IMS and continuing to finish maintenance periods on time (no days lost to overruns), that is a realistic 'best case'. The lower projection assumes that the current trend for days lost to URDEFs continues (benchmark achieved in FY20), that the timeliness of completion of IMAVs, IDs and MCDs is at benchmark levels and, that HMAS Farncomb's and HMAS Collins' FCD overrun by three months – something we consider to be not an unrealistic 'worst case' because:

- The assumption underpinning HMAS Farncomb's overrun is that the scheduling and planning methodology used is untried. There has been no piloting or trialling on other maintenance periods by the ASC.
- HMAS Collins will need to be upgraded to match the rest of the Class, otherwise major systems will be unsupportable and she will not be as deployable as the rest of the Class. If a significant amount of upgrade work is not carried out in the period

[4] Based on SIMS URDEF records from 2010 to 2013

prior to HMAS Collins FCD (she is currently in pre-FCD), then this may have an impact on the overall schedule for HMAS Collins' FCD. We have illustrated the effects of a three month overrun.

Figure 14 – Projected availability performance



Based on these projections, we believe that benchmark performance should be achievable by FY17, however, significant risks remain that will require specific attention:

- Utilising the pre-FCD opportunity to upgrade HMAS Collins will significantly reduce the risk of HMAS Collins FCD extending in time.
- Continuous review of HMAS Farncomb's schedule (involving planning, engineering, supply and production, effectively treating it as a dynamic schedule and progressively refining it) will help reduce the impact of errors in activity scheduling and work pack planning that will undoubtedly exist since this will be the first time that the 'Work Chain – Hammock – Work Pack' (see Section A1.2.4) method has been used.
- Continuing or enhancing the drive towards resolving reliability and obsolescence is important even if the Benchmark can be achieved by completing all maintenance periods on time. MRDs lost to URDEFS are far more disruptive to operations than MRDs lost to maintenance, and poor reliability and high obsolescence also contribute to the burden of corrective maintenance. The amount of potential corrective maintenance is currently very high, with the potential to frustrate attempts to get the management of the maintenance periods under control.

The 25 recommendations in our November 2012 Report can be considered in three categories: those that will lead to an early improvement in availability, those that drive the trajectory towards the International Benchmark performance and those that will ensure the improved performance endures over the long-term. Provided these recommendations are fully implemented it is highly likely that the International Benchmark will be achieved or exceeded. The section that follows discusses progress with the recommendations and the associated risks that remain.

3 Progress against the Study recommendations

This section offers a snapshot view on progress of the 25 recommendations made in our November 2012 report and their impact on the trajectory towards and sustainment of benchmark performance.

3.1 Progress on implementing the 25 recommendations

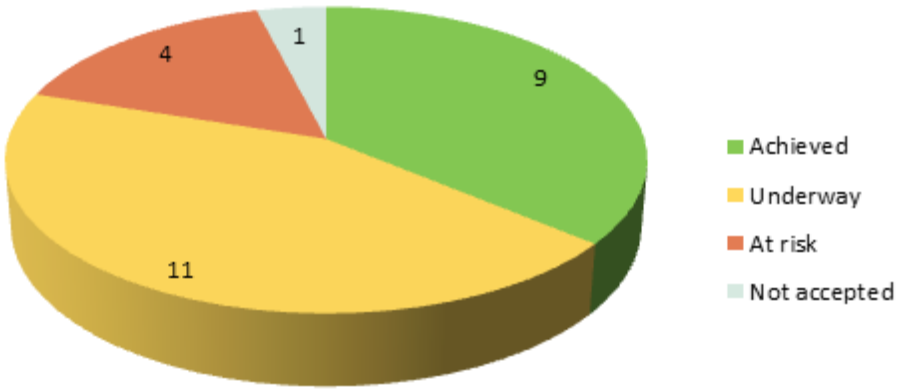
It is important to note that the 25 recommendations are a necessary but not sufficient condition to achieve and then sustain benchmark performance. The Enterprise has developed a Transformation Plan to address the entirety of changes that support the transformation, including many 'tactical-level' but nevertheless important initiatives. This review has considered the 25 recommendations and the underlying factors that contribute to good practice sustainment and the results achieved so far, but it has not considered each Transformation Plan tactical initiative in detail.

Recommendation progress has been described in three broad categories:

- Implementation of the recommendation has been **completed** and the objective achieved (Green assessment)
- Implementation of the recommendation is **still underway** but is expected to meet the intent expressed in Phase 3 (Amber assessment)
- Implementation of the recommendation is **at risk** (Red assessment), because the intent of the recommendation has been misinterpreted; or implementation is too slow or has not commenced.

Figure 15 illustrates our assessment of the implementation progress according to these categories. Detailed comments on each recommendation are at Annex 1. One recommendation was not accepted for implementation.

Figure 15 – Progress on implementing the 25 recommendations



3.2 Current performance

The completed recommendations and good progress against some of the other medium to long-term recommendations have allowed the Enterprise to achieve its transition targets to date. Specifically, positive action in the following areas is assessed to have led to the improved performance:

- Better engagement by Navy as the intelligent customer setting clear requirements (Recs 2, 5, 14, 19)
- The establishment of collaborative Enterprise behaviour with clear roles (Recs 7, 9, 10, 20)
- Clear availability targets which flow down through the MSA and IMS into the ISSC (Recs 1, 3, 13)
- Better planning processes at all levels (Rec 11)
- Far better supply support outcomes (Rec 16).

3.3 Trajectory towards benchmark performance

Continued progress of our medium-term recommendations is necessary to maintain the momentum towards benchmark levels in the following areas:

- Continued Enterprise collaboration (Recs 4, 6, 7, 8)
- A strong asset management approach (Recs 12, 15)
- Continued improvements in planning (Recs 11, 18)
- Continued improvements in O-level maintenance (Recs 18, 23)
- Adequate staffing across the Enterprise (Recs 21, 22).

It will be important to continue the change process over the next two years and complete the medium-term recommendations that have been assessed to be on track but not yet complete. Of concern, some of the recommendations in these areas have made little progress, putting the trajectory to benchmark at risk.

3.4 Making the transformation enduring

Long-term continued performance is underpinned by the long-term change recommendations. Most of these have made little or no progress. Specific areas that will contribute to enduring performance are:

- Continued and broadened Enterprise collaboration (Rec 7)
- A strong and skilled workforce across the Enterprise (Recs 21, 22)
- Enabling IT systems across the Enterprise (Rec 24)
- A clear understanding of cost drivers (Rec 25).

The failure to progress the longer-term recommendations is of concern, as it is these deep changes that underpin the transformation program. Changes of this nature generally involve authorities outside the sustainment Enterprise and hence are more difficult to manage. They are vital to achieving an enduring Enterprise that does not have to rely on the heroic efforts of individuals to sustain benchmark performance.

4 Moving to the 10+2 usage and upkeep cycle

Our November 2012 Report suggested that a reasonable and practical way to meet Navy's Capability Requirement (which can be simply described as two deployable submarines from a fleet of six) was to move from the '8+3' usage and upkeep cycle to a '10+2' cycle. This is 10 years in-service followed by a two-year Full Cycle Docking. It will provide a stable, enduring and consistent program for the Navy as well as the industrial base. It will be more robust in case of major equipment failures and able to cope with unplanned incidents without disruption to the overall program schedule.

The Enterprise has already committed to moving to the new 10+2 UUC.

Moving to this new cycle is not a straightforward exercise – it means realigning the maintenance and operations cycles of all the submarines and restructuring the planned maintenance management program to match the time between major maintenance periods. We believe that the proposed longer docking periods during the ten year operations period will also provide more opportunities for installation of capability enhancements and enable a more rapid upgrade of the whole Class.

The 12 month period between major maintenance for a submarine operating in a punishing environment is quite lengthy. The Navy has inserted short Self Maintenance Periods to repair accumulated defects and conduct minor maintenance. This facilitates distant deployments but reinforces the need for the O-level maintenance to be undertaken with greater certainty.

4.1 The "10"

The bulk of the preparation for the 10 year operating period is to realign the maintenance program while ensuring technical integrity is maintained. This in-service maintenance review is currently focused mainly on scheduled work for the intermediate and mid-cycle dockings.

We have been advised that there are three outstanding issues to resolve, although at this stage and from a technical perspective, there does not seem to be any impediment - certification of high pressure air vessels, certification of flexible hoses and calibration of gauges. While solutions to these exist, it is a matter of assessing and selecting the best options.

This work also included adopting new scheduling techniques (now being used for the FCD – see below) for the next docking in WA and adopting new work supervision methods commonly used in industry ("Safely on Time").

There appear to be no major obstacles to achieving a 10 year operating period. HMAS Farncomb has effectively already completed a 10 year operational period following its first FCD (which was less than two years) and with a longer MCD for capability insertions. In short, this experience has demonstrated that such a cycle could be achieved.

The Navy is pursuing maintenance efficiencies under the Submarine Capability Improvement Program (SMCIP) program. Also under this program, Navy is up-skilling ship staff and improving delivery of spares on-board and shore side.

4.2 The "2"

Achieving the 10+2 UUC is dependent on moving to a new program with two-year, back-to-back FCDs. Without the two-year FCD, there will be no realistic chance of achieving and sustaining benchmark availability.

As part of ASC's 10+2 transformation program, it is implementing a number of projects to achieve the two-year FCD. This includes delaying the start of the HMAS Collins FCD and using it to support the overhaul of HMAS Farncomb, and for trialling new techniques:

- Focus on a single-stream FCD rather than dual-stream FCDs
- Development of standard work schedules and new scheduling techniques in line with industry norms to produce an intermediate level project schedule (with repeatability, a less detailed management view and strict change control) and a detailed level which bundles work packs into "hammocks" with sufficient flexibility for trade supervisors
- Removal of some 350,000 man-hours from a nominal 1,150,000 man-hours per FCD without transferring work scope to another maintenance period
- Improvement in maintenance procedures to reduce effort
- Condensing the set-to-work phase by parallel commissioning and a more logical network flow (now being applied to the HMAS Rankin FCD)
- Changes in behaviour at the work front with "Safely on Time" methods so that all of the production and supporting elements are coordinated to achieve schedule start/finish compliance – proven in WA and applied in the second half of HMAS Rankin's FCD in SA
- The building of Maintenance Support Towers in SA to remove the greater portion of production inefficiencies (similar in concept to ASC's facility in WA)
- Pressure hull cuts have been made to HMAS Collins for removal of the diesel-generator sets (seen as risk reduction for HMAS Farncomb) and other machinery, and for parallel access into tanks. A circumferential pressure hull cut will be made for removal of HMAS Collins' main propulsion motor (also seen as a risk reduction for HMAS Farncomb). All of these cuts allow greater access for more efficient work on multiple work fronts
- A purpose-designed diesel engine workshop has been built in SA for efficiency and ease of maintenance
- A diesel test facility is planned in SA, this will enable set-to-work to be conducted in a shorter timeframe
- A revamp of supply support to ensure on-time material supply, including establishing a rotable pool of some 3000 items that incorporates approximately 800 items from HMAS Collins, refurbished for HMAS Farncomb, to allow streamlined removal and replacement
- The adoption of new technologies, for example circularity measurements using lasers, dehumidifiers during painting, video cameras for confined space monitoring, saddle vents to reduce mobilisation time and single coat painting system (from the US Navy).

There is residual risk to completion of HMAS Farncomb's FCD. All these initiatives will be brought to bear for the first time on HMAS Farncomb's FCD. Further, the new scheduling

methodology is still untested in ASC, although it represents best practice. Work pack accuracy within this new scheduling methodology will need considerable improvement.

There remains a risk in aligning the commissioning phase, which is system based, with the zone-based work chains (see Section A1.2.4). ASC's plan called 'The Single Stream FCD' recognises this risk; however, ASC is yet to include the mitigation processes into the schedule.

If the FCD over-runs, the Enterprise should be prepared to let it overlap and accept MRD losses, holding the HMAS Collins FCD start date in order to preserve the overall operations and maintenance pattern.

The unknown elements of the HMAS Farncomb and HMAS Collins FCDs are risks to the trajectory of the 10+2 UUC. We have examined the potential effect on total MRDs of three month over-runs on both HMAS Farncomb's and HMAS Collins' FCD and this is illustrated in Figure 14.

For the longer term, we note that the HMAS Waller FCD (commencing mid-2018) will not have the benefit of major equipment (for example diesel-generator sets and main propulsion motor) which will be provided as rotable pool items and therefore these must be overhauled within the FCD period. The work on HMAS Farncomb and HMAS Collins should mitigate this risk; however, attention will have to be focused to achieve the required turn-around times.

5 Review of underlying performance drivers

In our November 2012 Report we defined Collins Class sustainment using a value chain that described the key activities to deliver sustainment effectively. As part of the study, performance issues were analysed to determine how they related to each other and where they sat on the value chain. We identified that there were many individual issues that impact the effectiveness of Collins Class sustainment. Further, we found that these issues were interrelated across the value chain and amongst Enterprise participants. The conclusion reached was that the historical performance issues were systemic and required improvement at all levels to achieve benchmark performance.

To make an assessment on whether the Enterprise is able to continue on its current trajectory to benchmark performance, we have reviewed the underlying value chain attributes. Findings and observations made in each of these areas is included in Annex 1.

Table 1 - 'What good sustainment looks like' framework

<table>
<tr><th>Enable capability</th><th colspan="5">Sustain capability</th><th>Use capability</th></tr>
<tr><th>Governance and strategy</th><th>Capability</th><th>Engineering</th><th>Planning</th><th>Supply</th><th>Production</th><th>Force generation</th></tr>
<tr><td>• Operational requirement effectively stated
• Clear sustainment objective
• Overarching Asset Management Strategy
• Cooperative and collegiate Enterprise
• Effective governance
• Sustainment cost actively managed
• Performance driven culture</td><td>• Capability upgrades identified early
• Submarines sufficiently crewed</td><td>• Clear design authority
• Obsolescence and reliability managed
• Appropriate preventative maintenance plan
• Design configuration accurate
• Quick approvals
• Effective and efficient asset management plan</td><td>• Working level master plan
• Work scope is accurate
• Accurate BoM
• Efficient scheduling of the work scope</td><td>• On-time POs
• High delivery performance
• Supplier relationships managed
• Effective inventory policy
• Inventory record accuracy high
• Sufficient parts available in the warehouse
• Returns and repairables managed
• Effective wharf-side distribution
• Achieve an accurate SAL</td><td>• Maintenance staff skilled and enabled
• Schedule adherence is high
• Adequate feedback from production
• Maintenance staff levels balanced between SA and WA</td><td>• RAN crews appropriately skilled and enabled
• O-level maintenance completed
• Feedback and at sea record keeping is high</td></tr>
<tr><td></td><td></td><td colspan="4">Managing maintenance activities</td><td></td></tr>
</table>

6 Discussion and conclusions

Our analysis for this progress review has been limited to assessing the availability of the Collins Class submarines achieved by the Enterprise and the trajectory of performance to reach and sustain the International Benchmark by FY17. This section of the report reviews our findings and draws a number of conclusions.

6.1 Current Performance

Independently determining current availability and other related performance metrics requires a comprehensive analysis of the raw data collected by the Enterprise. We have collected data that tracks each day, for each submarine whether it was in maintenance, or had a defect that prevented it from proceeding to sea. From this we determined the availability of each submarine and the reasons for availability being lost. Our analysis, at Section 2, is presented in a format consistent with that shown in previous reports. We provide a snap shot of performance, the current trajectory and, based on some assumptions, the predicted performance.

We have also been provided with a significant amount of data on engineering, supply, planning, production and progress with the 25 Recommendations contained in our November 2012 Report to support our review of the underlying drivers of performance. Our analysis of this is contained in Annex 1.

Our analysis confirms that the material availability of the submarine force has broadly improved at a rate and in line with the targets set within the MSA.

We judge this achievement is largely, although not exclusively, due to spares now being readily available to meet most demands for operational submarines (shortening the time to correct defects) and those in maintenance periods (spares available to maintain the schedule). Other contributory factors include: improvements in the management of all major planned maintenance periods, ("Safely on Time"); an updated SAL of spares carried on board to rectify defects quickly; and a greater focus upon and support for ships staff to conduct in-service maintenance at sea and alongside during Self Maintenance Periods (SMP).

The ISSC contract, including changes to it during the transition period, has sharply focused responsibility onto the ASC to be the responsive and accountable agent for submarine availability.

All these factors have contributed to submarines based in WA being ever closer to meeting or exceeding the benchmark performance for time in maintenance periods, although our analysis has shown delivery was much more resource intensive than planned. The improved scheduling that will be used for the first time on HMAS Farncomb's upcoming FCD should enable adherence to the schedule and to the maintenance period end dates without the need to surge load the program. The accuracy of the work scope also relies on a clear understanding of the condition of the submarine. This needs to be achieved through close Enterprise collaboration between ship staff, DMO and ASC on the Pre-Availability Condition Assessment (PACA), outstanding URDEFs, and status of O-level maintenance conducted.

Time lost for defect rectification against the benchmark has improved significantly over the last two years but is unlikely to be achieved in full until the backlog of reliability and obsolescence issues is substantially cleared and reliability improvements incorporated into the submarines. The Submarine Reliability and Availability Management Group (SRAMG) has been established to clear the backlog and manage reliability and obsolescence into the future. We believe this requires full representation and importantly gives SUBFOR the opportunity to provide input directly from its knowledge of the material condition of the submarines.

Conclusion:

The combined efforts of the Enterprise have delivered availability that exceeds Navy's current targets.

6.2 Progress towards achieving the benchmark

Operating Collins Class submarines over a 10 year in-service period is the first necessary condition for the submarine force to have the potential to reach benchmark performance. All submarines are now effectively in or transitioning to the 10 year in-service period. A second necessary condition to achieve benchmark performance is to complete all future FCDs in two years, commencing with HMAS Farncomb.

Our review confirms that there is no serious technical impediment to conducting all the required maintenance in the 10 year in-service period: Collins Class submarines can operate for 10 years between FCDs whilst maintaining the design intent. Considerable effort remains to realign and reapportion the planned maintenance activities across the cycle, but this is well understood and in hand.

Planning for the first two-year FCD in HMAS Farncomb began some 12 months ago. The plan requires a step change in culture, planning, material supply, an accurate and reduced work scope, construction of new facilities, several pressure hull cuts to remove and reinstall equipment and improvements in productivity. We have questioned closely those managing these improvements, observed some of the new processes and talked through others. We have been encouraged by what we have seen, but have a concern with the fidelity of the detailed planning processes. We note that the transition from a compartment-based schedule to a systems-based one during the commissioning phase may be challenging to manage. ASC is aware of this risk and has some mitigations in place.

Our own analysis of the improvements in material supply and work scope definition has shown that the ASC has improved and there is evidence of this in current maintenance activity. The Safely on Time program has been used to drive projects to deliver on time, but frequently with resource levels higher than planned. HMAS Collins will seed the rotable pool for HMAS Farncomb's FCD, with refurbished HMAS Collins equipment fitted in HMAS Farncomb. This will save time and be more efficient e.g. the removal of complete diesel engines allowing disassembly, rebuild and commissioning ashore before reinstallation as a complete unit.

The current schedule for HMAS Farncomb is nearing finalisation but is still being refined for a much-condensed system test and commissioning phase. We note that the programed

completion date is three months ahead of the contract date, a prudent buffer given all the changes necessary to meet the much shorter schedule. While we are confident that the improvements in train will mean that HMAS Farncomb's FCD could be completed in two years, there is not yet a high degree of confidence of that outcome, since many of the enabling initiatives are yet to be proven.

Conclusion:

We believe that the right initiatives to achieve a two-year FCD are being undertaken, but many are untried, so there remains more than routine risk to be managed to achieve HMAS Farncomb's scheduled end date.

The Collins Class submarines have had a history of unreliable equipment and systems. We note that the lack of reliability and obsolescence management (an essential part of an Asset Management Plan) in the past has contributed to the submarines' historically low availability. A backlog of reliability issues has built up over many years but is now being systematically addressed by conducting a thorough analysis of system or equipment defects and providing solutions by engineering re-design, changes to planned maintenance or improved operation of equipment. Similarly, a lengthy backlog of platform and combat systems obsolescence issues is now being tackled on a systematic basis. Obsolescence management includes update – replacing whole equipment with the same capability, often at a lower cost.

The backlog of reliability and obsolescence issues is being worked through but will take several years to eliminate at the current rate of progress. At the margins, this may delay the achievement of benchmark availability by FY17. It will be important to maintain progress as reliability failures for submarines in-service have a very disruptive impact. The third and final condition to reach benchmark performance is to eliminate the more significant reliability issues.

Conclusion:

Benchmark performance may be delayed if reliability and obsolescence issues are not resolved.

There has been overall progress in the implementation of the Transformation Plan, although some of our recommendations have not progressed at the pace and intensity required. The TPO has not to date, been required to push hard to ensure delivery of the key elements of the plan because of the natural momentum of the early changes. But it is clear that stronger direction is now needed as the Enterprise moves into the second half of its transformation.

It is important to ensure that new processes are actually embedded before declaring recommendations and initiatives are complete. Such issues point to the need for a much more pro-active TPO with resources and real teeth. Its role now needs to drive change and not just monitor progress. We also note that the Transformation Board does not have any representative from the DMO Submarine Branch finance area. DMO finance staff also need

to embrace the transformation process, particularly as later phases of change will include bearing down on costs and providing support and direction on the cost model.

Conclusion:

The transformation is only half progressed, there are significant recommendations which are unlikely to progress without the TPO driving others to deliver as well as supporting when required and monitoring overall progress.

6.3 Sustaining Benchmark Performance

Sustaining benchmark performance from FY17 onwards is necessary to meet Navy's enduring capability requirement. The failure to progress the longer-term recommendations is of concern to us, as it is these deep changes that underpin the transformation program. Changes of this nature involve authorities outside the Enterprise and hence are more difficult to manage, but they are vital to achieving an enduring Enterprise that does not have to rely on the heroic efforts of individuals to sustain performance and can manage efficiency initiatives over the long-term without degrading performance.

Without developing and implementing a workforce strategy to specifically address skills shortages at the management level, competent and qualified staff will not be in place to undertake new roles and responsibilities and either stall, impede or even reverse the transformational program. The ASC and RAN have plans in place to mitigate this risk. The DMO still carry this risk and nothing appears to have been done to mitigate it. Indeed the reverse may well be true. The public service freeze on recruitment to reduce head count has forestalled any attempt to match new skills with the new roles required after transfer of many DMO tasks to the ASC following placement of the ISSC. The DMO now has the greatest need to change but appears to be the least agile to address this issue.

Conclusion:

An independent mapping of the functional competencies required within the DMO to discharge its responsibilities within an output focussed Enterprise should be undertaken. This needs to lead to the identification of any shortfalls and recruitment required and a mechanism to fill quickly any of these gaps.

The Enterprise IT strategy is required to address the issue of a lack of single set of accurate information to improve decision making. The Collins IT environment requires the rekeying of information which wastes time, introduces errors in data and data latency which are difficult to detect and correct, which negates good control of records and materials. The Enterprise IT Strategy should cover the application landscape, architecture, data quality, data management systems and integration and management information requirements.

Conclusion:

If the Enterprise IT strategy is not progressed, the status quo will prevail and Enterprise will not be able to drive efficiencies after benchmark availability has been achieved.

The Enterprise cost model needs to be completed and implemented. Without this, the cost of the Enterprise will not be managed in the most effective manner, leading to incorrect balance of investment decisions and increased risk to the output as cost efficiency measures are implemented in future years. Ownership of the cost model has not been resolved. Good practice would suggest that those involved with the delivery of the services should be core users, and independent assurance should be provided by the Central Finance Group in DMO.

Conclusion:

A sustainable and efficient Enterprise will not be established without a single Enterprise wide cost model being used to underpin financial decisions.

HMAS Collins, has for a variety of historic reasons not been upgraded in line with the rest of the class. Unless this backlog is progressed she would be unable to undertake all the required operational tasks. HMAS Collins is currently at ASC in preparation for its two-year FCD, providing the opportunity to de-risk HMAS Farncomb's FCD. This pre-FCD period also gives the opportunity to progress the backlog of capability upgrades. If sufficient resource levels are not available within the ASC, then the task could be out-sourced. It is unlikely all required upgrades could be completed within the time and work scope constraints of a two-year FCD.

Conclusion:

An opportunity exists to de-risk the Collins Class program by commencing the installation of outstanding capability upgrades into HMAS Collins prior to starting her two-year FCD. Not doing this threatens the ability of the Enterprise to meet Navy's requirement for two deployable submarines at all times.

6.4 Efficiency

Currently the Enterprise is focused upon achieving the required performance and less on efficiency. We support that view until benchmark availability is achieved. Although the cost per MRD is improving this has been achieved by increasing availability not by reducing the cost base. However, once the program's benchmark availability is achieved, the focus should change to include efficiency and tackle the cost base across the Enterprise.

Less time in maintenance and increased incentives on performance and cost (in the ISSC performance period) should naturally drive efficiency provided the right balance between risk and reward is achieved. There was limited incentive to reduce ASC costs in the transition period as it is based on full cost recovery.

The Commonwealth and the ASC have had ample time and opportunity to align profit and risk, not only for delivery, but also to reduce costs through the transition period. The significant transfer of resources to the ASC to purchase spares should for example provide the ASC with the incentive to become a more effective buyer, during the upcoming performance period (five-year contract). A pro-active supplier relationship management

program, including the use of make-buy is required in the absence of competition. A make-buy program is also a useful way of demonstrating efficiency in a non-competitive market place, however, this may require the use of independent review of sealed bids.

The Navy SMCIP programs are targeted to reduce maintenance through a systematic review that should reduce the overall maintenance load and adjust the level of stores held. Once savings are identified and agreed the benefits should be reflected in the budget.

A significant proportion of the Collins Class sustainment budget is consumed outside the ASC and equal focus on reducing that cost base is necessary. Much of that expenditure is non-competitive.

Conclusion:

An increased focus on cost effectiveness is necessary for enduring performance once benchmark availability performance is achieved.

Annex 1 – Evidence base

A1.1 Recommendation progress

A1.1.1 Recommendation 1

Set a realistic target for the DMO to deliver MRDs and incorporate in the MSA

Why this recommendation is important	To ensure that the MRD in year targets were seen to set by the customer (CN) and these were comprehended, realistic yet challenging for the budgetary provision
Progress observed	Evidence in the Reference Set of Objective Quality Evidence (OQE) supplied and or updated by the Commonwealth for the Review team Evidence sighted: • CN10 PdS Sustainment of the Collins Class Submarine dated 27 June 2013 • Material Sustainment Agreement between RAN and DMO Dated 1 July 2012
Risks identified	The linkage to budget provision is not firmly established and output may not be deliverable. Refer Recommendation 25 - Develop a cost baseline/model and supporting processes for the sustainment program commentary.
Status	Green

A1.1.2 Recommendation 2

Define a clear (unclassified) requirement for the sustainment program

Why this recommendation is important	To ensure a common and shared view is available to all across the Enterprise
Progress observed	Evidence inserted into the Reference Set of OQE supplied and updated by the Commonwealth for the Review team Evidence sighted: • CN/OUT/2013/1006 Dated 30 Sept.2013 • CN/OUT/2012/991 Dated 18 October 2012
Risks identified	None identified.
Status	Green

A1.1.3 Recommendation 3

Implement the ISSC to encourage performance-based behaviour:

i. Review the overall structure of the ISSC to allow a greater focus on the performance management of individual maintenance periods; the management on a continuous basis of "Parent Navy" activities; support services to operational submarines.

ii. Set an annual target for MRDs, based upon the MSA, in the ISSC

iii. Apply specific senior level oversight to ensure that the specification for a maintenance period (the work scope) contains all known work and that the contract price and schedule/plan is based upon this more complete specification

iv. Remove or increase the thresholds for the ASC needing approval to commence emerging work. These are set far too low for an output based performance contract and should be optimised during the Transition Period

v. Before entering a performance period conduct an independent audit of performance and cost before formalising the metrics for the contract performance period

vi. Introduce early in the Transition Period a formalised process involving DMO and ASC senior management to agree adjustment events during the Transition Period

vii. Adopt a framework of guidelines for Make-Buy decisions and the refinement of this during the Transition Period

Why this recommendation is important	i. Encourage major maintenance periods to be managed as projects, avoiding issues related to maintenance periods spanning end of contract and allow in-service support to be managed as a service provision. ii. Incentivise reduced time in maintenance as well as timeliness and days lost to URDEFS. iii. Improved definition enables a better plan and Bill of Materials (BoM) to be developed. iv. Trial the proposed end game and not drip-feeding. v. Provides confidence that a sound footing has been achieved. vi. Adjustment events tend to de-focus the effectiveness of the contract performance mechanisms. vii. Enables cost efficiency, quality improvements and ability to flex resources.
Progress observed	i. The recommended contract structure of three elements (Overarching, Fixed Price for larger maintenance periods and Target Cost Incentive Fee (TCIF) for in-services support) has not been adopted. However, with the incorporation of a MRD Target and a greater focus on availability this is considered acceptable ii. MRD Targets have been introduced into the ISSC iii. The 'work scope' definitions have been improved iv. Emerging work is dealt with as a package and not in a transactional style v. Independent audit of performance and cost before finalising metrics has not been done, nor is planned vi. No adjustment events have arisen, control exercised at a senior level. Intend to modify adjustment event procedure for performance period of ISSC vii. Make/buy process has been implemented, but is unlikely to show significant "buy" results until transformation bedded in.
Risks identified	The recommended changes have been satisfactorily incorporated; however, there remains a risk that the successful operation of the ISSC during the upcoming performance period (next five years) could be undermined if behaviours revert to the "old way" not Enterprise behaviour.
Status	Amber

A1.1.4 Recommendation 4

Finance to strengthen and broaden the accountability framework for the oversight of ASC

Why this recommendation is important	To ensure that the ASC Board of Directors is focused on output and the financial metrics, and that objectives of the CEO and other senior company executives reflect that focus.
Progress observed	In conjunction with ASC, Finance reviewed and refreshed ASC's performance monitoring and reporting arrangements during 2012-13. The new reporting framework provides end to end coverage of the business and focuses on the decisions required to manage performance; supported by appropriate information and analysis. The new framework includes key measures (financial and non-financial) across all of ASC's main activities which enhance the clarity and depth of reporting to the Shareholder and the Board. The framework has capacity to adapt to reflect any changes in ASC's responsibilities agreed as part of the full performance phase of the ISSC. Evidence sighted: • ASC Group September 2013 and December 2013 Integrated Performance Reports
Risks identified	While the ASC focus on MRDs is clear, this could be weakened if: • The ISSC is updated in a way that undermines what has been achieved to date • Wider issues such as those associated with the AWD program dilute the focus of the ASC Board of Directors.
Status	Green

A1.1.5 Recommendation 5

Strengthen the RAN as the Intelligent Customer for sustainment

Why this recommendation is important	Navy owns the operational output of the Submarine capability so it is vital that sustainment understands the output and delivers the material state needed for the output. Navy must operate the submarines within its sustainment budget, to do this it must be fully engaged in the sustainment decision-making processes. • Navy as experienced, educated, informed and engaged participant • Setting realistic requirements and continuous monitoring • Managing risks and making trade-off decisions.
Progress observed	Navy is clearly engaged in the Enterprise as evidenced by Enterprise Governance Framework and CN10 Product Statement. The Collins class Capability Management Plan (CMP) and Statement of Operating Intent are evidence of Navy's clear requirements for Sustainment and how this fits in to the overall capability. The Forward Planning process has only just been established but, when mature, will allow Navy to understand the impact of future updates/upgrades and make trade-off decisions with DMO/ASC.
Risks identified	Navy could be distracted by other pressures and step back to let DMO & ASC manage submarine availability on its behalf – its role must be well embedded in Enterprise processes. Key personnel could change and bring other priorities. Requirements could become unrealistic again. The Forward Planning process could falter if not supported by leadership in Navy, DMO and ASC.
Status	Green

A1.1.6 Recommendation 6

A forum to bring together all suppliers within the CCSP

Why this recommendation is important	OEMs and other suppliers can often find innovative ways of removing / refurbishing / installing or setting to work equipment and systems or providing advice on reliability improvements or obsolescence issues. Giving them a regular forum (such as twice a year) to offer input will provide an advantage to the Collins sustainment program. This is more challenging for Australia where submarine suppliers are at the high-end, low volume part of the supply spectrum. This will also be an issue for the SEA 1000 program.
Progress observed	A Collins Submarine Supply Support Council (CSSSC) has been established and some forums have been held with suppliers for specific purposes, such as ideas to achieve the 10+2 UUC, however, these have not been established in the way the recommendation intended. The CSSSC, which is held on a regular and ongoing basis, is looking to streamline procurement and inventory management. However, the "good ideas" forums are "one off" rather than an embedded regular event that is part of business as usual for the Submarine Enterprise.
Risks identified	The risk is that CCSP will not benefit fully from the collective knowledge that exists within Australian industry nor will it motivate an engaged, proactive and constructive "All In" culture.
Status	Amber

A1.1.7 Recommendation 7

Co-ordinate existing initiatives, accept recommendations from the Phase 3 Report and co-ordinate implementation according to the Implementation Strategy

Why this recommendation is important	There are a large number of recommendations and other initiatives still running – all of which will contribute either directly or as an enabler to maintaining availability. Our intention was for the TPO to direct the implementation of recommendations and initiatives where necessary and to support their delivery whilst monitoring progress.
Progress observed	The bulk of the short-term recommendations and initiatives have been completed, but the longer-term and more complex recommendations have not been completed, and in some cases not started. Evidence sighted: • Transformation Plan in April 2013 • Refreshed Transformation Plan in December 2013 • Recommendation evidence material provided by the TPO.
Risks identified	The TPO drifts into a monitoring function and does not proactively move the Program forward and embed performance improvements in an enduring way.
Status	Red

A1.1.9 Recommendation 8

Develop and implement a contracting strategy

Why this recommendation is important	Alignment of the supply base to support the achievement the performance metrics within the ISSC will increase the value of the supplier base contribution to improving the overall availability of the Collins Class.
Progress observed	The outline of a contracting strategy is embedded within the Asset Management Strategy (AMS) document. This provides a good basis from which to develop a full contracting strategy in a separate document. We have seen evidence of this: • The proposed move into the first ISSC 5 year performance period • Reforms to incorporate supply support and rolling combat system baseline management into combat system support arrangements • Similar arrangements currently in negotiation for sonar support • Similar approaches to the negotiations for the submarine escape and rescue arrangements. The AMS is yet to be endorsed.
Risks identified	There are many contracts outside the scope of the ISSC that contribute to the Enterprise objective to reach or exceed the international benchmark by 2016. These can be marshalled in several ways. The risk is that without an overarching contracting strategy these contracts will be optimised on an individual and not best overall basis.
Status	Amber

A1.1.10 Recommendation 9

Create a collaborative framework known as the 'Enterprise' without diluting the individual responsibilities of the participants

Why this recommendation is important	Enterprise level behaviours will continue to deliver high levels of performance under difficult circumstances without an over reliance on the commercial frameworks.
Progress observed	Transformation Program Board is established, supported by joint governance and working teams. Evidence sighted: • 'Working together as an Enterprise' document, January 2014 • Collins Submarine Enterprise Governance Framework, Joint Procedure, December 2013 • Submarine Enterprise Key Performance Indicator (KPI) framework, November 2013 • Enterprise roles and responsibilities against value chain, August 2013.
Risks identified	Enterprise behaviours do not permeate all levels of the Enterprise which inhibits performance.
Status	Green

A1.1.11 Recommendation 10

Improve leadership skills, knowledge and experience

Why this recommendation is important	The Enterprise needs transformational change to achieve its benchmark targets. For transformation to be effective senior leaders across the Enterprise must work together to drive change at a program-wide level. Executive management team able to lead change and drive improved performance with common purpose. High Performance Leadership and Management teams (HPLT) development program delivered.
Progress observed	The Phase 3 report (p56) identified the key enablers for program-level change as: • Leadership must set a clear and strong vision with meaningful objectives • Supported by defined operational plans that are cascaded down • Communication needs to be frequent and widely distributed • A governance system is required to allow leaders to work together • A clear channel for feedback • The workforce needs to be provided with the required authority and autonomy to carry out the strategy. We have seen good progress against the majority but not all of these key enablers.
Risks identified	Transformation may stall if leaders 'take the foot off the accelerator' or become distracted. Without well structured, long-term succession planning, changes in leadership may not have the skills, knowledge or experience to continue to lead change and drive improved performance.
Status	Amber

A1.1.12 Recommendation 11

Defer HMAS Collins Full Cycle Docking (FCD) and improve maintenance planning

Why this recommendation is important	The original recommendation was to delay the start of HMAS Collins and develop an improved FCD schedule, and hold the original HMAS Collins end-date. This was important to progressively move to a two-year FCD and thereby enable a 10+2 UUC.
Progress observed	The Enterprise agreed to move to an immediate transition to a two-year FCD for HMAS Farncomb and overhaul the Planned Maintenance Management Program (PMMP). As part of the 10+2 program seven major projects are underway to achieve a two-year FCD from HMAS Farncomb onwards with HMAS Collins being used as an enabler as part of the transition.
Risks identified	All these methods will be brought together for the first time on HMAS Farncomb and the two-year FCD may not be achieved.
Status	Amber

A1.1.13 Recommendation 12

Develop an Asset Management Strategy for sustainment

Why this recommendation is important	The AMS should connect the Asset Management Plans (the details) with the Navy's asset management policy – simply described as the capability requirement – in short, "two deployable submarines from a fleet of six". The strategy should explain how the UUC (now 10+2 years) will maintain the policy. The strategy should direct maintenance program planning, including improvement and upgrade work (Asset Management Plans) to be developed with the accompanying budgets. Currently these are embodied in the DMO's "Longcast".
Progress observed	The draft Collins Class AMS is a good document which is in its infancy. It is suggested that its scope be extended to mitigate the risks identified below. Evidence: • Collins Class Asset Management Strategy Version 1.0 November 2013 (unsigned, unapproved).
Risks identified	The AMS is an important document to provide governance and drive priorities in what people focus on, such as: requirement for asset management plan; knowledge of the material condition of the submarines (therefore what needs to be prioritised); accurate capture of task-level costs to support long-term decision making and availability improvement; development of appropriate skills (reliability, maintenance management, planning/scheduling); commitment to Enterprise IT strategy.
Status	Amber

A1.1.14 Recommendation 13

Availability requirements in the MSA should be derived from the IMS and a working level plan generated

Why this recommendation is important	It is vital to have a 'single point of truth' for availability data, which flows down from and supports the clearly-stated operational output. All Enterprise participants must have confidence that there is a shared aim point. The authorized IMS is used as a planning template by Navy/DMO to establish annual Enterprise performance targets.
Progress observed	The availability targets (MRD) derived from IMS 5.0 are reflected in the PdS Product Operating Profile and in Enterprise KPIs. The ISSC Contract Master Schedule uses the same availability requirements. Evidence sighted: • IMS v5.0 (May13) is incorporated as the Product Activity Plan for the MSA Product Schedule (CN10 PdS) FY14 – FY23.
Risks identified	The IMS change process must remain agile enough to avoid the IMS becoming rigid and therefore outdated to be of little value.
Status	Green

A1.1.15 Recommendation 14

Develop a through-life Capability Management Plan reflecting the updated requirement

Why this recommendation is important	The CMP is the top-level document that sets out how all FICs contribute to the submarine capability. CMP reflects the Navy Statement of Requirement and covers all FICs. It is endorsed and used for planning.
Progress observed	The CMP sets the high level FIC requirements to meet the Navy Requirement (two deployable submarines). More detailed FIC requirement annexes are still in production. Evidence sighted: • Submarine CMP issued by Director General Submarine Capability (DGSMC), August 2013.
Risks identified	The CMP may become less relevant if not updated annually.
Status	Green

A1.1.16 Recommendation 15

Define and endorse an Asset Management Plan

Why this recommendation is important	The Asset Management Plan is key to ensure the "design intent" is preserved and what upgrades or modifications (including all reliability and obsolescence issues) should be fitted and when. This will allow a bottom up budget to be compiled (the cost model) for forward budget planning and allocation, and for prioritisation and long-term decision making.
Progress observed	There is good work on improvement, drawing together multiple data sources and the use of that data, as part of setting up a Forward Planning team. But there needs to be a rationalisation as to what an asset management plan for CCSMs really means and a single point of authority and accountability. The plan is not aligned with the guidance of the public specifications or standards (see PAS 55 or Cl 6.22 of ISO 55000). Suggest this be revisited in the light of this feedback. Evidence sighted: • CCSM Reliability and Asset Management Plan Doc No ASC-12706, 24 September 2013 • Draft Forward Planning ToR.
Risks identified	Without a "single point of truth" with regard to submarine work activity including budget data, the overall material health of the submarines may deteriorate. This has been recognised by virtue of the development of the DMO "Longcast", the Enterprise need for a Forward Planning team and Cost Model. If the "what, when and cost estimates" are not covered in a live document the risk is that the work scope and cost estimates for a maintenance availability will not be defined in sufficient detail or time to allow proper scheduling or the BoM to be accurately compiled. Without this, holding to the 10+2 pattern would be virtually impossible.
Status	Amber

A1.1.17 Recommendation 16

Implement and complete a fully-integrated sourcing and materials supply support program under the ISSC

Why this recommendation is important	This recommendation when implemented is intended to provide the strategy for how the right supplies will be made available at the right time and in the right place. It also covers the relationships with suppliers to ensure the inventory is maintained at the right levels and early obsolescence etc. identified. The relationships can range from Vendor Managed Inventory (VMI) under a long-term contract to specific buys under a transactional arrangement; often a short-term contract. In general, and particularly where there is limited competition in the supply base, we would expect long-term support contracts would be more beneficial than short-term and VMI or Availability contracts to be the ultimate goal.
Progress observed	Good progress has been made on supply support and this has underpinned the improvement in submarine availability achieved over the last two years. A sourcing strategy has been developed with objective of achieving long-term and where practical VMI contracts. However, due to the short-term nature of the ISSC Transition contract this has not, by and large, been implemented yet.
Risks identified	We would expect that with the placing of the five year ISSC for the first Performance Period that the sourcing strategy would be prioritised. The right focus and resources will be required to drive this sourcing strategy forward.
Status	Amber

A1.1.18 Recommendation 17

Treat defects occurring prior to the completion of Sea Acceptance Trials (SATs) as part of the contracted maintenance period

Why this recommendation is important	The standard international practice is to treat any defects occurring prior to the completion of SATs as part of the contracted maintenance and therefore as part of the original contract.
Progress observed	Not accepted
Risks identified	None identified
Status	Not accepted

A1.1.19 Recommendation 18

Review and where necessary improve procedures to audit O-level maintenance and records

Why this recommendation is important	Ships staff needs assistance in planning and execution of their work. Their knowledge of material condition of equipment is critical to correcting small defects or nursing stressed equipment before they become URDEFs, as an input to Intermediate Level Maintenance and Depot Level Maintenance plans, and to keeping the risk to operations at a manageable level between maintenance periods. Good knowledge of material condition and planning by ships staff, and good practices for material supply will enable start/finish compliance with tasks and more efficient progress of activities. This will reduce the load on ships staff resources at the O and I levels but also reduce maintenance backlogs and maintain work at manageable levels.
Progress observed	Progress is underway but will not provide sustainable benchmark performance until it is embedded as business as usual within the SUBFOR HQ technical office. • A program using a consultant to correct maintenance shortfalls was implemented for Self Maintenance Periods (April 2013-February 2014) and a further five planned to August 2014 • Open Maintenance Control Records (MCRs) (several thousand over many years) are being cleansed. Evidence sighted: • Covaris/Secora-Watchfire Collins Class Fleet- Reliability Analysis-SIMS Analysis report – October 2012 • CSMP Maintenance Availability Planning and Review (End to End) Process V1-5 – January 2014 • CCSM Total Open MCR Count by Boat and MP • MSA KPI/KHI Master Open MCR count.
Risks identified	That the procedures and practices being implemented will not be embedded as business as usual within the SUBFOR HQ and that the momentum being developed in the Navy SMCIP project will be lost, that ships staff skills, knowledge and experience will not be improved, and that risks to operations and availability will not be improved due to URDEF losses, maintenance schedule overruns and poor record keeping.
Status	Amber

A1.1.20 Recommendation 19

Create a Head of the Submarine Profession

Why this recommendation is important	This action establishes a single point of accountability in Navy for the capability output. It makes clear CN's ultimate role as Capability Manager and the delegation of this responsibility to DGSMC.
Progress observed	CN Directive designates DGSMC as 'Head of the Submarine Profession'. Heads of all Fundamental Inputs to the Submarine capability liaise routinely with DGSMC staff. Evidence sighted: • CN Directive 3/12 to DGSMC establishes him as Head of the Submarine Profession and Navy lead in the Submarine Enterprise • CN10 PdS sets out DGSMC's responsibilities in the sustainment Enterprise • The Submarine CMP issued by DGSMC describes how FICs are managed to deliver the capability output.
Risks identified	FIC requirements will be determined from a range of organisations across the submarine community leading to confusion and uncertain outputs.
Status	Green

A1.1.21 Recommendation 20

Develop a clear line of authority for maintenance of the design intent

Why this recommendation is important	Necessary to remove ambiguity in responsibility and provide a single line of authority, also to prevent the seeking of "alternative" approval through Fleet Engineer.
Progress observed	Established Chief Engineer Submarines position who acts as the Class Engineering Officer (CLEO) for Collins. There are plans to delegate the CLEO role for Collins to SUBFOR PSOE. Evidence sighted: • CCSM Joint ASC/DMO Procedure for the management of engineering assessment (JP 001/2012 of 25 March 2013) • Certificate of Recognition of ASC Pty Ltd Submarine Engineering as an integral part of the Submarine AEO for Collins Class Platform Systems and Whole-ship design integration, in accordance with ABR 6492, Naval Technical Regulations Manual dated 1 July 2013.
Risks identified	Serious concerns about sustainability due to personnel gaps in DSME and inability to recruit because of Defence-wide recruiting freeze. Plans to delegate responsibility to SUBFOR Engineer may result in insufficient separation between design and operations.
Status	Green

A1.1.22 Recommendation 21

Develop and implement a workforce strategy to specifically address skills shortages at the management level

Why this recommendation is important	To ensure that the staff across the Enterprise have the skills, competence and knowledge to undertake the new tasks following transformation of the roles and responsibilities.
Progress observed	The ASC has produced a Strategic Workforce Plan for the years 2013 to 2018. It considers its potential order book, headcount forecasts, areas of workforce vulnerability by function and trades, the impact of Australian and Global workforce trends and the balance between fixed and flexible employment contracts. We have not been made aware of any progress in this area within the DMO. See Recommendation 22 for RAN. Evidence sighted: • ASC Strategic Workforce Plan (2013 to 2018) • Naval Engineering Strategic Plan 2013-17 • Naval Engineering Future State Blueprint August 13.
Risks identified	Competent and qualified staff will not be in place to undertake new roles and responsibilities and either stall, impede or even reverse the transformational program. The ASC and RAN have plans in place to mitigate this risk. The DMO still carry this risk and nothing appears to have been done to mitigate it. Indeed the reverse may well be true. The public service freeze on recruitment to reduce head count has forestalled any attempt to match new skills with the new roles required after transfer of many DMO tasks to the ASC following placement of the ISSC. The DMO now has the greatest need to change but appears to be the least agile to address this issue.
Status	Red

A1.1.23 Recommendation 22

Develop and implement a plan to resolve loss of Naval Engineering skills

Why this recommendation is important	Strong Naval Engineering skills are central to Navy's role as Informed Customer, DMO's role as Intelligent Buyer and Industry as the Skilled Provider. A submarine, which is sophisticated, requires a high level of electrical and mechanical engineering knowledge and skills to maintain it in a safe and reliable condition. In particular, experience in power electrics (main storage batteries, generators, motors and switchgear) is crucial. The harsh operating environment also places extreme demands on many mechanical systems, including the diesel-generators and propulsion. The submarine is also highly reliant on others, including high pressure air, hydraulics and cooling.
Progress observed	The Navy SMCIP ET/MT Up-skilling Program is well underway and has significantly enhanced on-job and formal training through tighter control of ship staff maintenance including reducing maintenance backlogs, accurate recording of work and management of self-maintenance periods. Evidence presented: • Covaris/Secora-Watchfire Collins Class Fleet- Reliability Analysis-Sims Analysis report – October 2012 • CSMP Maintenance Availability Planning and Review (End to End) Process V1-5 – January 2014 • CCSM Total Open MCR Count by Boat and MP • MSA KPI/KHI Master Open MCR count.
Risks identified	Lack of understanding of the importance of good education and training on specific issues such as maintenance management and main storage batteries will lead to poor decision making and loss of availability.
Status	Amber

A1.1.24 Recommendation 23

Improve adequacy of the Ships Information System and implement the use of onboard portable technology to aid in maintenance efficiency

Why this recommendation is important	Ships staff need assistance in conducting and recording maintenance. Maintenance records, especially at O-level, are critical to understanding the material condition of the equipment, the correct planning of maintenance availabilities, and the avoidance of small defects becoming URDEFs. This applies to simple maintenance routines such as cleaning and inspection as much as to more complex procedures.
Progress observed	We have been informed that: • Tablets purchased but awaiting delivery of SIMS #6 (porting onto modern, supportable software) • Time taken to implement tablet connectivity is affected by lack of supportability of current SIMS software and need to port onto modern language • Live testing of SIMS #6 commences after mid-February 2014 • Finalisation of tablet connectivity and rollout due mid-2014
Risks identified	The awaited SIMS #6 is not released thus precluding the connectivity of the tablets.
Status	Amber

A1.1.25 Recommendation 24

Develop an Enterprise-wide IT strategy and information management strategy

Why this recommendation is important	The Enterprise IT Strategy was intended to address the issue of a lack of single set of accurate information to improve decision making. The Collins IT environment requires the rekeying of information which wastes time, introduces errors in data and data latency which are difficult to detect and correct, which negates good control of records and materials.
Progress observed	Developing and approving the Enterprise IT strategy has stalled. The IT Strategy was developed and subsequently discussed by the Transformation Program Board. The focus of the Enterprise IT Strategy is on improving integration of existing systems as opposed to overall system change. Examples: • Clarification and direction is needed by CIOG to deploy SIMS to the DPN (DRN). • ASC/Defence connectivity (CONTROL/Military Integrated Logistics Information System (MILIS)) stalled – interface protocols not yet simplified and agreed Evidence sighted: • Draft Collins IT Strategy, February 2013 • Project I15: SIMS/ASC integration – SIMS #6 (DRN), December 2013
Risks identified	If the Enterprise IT strategy is not progressed, the status quo will prevail and Enterprise will not be able to drive efficiencies after benchmark availability has been achieved.
Status	Red

A1.1.26 Recommendation 25

Develop a cost baseline/model and supporting processes for the sustainment program

Why this recommendation is important	An Enterprise level cost model will provide an essential tool for the Enterprise to proactively manage cost. It will provide a complete understanding of the entire costs across the Enterprise linked to the outputs and will underpin the balancing of expenditure across the Enterprise (maximize bang for the buck) and direct efficiency initiatives to best effect.
Progress observed	We have observed that the cost model structure has been established and codified, however, it is yet to be populated with data. We have not identified the owner and assurer of the cost model, once populated. Whilst the update of the program schedule and impact on the Enterprise cost model with revised work scope (reallocated resources) has been assigned to the Forward Planning Team the broader use of the cost model to manage cost saving initiatives is not understood.
Risks identified	The management of cost across the Enterprise will not be managed in the most effective manner leading to incorrect balance of investment decisions and increased risk to the output as cost efficiency measures are implemented in future years. Ownership of the cost model has not been resolved, good practice would suggest that those involved with the delivery of the services should be core users, and independent assurance should be provided by the Central Finance Group in DMO
Status	Red

A1.2 Review of underlying performance drivers

A1.2.1 Governance and strategy

Operational requirement effectively stated

The Chief of Navy has clearly expressed his operational requirement as:

"two deployable submarines consistently available, with four submarines available to the Fleet Commander and of these four, three submarines consistently available for tasking with one in shorter term maintenance and two submarines in long term maintenance and upgrade".

This requirement is translated into a steady-state MRD requirement and transitional targets for the years before benchmark availability is achieved.

Further work has been completed to define the Mission Equipment List required to achieve 'deployable' status and an additional Material Capable Days (MCD) metric developed to measure achievement against "two deployable submarines consistently available". A steady-state MCD requirement has been set and transitional targets established.

The operational requirement and associated MRD and MCD targets are reflected in the RAN Submarine CMP, the Collins Class Statement of Operating Intent and the CN10 Product Schedule.

Significant achievement:

- The operational requirement is clearly and effectively stated across the Enterprise.

Clear sustainment objective

The combination of MRD and MCD targets form an effective high-level output requirement for the Enterprise and is reflected in its KPIs. The MCD requirement is not, however, currently reflected in the ISSC Performance Management Framework (PMF) and hence ASC is not currently incentivised to achieve it.

The current Transition Period was designed to enable the ISSC to be optimised to achieve the desired outcomes. During this period specific contract changes have been made to introduce overall MRD target (as defined in the CN10 PdS) and adjust the maintenance overrun target to that of the benchmark. These have collectively reduced the over-emphasis on completing maintenance periods to time and not accepting important additional work within the maintenance periods or responding to in-service defect repair.

MRD and MCD measures are part of the revised ISSC Performance Period KPIs, currently under negotiation with intended start in July 2014. It is intended that over the period FY15 to FY19 MCD will supplant MRD in a phased manner as the primary incentivised output measure.

When the ISSC PMF is changed to reflect the Enterprise KPIs there will be a clear sustainment objective that flows down from and is tightly linked to the operational objective specified by Navy.

Significant achievement:

- The current DMO and ASC principals are committed to reforming the ISSC PMF for the Performance Period to reflect the clear sustainment objective in the Enterprise KPIs.

Overarching Asset Management Strategy

An asset management strategy has been drafted and is a good document which is in its early stages. It should directly connect the Asset Management Plans (the details) with the Navy's asset management policy – which can be very simply described as the Capability Requirement – in short, 'two deployable submarines from six'. The strategy uses the 10+2 UUC to deliver availability targets and is the link between the Navy's Capability Requirement and the details in an asset management plan.

The AMS (yet to be endorsed) is silent on guidance for the asset management plans (maintenance program planning, including improvement and upgrade work and budgets). The Enterprise realises the need however, and this is being achieved with the DMO's "Longcast" which should provide the source data for the Enterprise Cost Model. The draft strategy is focused on performance based behaviour among the partners and with clear functional objectives for the submarines. The basis for achieving the objectives is defined as:

- Revised UUC design to 10+2
- Identification of the top level roles of organisations in the CCSM Enterprise: Navy, DMO and Industry
- Performance oriented approach and recognition of the performance targets of Industry
- Timeline for change/improvement based on the Incentive Periods.

The draft AMS is a vital document to provide governance and drive priorities. We suggest that the following elements be considered as this document matures and is extended, for example: requirement for an asset management plan, knowledge of the material condition of the submarines (therefore what needs to be prioritised), accurate capture of task-level costs to support long-term decision making and availability improvement, development of appropriate skills (reliability, maintenance management, planning/scheduling), commitment to Enterprise IT strategy.

Cooperative and collegiate Enterprise

An Enterprise approach to sustainment has been in place since late 2012, succeeding the early moves to establish a Navy/DMO/ASC joint program office in 2010.

A cooperative and collegiate approach to decision making was noted at management levels in the Enterprise. This approach may not yet have percolated down to working levels within the three organisations.

Enterprise governance arrangements have evolved during 2013. The Transformation Program Board (TPB) has been in existence for just over 12 months and has agreed an Operating Model and Enterprise KPIs. The Operating Model clarifies roles and responsibilities across the Enterprise. One function (Forward Planning) is shared amongst the three participants but all others are specifically assigned to one lead participant. The KPIs give a clear view of performance against the operational outcome of "two deployable submarines". Whilst these KPIs are not yet fully reflected in subordinate structures (primarily the ISSC) work is underway to change the ISSC: Enterprise behaviour in action.

At present the involvement of other industry partners is limited but we expect that this should expand as the Enterprise matures.

Effective governance

Enterprise governance forums have evolved and have been delegated appropriate levels of responsibility. The Program Delivery Board (COMSUBFOR, DSMS and GM ASC-WA) makes most of the major decisions around maintenance activities (primarily in WA) and has been reported by all three members to be an effective and timely management body with appropriate delegations. It is supported by an effective Delivery Team in WA for day-to-day decisions.

The draft Enterprise governance framework was approved 'for guidance' by the Program Review Board (PRB) in December 2013, but is yet to be formally endorsed.

Sustainment cost actively managed

The active management of sustainment costs can be considered as three key elements:

- A clear understanding of the costs across the Enterprise and how they relate to the outputs (the Cost Model at Recommendation 25)
- Balancing the expenditure to optimize the overall outcome of the Enterprise
- Achieving cost savings in a holistic manner.

To date, as can be seen from the assessment of progress on Recommendation 25, the structure of the cost model has been largely defined, but has yet to be populated. The Forward Planning concept, once mature, will contribute in some measure to gaining a clear understanding of how the costs can be optimized and provide a mechanism for identifying savings. However, as this process is far from mature we cannot make a judgment on its efficacy. Moreover, without a populated and agreed Enterprise cost model active management of cost will be impossible.

We suggest that some urgency should be applied to completing the Enterprise cost model.

To ensure enduring transformation:

- We suggest that some urgency should be applied to completing the Enterprise cost model.

Performance driven culture

A pre-requisite to establishing a performance driven culture is a common target that all can aim at. This has been clearly stated in an Unclassified Statement of Submarine Availability issued by the Chief of the Navy dated 18 October 2012. This statement reflects the availability achievement defined by the International Benchmark. To meet this, the Enterprise has adjusted the UUC to 10+2 and has set targets to meet the four key components of the International Benchmark: planned time in maintenance; maintenance overruns; days lost defects; and total number of MRDs achieved.

We have witnessed first-hand and seen supporting documentation that demonstrates that at senior and managerial levels across the Enterprise this challenge has been accepted and is being pursued. The amendments made so far to the ISSC and the changes planned to the ISSC for the performance phase confirm this continuing desire to embed an "output focused" performance driven culture. However, assessing the depth to which this culture has permeated within the workforce throughout the Enterprise would require a staff survey along the lines of the "Belong – Belief – Behave" survey that was conducted during Phase 2.

To measure transformation:

- A staff survey should be conducted to assess how well the performance culture has been adopted.

A1.2.2 Capability

Capability upgrades identified early

An Enterprise Forward Planning process, led by Navy as the capability manager, has recently been implemented. The focus of Forward Planning is the period beyond the currently contracted work i.e. currently FY17 onwards.

The Forward Planning process aims to identify all generation and sustainment update/upgrade work which could be incorporated in future maintenance activities and assess them for workload, cost and capability impacts. This allows the Enterprise to make early trade-off decisions on capability, schedule and cost. The maturity of projects is one of the factors considered in the forward planning process.

The Forward Planning process includes capability upgrades being identified well in advance of ISSC contracted work scope development, and balanced against other competing demands.

The current focus of the forward planning team is HMAS Collins' FCD starting mid-2016. When mature, Forward Planning will be an important contributor to long-term program stability and affordability.

Submarines sufficiently crewed

The RAN Submarine CMP (V 1.0 August 2013) identifies an overarching requirement for sufficient submarine domain knowledge to sustain five crews for the Collins Class and all

other positions supporting the capability, while growing the workforce further to transition to the future submarine.

The current submarine workforce establishment (or position structure) was developed from the 2008 Submarine Workforce Sustainability Review. It allows for four sustainable submarine crews (of 58 personnel) supported by a Submarine Support Group and shore support positions for both the Collins and future submarine capabilities. Expansion of the workforce establishment to include a fifth crew would require an increase in Navy's Average Funded Strength (personnel budget). Such an increase would be significant in AFS terms but small in comparison to the Sustainment budget.

The fourth submarine crew was established in 2012 after a dedicated training program over the three years FY10 to FY12. All four in-service submarines are currently crewed, although HMAS Dechaineux (currently in 17-month MCD until late 2014) is not fully crewed.

The workforce strength has improved over the past two years but there are still areas of fragility. Recruiting into the submarine training pipeline is generally adequate but moving these trainees through to submarine qualification is highly dependent on submarine availability. Training bunks at sea for new submariners (increasing the submarine workforce size) competes with space for more advanced training (increasing skills and experience). The 'new submariner' qualification achievement in FY13 was relatively low (53 officers and sailors qualified) but we were told that experience levels in the crews was now being measured and was at a good level, perhaps reflecting this trade-off between building workforce numbers and building experience. Changes to the qualification pipeline were made in 2013 and seem to have been effective, with 60 new submariners qualified to date in FY14 from a target of 93.

Retention of experienced personnel remains a key challenge for Navy and a key driver of the size of the submarine workforce. Various retention measures have been or are in place. Improved availability leading to improved programme certainty is an important retention factor.

The CN10 Product Schedule FY14-FY23 describes Navy's top-level availability and utility requirements in its Product Operating Profile. It states that, at benchmark availability, four crews will meet Navy's submarine preparedness obligations and its training requirements. This is strictly correct since, even at benchmark availability, three to four submarines will be available for sea at any one time with a fifth submarine always in ID or MCD, and the sixth in FCD. Four crews across the fleet however implies that the ID/MCD submarine will not be crewed and therefore that the four crews will rotate between the five submarines in WA. This is a similar situation to 2009-2012, when three crews rotated between four submarines in WA and crews changed as submarines entered ID or MCD, resulting in some of the 'crew ownership' problems identified in Phases 1-3.

Although four crews is strictly sufficient to meet Navy's preparedness and training objectives at benchmark availability, this is considered to be a higher risk strategy given the crew ownership problems experienced in the past. The overarching requirement for five crews expressed in the CMP is therefore supported, noting that the fifth crew may not need to be fully manned, particularly in the longer (12 month) MCDs. Having at least a core

technical crew in the ID/MCD submarine however will strengthen crew ownership during these dockings and lessen the risks identified in previous phases of the review.

Navy's aim for the overall submarine workforce is not clearly stated. This includes crews, command, training, shore support and strategic and capability management. A clear statement of intent to appropriately crew submarines in deep maintenance (ID, MCD, FCD) would be welcomed. A dedicated training plan to achieve that aim is the next step, recognising that success is highly dependent on the achievement of increased submarine availability, and workforce retention.

A1.2.3 Engineering

Clear design authority

The Naval Engineering Future State Blueprint issued by Head Navy Engineering in August 2013 provides guidance on how naval engineering will be managed in the future. It establishes a "Ship Class" system overseen by Class Engineers. This Class Engineer is in effect the single point of authority for design aspects of the "Ship Class" and controls delegations to others.

For submarines there is a Chief Engineer Submarines who currently acts as the Class Engineer for the Collins Class. This position is in the DMO and is the Head of the Submarine Authorised Engineering Organisation (AEO) and responsible for maintaining the technical design integrity of the Collins Class. ASC Submarine Engineering Group have been recognised as a part of the Submarine AEO for sustainment of platform systems and as the whole-of-submarine design integrator. As an element of this recognition, a number of competent senior ASC engineers have been granted a Level 2 delegation of Engineering Authority by Director General Technical Standards.

This arrangement formalises and clarifies the design management arrangements for the Collins Class.

Reliability and obsolescence managed

One of the key measures of success for an engineering support organisation associated with asset management of large systems is the monthly or quarterly tracking of how many reliability and obsolescence issues are opened and how many are closed. Getting these issues resolved, and the time taken, are key measures of performance.

A properly funded and managed reliability and obsolescence program will ensure the submarine and its equipment can be maintained to meet the designer's intent. The SRAMG has been established at Enterprise level to manage the process for platform system items. A similar group comprising DMO and the three major suppliers has been established for combat system items.

DMO, with ASC and combat system vendors now operates a sensible, logical and stable system for predicting obsolescent items and categorising by risk, which represents good practice. Meetings with ASC and combat system suppliers occur regularly (at least every six months).

Items predicted to be unobtainable within three years are categorised as obsolescence critical and are attended to immediately. Currently there are only four items within the combat system thus categorised; all are being managed.

In May 2013, for the platform, of nearly 16,000 items of interest for obsolescence there were nearly 10% of items obsolete and nearly 2% awaiting responses. The next SRAMG summary report will be at the end of FY14 when these figures will be updated.

We were advised by ASC in this review that about 1000 items were outstanding within the platform obsolescence and reliability program, with a clearance rate of some 80 per year. We feel this may be too slow to achieve benchmark days lost to URDEFs during FY17.

If the funding for the obsolescence and reliability program is inadequate, this problem will re-emerge.

Appropriate preventative maintenance plan

An efficient maintenance plan ensures the right amount of maintenance is completed to meet the designer's intent, while avoiding nugatory work and waste of funds and effort.

Our November 2012 Report showed that a percentage of preventative maintenance was nugatory, and not addressing actual failure modes which are driving suppressed reliability performance.

Since then, there has been a focus on root cause analysis for all major failures, feeding back into the maintenance system. Also, as part of the 10+2 transformation program, ASC has been concentrating on reducing work scope where appropriate to support HMAS Farncomb's two-year FCD. ASC is planning to follow this up with a review on maintenance in the 10 year operational period.

Navy through the SMCIP is running its Maintenance Evaluation Review to reduce inefficient maintenance. This combined work should drive the maintenance program to a more effective and efficient basis.

Another analysis should be conducted after benchmark availability has been established.

Design configuration accurate

The configuration management of the Collins Class is controlled through a Configuration Control Board (CCB) that meets monthly it considers all Configuration Change Proposals (CCP) and Concessions in SIMS. This is supported by two Steering Groups; one for platform systems and one for combat systems.

The configuration management processes, procedures and roles and responsibilities are contained MP11751 Collins Class Configuration Management Plan dated July 2011. The processes and procedures are based on good practice.

MP 11751 is currently under review. We would suggest that the roles and responsibilities for configuration management are re-considered in the light of the changes brought about by the ISSC and the use of increased delegations to the ASC.

Quick approvals

Approvals can often lead to delays during production. These can be engineering approvals for the emerging/corrective work or executive approval of the cost and schedule impact. The DMO has transferred a "block budget" to the ASC for emerging work and with a range of ASC engineers having achieved Levels 2, 3 and 4 AEO status, and delays due to engineering approval of concessions or Maintenance Amendment Proposals (MAPs) have all but disappeared. However, the ASC has yet to formally accept Executive Authority for concessions and the process for this is under development. We understand that ASC is willing to accept this authority and DMO is prepared to relinquish this level of control. ASC is exercising Executive Authority for Level 5 MAPs.

We would suggest that the ASC accept Executive Authority for any concessions that do not impact upon the schedule or cost estimates.

Effective and efficient asset management plan

The Asset Management Plan is key to ensure the designer's intent is preserved through the maintenance program, and what upgrades or modifications (including all reliability and obsolescence issues) should be fitted and when.

This will allow a zero-based budget to be compiled for budget planning and allocation, and for prioritisation and long-term decision making (the Cost Model). It also represents best practice to develop future budgets.

An Asset Management Plan has been developed by ASC but it is not aligned with the guidance of public specifications or standards (see PAS 55 or Cl 6.22 of ISO 55000). Elements have been developed elsewhere which should be incorporated. Examples are:

- The 'Longcast' – the detailed description of the work required to maintain the design intent, capability upgrades and updates to overcome reliability and obsolescence issues
- Reference to the Cost Model and how this would be used
- Single point accountability for the work scope of each maintenance period.

We suggest the Asset Management Plan be revisited in the light of this feedback.

A1.2.4 Planning

Working level master plan

At the top level the IMS is developed to meet the UUC and to deliver Navy's MRD target expressed in the CN10 PdS. The current IMS v5.2 (19 December 2013) reflects the approved 'immediate' transition to the 10+2 UUC and delivers benchmark availability from FY17 onwards. The IMS is approved at an appropriate (1*) level and is endorsed by the PRB for planning purposes beyond the currently contracted ISSC period. It has been updated a number of times in the past 12 months and so is now a 'live' document that represents a 'single point of truth' for Enterprise planning, including Forward Planning and issue of the Advanced Planning Letter to Industry.

The recent positive achievements (HMAS Farncomb's ID/CED, HMAS Sheean and HMAS Waller IMAVs) and the recovery of HMAS Rankin and HMAS Dechaineux schedules indicate

significant progress has been made in translating IMS requirements into executable working-level plans. Successful on-time completion of the HMAS Rankin FCD and HMAS Dechaineux MCD in 2014 will give further confidence that benchmark availability can be achieved in FY17.

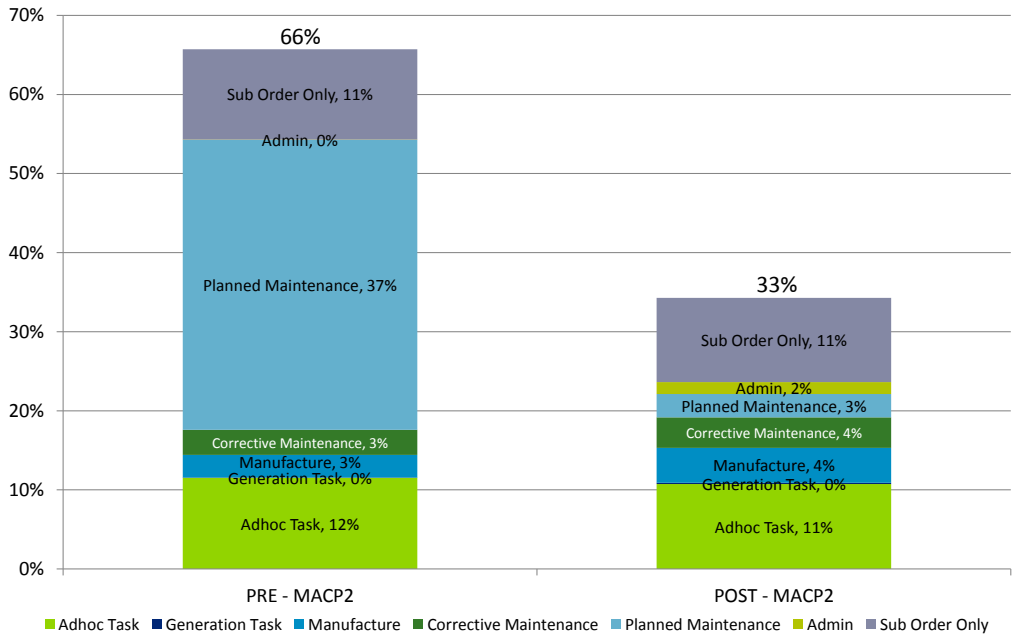
Work Scope is accurate

To optimise maintenance and ensure its timely completion, an accurate plan for a maintenance period that incorporates planned and corrective maintenance, update and upgrade work is required. There will always be an element of emerging work that cannot be built into the plan, but this needs to be minimised. A reasonable target is to have 90% of work scope planned for a complex artefact such as a submarine.

Figure 16 shows that the work scope accuracy for HMAS Farncomb ID/CED was 66% at the time work scope was frozen (pre-Maintenance Amendment Change Proposal 2 (MACP2)) and the additional 33% of work scope that had been added by the time the maintenance period was completed (post-MACP2).

The 66% work scope accuracy for HMAS Farncomb ID/CED compares favourably to HMAS Rankin FCD which was 28% at approximately the same point in time, but is still well below the reasonable target of 90%.

Figure 16 – HMAS Farncomb ID/CED work scope accuracy



The known planned work is described in a Maintenance Requirement Record – Planned (MRR-P). Corrective maintenance that has occurred more than once will be described in a MRR – Corrective (MRR-C). Corrective maintenance that has only occurred once is described as Ad-Hoc. The process should be that when an Ad-Hoc is repeated it is classified as a MRR-C and if a MRR-C is repeated regularly then it becomes an MRR-P. An extensive database, dating back to 1996 exists, with some 7000 MRR-P, 46000 MRR-C and 11000 Ad-Hoc items.

The engineering department of ASC is currently conducting a review of the maintenance work scope with a target of achieving 90% accuracy prior to a maintenance period commencing. The task is captured within CMS-51029 Revision 4.0 - Maintenance Availability End To End Process (Develop Maintenance Availability Work Pack – MAWP). This is a time consuming task and requires some manual input to sanitize the data and interpret the results.

A clear understanding of the material state of the submarine is also a pre-requisite to achieving an accurate work scope. This relies on continuous dialogue with ship's staff and a full PACA being conducted in a timely manner.

In order to minimise maintenance delays whilst the MAWP matures the ASC has adopted a pragmatic approach to the supply and planning elements. This includes:

- A BoM based upon the MRR-P
- A "Global Muster" stock
- A "rotables pool"
- A planning approach based on Work Chains and "Hammocks".

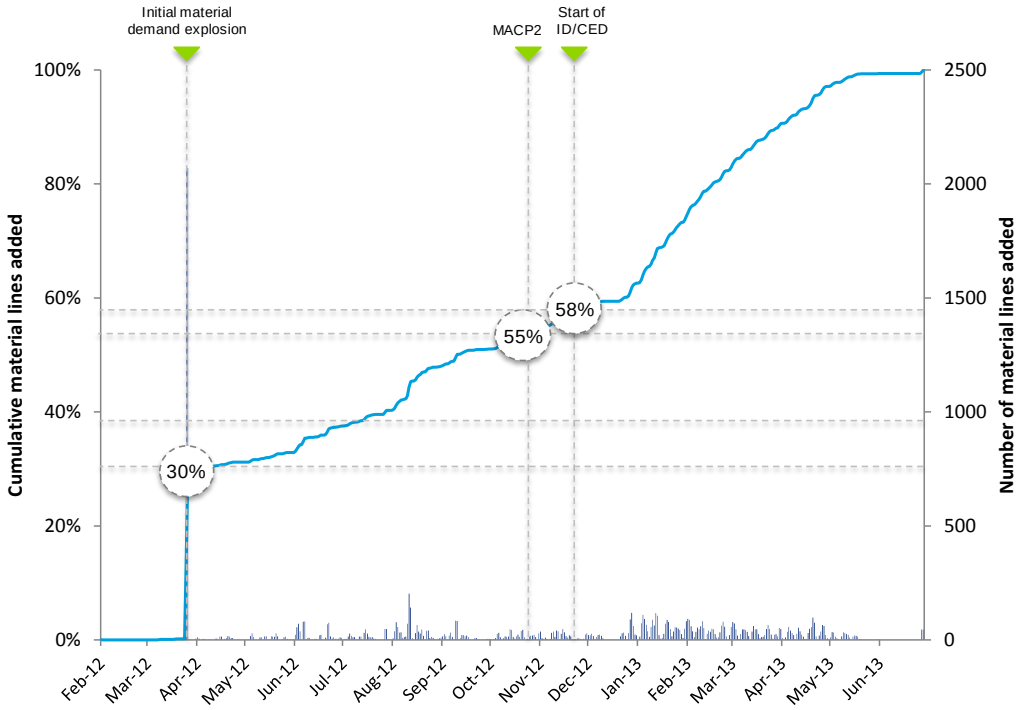
This practical approach to overcoming the disruptive effects of the unpredictable nature of corrective maintenance is supported by this review. It is imperative, however, that the continuing improvement processes and collective working of engineering, supply, planning and production are relentlessly pursued on a continuing basis. If the attention to detail is allowed to deteriorate then benchmark performance will not endure.

Accurate BoM

ASC have commenced a project to improve material demand accuracy to address the significant volume of material that is requested but not used during a docking (over-ordering). Material demand accuracy has been calculated at 75% compared to a target of 90%. Over-ordering creates waste in moving stock needlessly around the system and also is an opportunity cost, as this inventory could have been better used elsewhere. This issue has historically been driven by a 'just in case' attitude irrespective of cost, an unstable work scope, and inaccuracy in planned work scope. Increased confidence in material supply delivered through the Inventory Investment Plan (IIP), tighter control on update and upgrade work scope through Forward Planning and greater adherence to the established feedback processes to refine the MRR-Ps, should lead to improvements in this area, but this is yet to be demonstrated.

Equal attention needs to be placed on material completeness, which is defined as the amount of materials that were forecast as being required at work scope freeze (MACP2). Material completeness for HMAS Farncomb ID/CED was 55% (refer Figure 17). Low material completeness drives additional cost because a lack of materials results in a low work pack fill rate that delays production and impacts schedule adherence. These delays then need to be caught up through contingency or over-time which is often more costly than the more visible over-ordering cost. The IIP is compensating for this inaccurate material forecast, however, to improve the cost efficiency, material completeness needs to improve. When work scope is 90% accurate and BoM is 95% accurate this would give a material completeness target of 86%.

Figure 17 – Material completeness for HMAS Farncomb ID/CED



We suggest that these measures require further focus and scrutiny over the next two years. As learnings occur through HMAS Farncomb's FCD and other dockings are incorporated to develop a more accurate work scope, improvements to BoM accuracy and resulting material completeness.

Efficient scheduling of the work scope

ASC's former method of scheduling at work pack level, with over 8000 work packs was too detailed to manage and led to confliction in resource applications at work fronts. Even minor changes in the work became a major exercise to re-plan and re-schedule. The comments that follow are aimed at the two-year FCD for HMAS Farncomb as this is seen as the most difficult to resolve at this stage.

ASC has completely revised its scheduling methods for the HMAS Farncomb FCD and these are now in line with industry norms. All work is grouped into three main phases – deconstruct, work chains and re-construct. There are five work chains (applied as zones or work areas) and beneath these, work packs are bundled into hammocks to avoid confliction and easier management at the trade supervisor level. The zoned work chains allow de-confliction of resources with multiple work fronts and the hammocks allow sufficient flexibility in how the supervisors handle their work packs. This 'Work Chain – Hammock – Work Pack' approach enables minor changes to be managed without the need to reschedule the entire job.

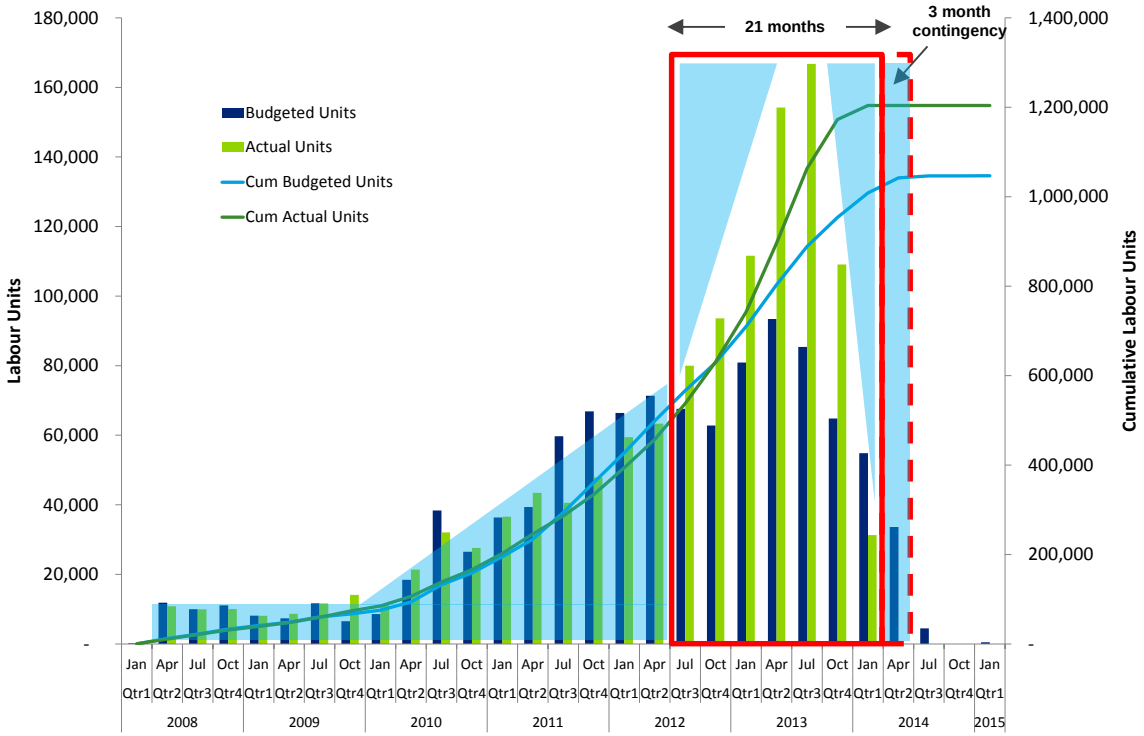
For the 21 month programmed period for HMAS Farncomb's FCD there are three elements which will allow completion of a body of work within a proposed time frame by a set amount of resources, presuming all instructions; material; tools and test equipment; plant and machinery; right people; and free access to the place of work are to hand:

- Work is well planned and will maximise labour utilisation during the delivery of each job (planning quality)
- Scheduling is optimal so that resources are allocated and utilised efficiently from job to job with minimum of set-up time
- Work front productivity is enhanced by keeping parts and infrastructure close to resources at the site of the jobs.

We have seen how ASC is attacking the latter two elements with the new scheduling methods (outlined above) and facilities such as the Maintenance Support Towers and new workshops, and access cuts etc. Our analysis leaves us with concerns about the quality of planning.

We have analysed HMAS Rankin's FCD to better understand past resource allocations and have tried to gauge what may be done to improve the probability of success for HMAS Farncomb (Figure 18 and Figure 19). We believe that the main risk to achieving HMAS Farncomb's (21 month) FCD is whether the amount of work allocated in past FCDs (using HMAS Rankin as an example) can be accommodated within the proposed 21 month time period for HMAS Farncomb. In addition, if emergent work is greater than 10% we believe that there is a probability that the 21 month period will overrun, so work scope and planning quality need to take this into account.

Figure 18 – HMAS Rankin FCD – Budget vs Actual Labour Hours

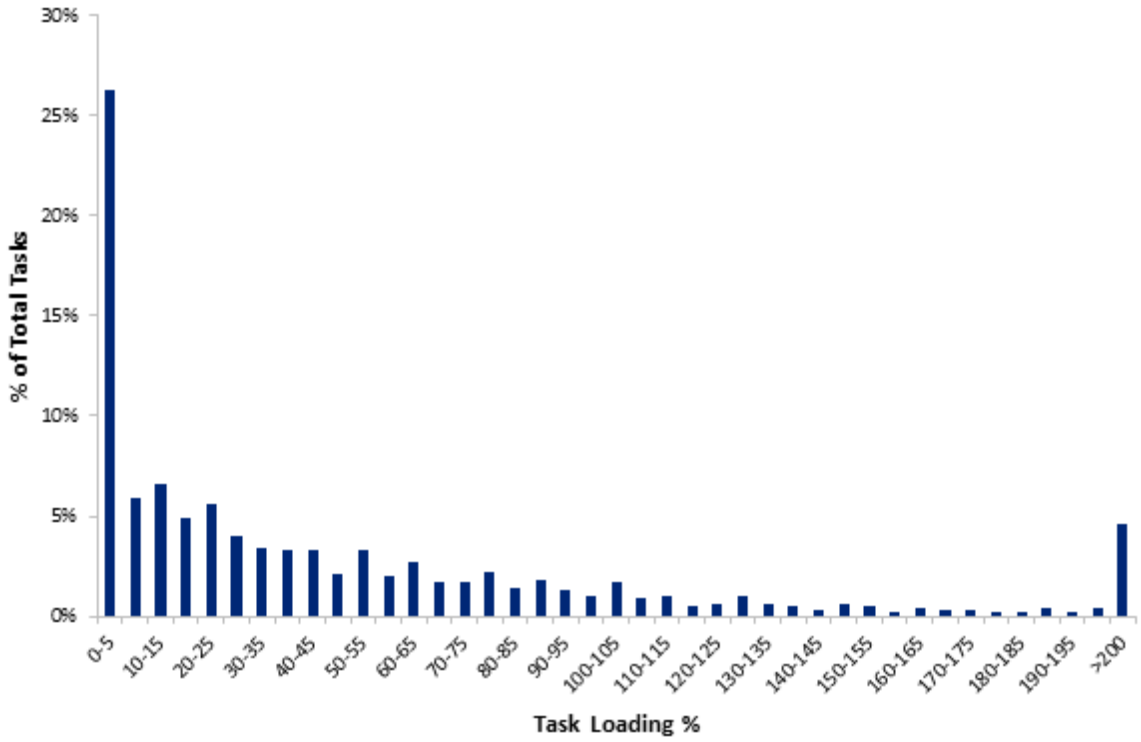


Referring to our analysis for HMAS Rankin FCD shown graphically in Figure 18:

- The actual hours represent historical time booked to the job and do not yet reflect efficiencies expected from improved working methods developed under the 10+2 Transformation program (e.g. Maintenance Support Towers)
- Working back from HMAS Rankin's FCD completion date for 21 Months (the planned time for HMAS Farncomb) there is a considerable amount of work that occurs before this point that will now have to be absorbed into the 21 months for HMAS Farncomb to complete its FCD on time, or removed or done a different way - we were advised that ASC is removing nugatory tasks and shortening other tasks as technical requirements for these are relaxed by Engineering
- We do not know the impact on the schedule of the 10+2 projects to improve work front productivity (for example putting the maintenance towers in place, cutting access openings in the submarine)
- The nature of the early part of past FCDs before the final 21 months (e.g. HMAS Rankin) needs to be better understood to see if it can be compressed.

Figure 19 shows labour task loading for HMAS Rankin FCD, which is the ratio of duration of the job compared to the budgeted hours.

Figure 19 – HMAS Rankin FCD – Task Loading Distribution



For more than 25% of the jobs, the duration allowed in the plan was 20 times longer in hours than sum of the allocated labour resources. This is seen as a planning quality issue. Jobs are not specified tightly, or well defined and bounded into discrete packages of work

which people can start immediately in accordance with the schedule and then quickly close out.

We believe that ASC can deliver the 21 month FCD for HMAS Farncomb but at this stage we see there are two key risks:

- How ASC will handle the first 3-4 months of the FCD (how the start-up of the FCD handles the traditionally long low intensity start-up of 24 or so months)
- How planning quality will improve and give us confidence that the critical path is what it is, and that improved planning will compress durations on the critical path.

A1.2.5 Supply

Over the last two years the Enterprise has transformed the Collins Class supply chain. Two separate supply chains (one for FCDs and one for in-service support) have been combined by moving from a GFE centric supply (managed predominately by NIPO) to a Contractor Managed Commonwealth Asset (CMCA) supply chain under a Performance Based Contract (PBC). CMCA supply chain responsibilities are shown in Table 2.

Table 2 - CMCA supply chain responsibilities

Category	Items	%	Manager
Platform	27,351	86%	ASC
NIPO	1,507	5%	NIPO
Combat	1,345	4%	Raytheon
Commons	823	3%	NIPO transitioning to ASC
Sonar	320	1%	Thales
Periscopes	227	1%	BAE Systems
Total	**31,573**	**100%**	

On-time purchase orders

On-time purchase order (PO) placement has improved over the last two years. ASC tracks the end-to-end process from the point at which material is demanded to a buyer issuing an RFQ, to a quote being received and then placed by the buyer. A uniform end-to-end cycle time of 14 days is targeted, with the RFQ to be issued within five days. Current performance is that 89% of RFQs are issued within five days and 84% of purchase orders are placed within 14 days (last 12 months). This is a significant improvement from two years ago when on time quotations ranged between 25% and 70%.

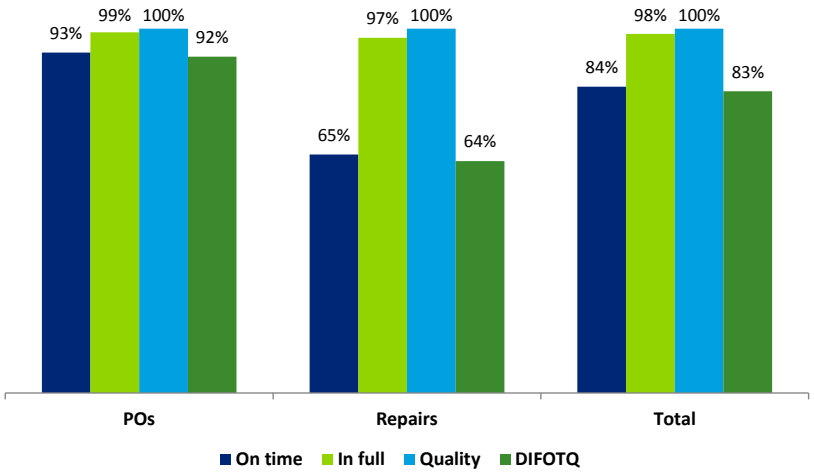
These improvements have occurred through delegation of supply responsibility to the ASC which has reduced approval times, a focus on internal performance and individual buyer efforts to work with suppliers. To continue the trajectory in performance a more holistic approach is required as part of a broader supply reform program.

High delivery performance

Over the last two years, ASC has focused on control of supplier delivery performance. On time delivery, has improved marginally with the annualised average now 84% up from 82%

two years ago. Delivery quality has also improved with the amount of conforming product received that is not quarantined now 99.9% up from 94%-99% two years ago. In-full delivery currently sits at 98% meaning that overall delivery performance is calculated at 83% (Delivery In Full, On Time to Quality (DIFOTQ)). Performance differs considerably depending on whether the delivery relates to a purchased or repaired item (Refer Figure 20). DIFOTQ in relation to POs is at average benchmark performance of 92% but is still short of a leading benchmark performance of greater than 95%. Receiving repaired items (repairs) on time (65%) is the area that requires greatest improvement for supplier performance. This is also important as part of a broader effort to reduce repair loop cycle time.

Figure 20 – Current Delivery performance (Feb-13 – Jan-14)



To achieve the breakthrough improvements to reach benchmark levels we suggest a different approach is required. Focus should shift from internal control to rationalisation of suppliers, capability improvement of the procurement function, waste reduction and value creation. For example with fewer suppliers, relationships can deepen and quality can be certified at the source reducing the reliance on an inspection based quality regime.

Supplier relationships managed

Supplier delivery performance has improved, but to reach benchmark performance pro-active supplier relationship management needs to be put in place. We hoped that the move to the ISSC (with greater funding certainty) would provide the opportunity to improve the level of effective partnership with key suppliers through long-term contracts. However, efforts to establish these relationships are still in their infancy, perhaps in-part due to the fact that the ISSC had an initial transition period of two years (albeit an increase over a three-month rolling Through Life Support Agreement (TLSA) funding model). ASC has a very large supplier base (3760 suppliers over the last five years) with zero spend under strategic contracts (defined as greater than three years).

ASC has recently commenced a procurement transformation journey and conducted a spend analysis and sourcing opportunity assessment and restructured the supply organisation to put a greater emphasis on strategic sourcing. This restructure needs to ensure that buying power through spend aggregation is maximised, and that ASC moves beyond buy/sell relationships and transactional processing to developing forward looking strategies to manage total cost, inventory postponement strategies, kitting and outsourced

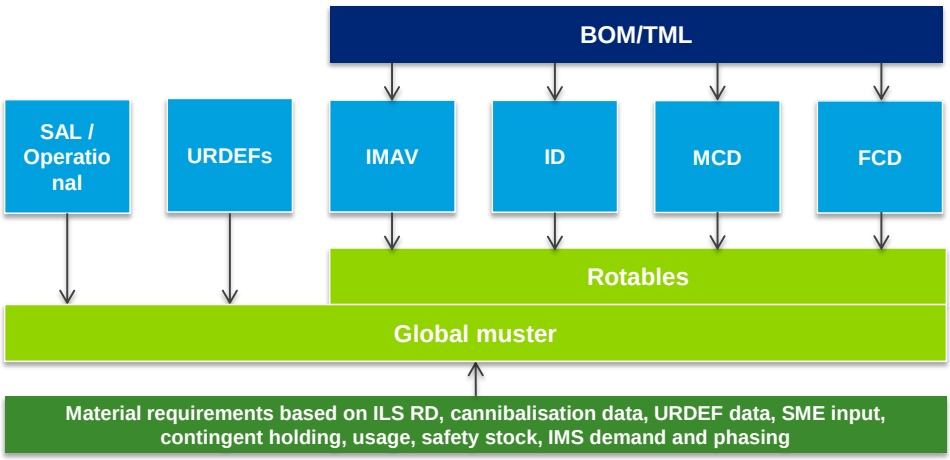
relationships. An example of such a strategy that ASC has recently implemented a VMI initiative for HP Air components, which we are advised has cycle times reduced, warranties extended and cost efficiencies gained.

ASC has plans in place to improve their supplier management capability and implement a category sourcing program. Such programs are often self-funding with savings achieved through initial category sourcing efforts, funding further category sourcing waves as well as other initiatives. This plan is in line with a shift to more effective supplier relationship management and needs to be adequately resourced and followed through. Sustainable performance will only be achieved if the Enterprise enhances its supply management skill sets and forms strategic supplier partnerships focused on the total supply chain. A lack of managed long-term contracts will continue to limit ASC's ability to influence supplier behaviour and incentivise suppliers to make investments to improve their performance.

Effective inventory policy

As part of the move to ASC managed supply chain for platform items, ASC have developed an Inventory Investment Plan (IIP) to better manage inventory. The IIP philosophy is to pool material requirements for FCD and in-service maintenance (MCD, ID and IMAV) as well as operational requirements for parts on-board defined by the SAL into a global muster (refer Figure 21).

Figure 21 - IIP philosophy



Material requirements have been determined through ILS Requirements Determination, inclusive of Mean Time Between Failure (MTBF) data and usage data combined with actual usage against each Activity type. Separately it incorporates cannibalisation data, URDEF data, SME input and contingent holding for unplanned and corrective maintenance. The plan is then time phased in accordance with the IMS and takes into account current inventory levels. Optimisation software is used to for IIP optimisation. This approach should be commended as it has optimised part availability independent of a better forecast. However, to achieve benchmark performance the material forecast does need to be improved.

Inventory levels are at much higher levels, but attention also needs to be placed on the quality of that inventory. We understand that as much as a third of the legacy items in

JLU(W) are not required. The temptation is to keep this stock, just in case, however if there is no actual requirement for this stock, it is just taking valuable warehouse space and increasing the carrying costs for the Enterprise. To achieve benchmark performance, inventory quality will need to be addressed.

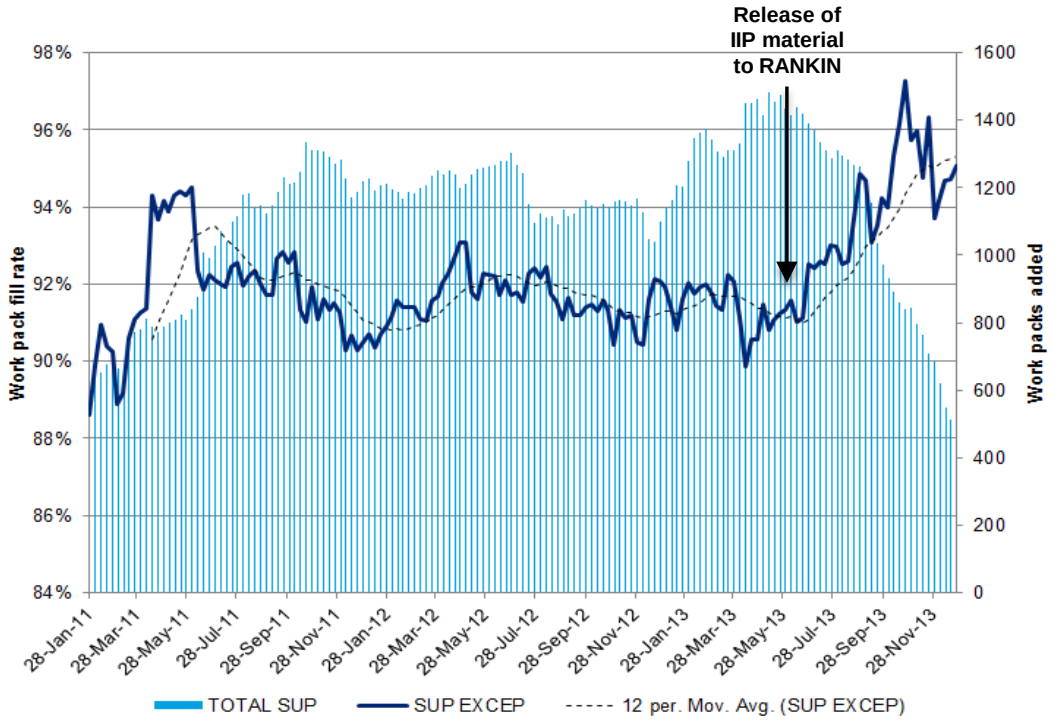
Inventory record accuracy high

Inventory record accuracy in ASC's Adelaide warehouse is high at 99%. This is at or approaching benchmark performance. However, in addition to managing materials in ControlOpen, as part of the ISSC, there is a requirement for ASC to update MILIS with CMCA inventory. As there is no electronic interface between the systems, this is done manually by 8 staff. Accuracy of MILIS relative to ControlOpen is currently 68% (measured at item and bin location). As ControlOpen is the primary inventory management system this does not have a significant impact on purchasing or stock movements, it does point to waste and inefficiency that must be addressed if enduring benchmark performance is to be achieved. A proposal was put forward in February 2011 to interface MILIS with ControlOpen for the management of Commonwealth owned inventory, but this has not progressed. It is suggested that the requirement for updating of stock items in MILIS as well as the interface opportunity is re-investigated with some urgency.

Sufficient parts available in the warehouse

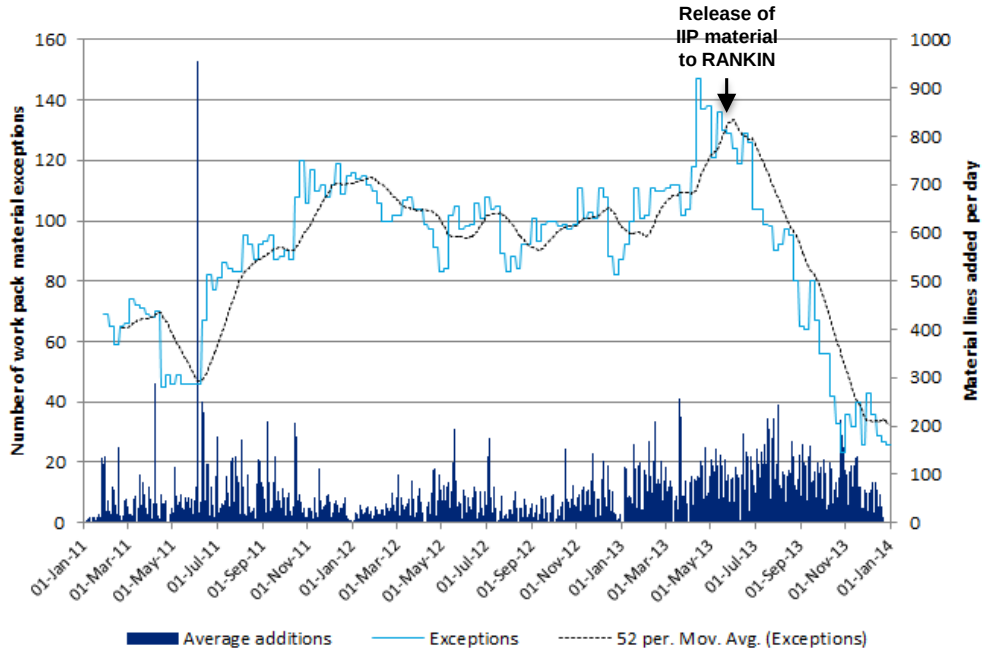
As part of ISSC transition a significant investment has been made to increase and better plan inventory holdings. The increase in inventory holdings and better planning has increased part availability as measured by work pack fill rate, which is the measure of the supply chain's ability to meet Production's demand for materials. This measure expresses what percentage work packs Supply can provide 100% of materials two weeks prior to when that work pack is required by Production. Work pack fill rate for HMAS Rankin FCD has historically been between 90-92%. With the release of materials from the IIP to the HMAS Rankin FCD work pack fill rate increased to an average of 94% over the last six months. This is consistent with recent performance for the HMAS Farncomb ID/CED (94%) and the HMAS Dechaineux MCD (93%) that is currently underway. We suggest that a good targeted performance would be 97%.

Figure 22 – Work pack fill rate for HMAS Rankin FCD



The improvement in performance is further shown by looking at material exceptions for the HMAS Rankin FCD (refer Figure 23). During the period post May 2013 a consistently large volume of material lines were added each day. Despite this demand, often as Additional Material Requests (AMRs) the number of work pack material exceptions started to drop, a direct result of having the material available.

Figure 23 – Material exceptions for HMAS Rankin FCD

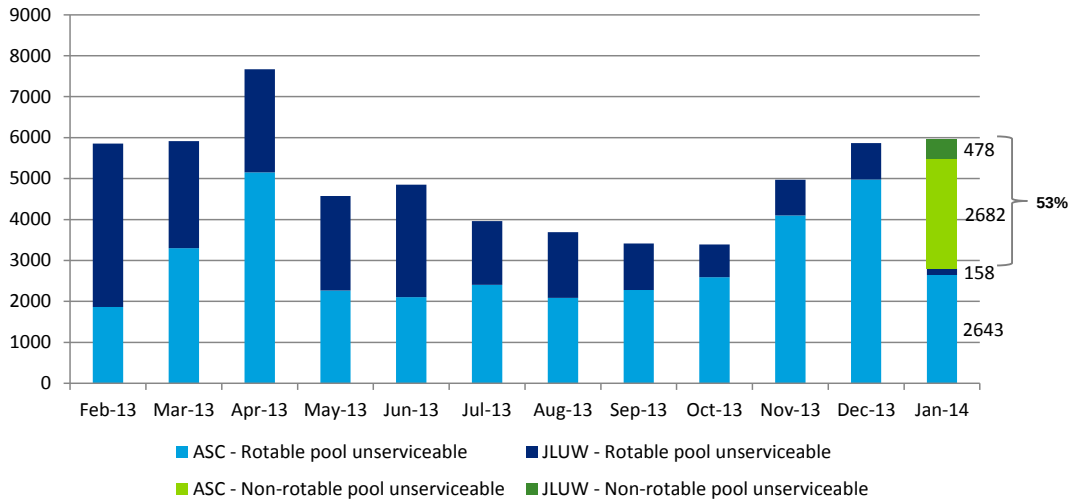


It would appear that historically the Enterprise has not tracked the demand satisfaction rate for spares meeting the operational URDEFs. We suggest that this should be tracked as a KPI.

Returns and repairables managed

Responsibility for managing the return of spares or repairables to the Original Equipment Manufacturer (OEM) or repair authority has shifted to ASC under the ISSC. Over the last 12 months the significant majority of repairables has been transferred from JLU(W) to ASC and this is a major achievement (refer Figure 24). Attention is now being placed on the quality of the inventory, with 53% of stock recently identified as 'potential disposal candidates or non-critical repair items'.

Figure 24 – Unserviceable items



Effective wharf-side distribution

Under the Navy Submarine Continuous Improvement Program (SMCIP) we are informed that wharf-side distribution has improved. This has included changing the delivery physical flows for demand items within SUBFOR stores. New sorting areas allow for sorting of items by boat and demand type with items that are not required urgently stored in SUBFOR stores. A new process for MCR-related demand has also been implemented with packs assembled when all items for an MCR are received and staged ready for transport to the Wharf-side Distribution Point (WDP).

Achieve an accurate Ship Allowance List

Having correct spares available during operations enables the timely completion of planned maintenance activities and corrective maintenance activities at sea. Completed planned maintenance prevents the chances of a breakdown occurring and successful corrective maintenance prevents days lost at sea. Two functions need to be right to achieve this aim: an accurate SAL and a fully-stocked SAL.

SAL accuracy has been subject to a review by Navy SMCIP to determine the O-level planned maintenance activities that had no requirement in the SAL. Reviewing parts in the SAL required for corrective maintenance is more difficult, and optimising these parts is subject to an ongoing review under SUBFOR Supply. As part of this review, the use of deployment

packs is also being reviewed, with the intent to move any critical items into the SAL and then eliminate the need for deployment packs altogether. We were informed that deployment packs vary hugely from submarine to submarine and are not currently an effective way to manage critical spare parts for corrective maintenance.

SAL fulfilment has improved from 77% to 87% from December 2012 to November 2013 and is targeted to be over 90% in 2014. This improvement has been driven by a better understanding of what should be in the SAL, as well as improvements in the broader supply chain. The Fleet Logistics Support Element (FLSE) has now been incorporated into SUBFOR and the FLSE staff has been instrumental in driving through the improvements. Based on our discussions, we understand that feedback loops are in place from SUBFOR to ASC Supply to ensure that part requirements are fed into the ASC IIP. With clear ownership of the SAL by SUBFOR Supply and these feedback loops in place, we expect this improvement is achievable.

A1.2.6 Production

Maintenance staff skilled and enabled

The maintenance workforce can be categorised as Navy – ships staff and shore based and ASC - North and West. The Navy skills are covered elsewhere in this report.

It is evident in the improvement in availability achieved since 2012 that the skills of the ASC labour force have been and are adequate. The major change is that the ASC workforce has through better delegation and improved maintenance management (e.g. Safely on Time) been enabled to carry out their assigned tasks more effectively. ASC WA has an ongoing recruitment program. They have also established a training program to convert newly recruited skilled electrical and mechanical technicians into skilled submarine technicians, and some Navy personnel have also attended these courses. This is essential to support five submarines based in the West on a long-term basis.

This represents good practice and should be continued.

Schedule adherence is high

Schedule adherence (start/finish compliance) is an indicator that the work within a maintenance period is under control and will be completed on time. By December 2012 ASC had come to the realisation that after the first six months of the ISSC, performance was not being delivered:

- HMAS Sheean had emerged late from its FCD with MRD losses from post-maintenance defects
- HMAS Waller had finished late from its MCD also with significant defects
- HMAS Rankin FCD was behind schedule and efforts to recover were not having the desired effect
- The HMAS Collins contracted FCD program was uncertain
- Achieving the MRD target was in doubt.

Overall, the program was at significant risk of exceeding budget and not delivering the FY13 MRD target. ASC set out to agree with Defence 'what success would look like' after the first 12 months of the ISSC.

Subsequently, considerable effort went into recovering the program. One way was to concentrate on achieving completion dates and a production approach which ASC calls "Safely on Time, Right First Time" (Safely on Time) was introduced. This approach drives team based behaviour, schedule adherence and work pack closure. Having tested Safely on Time in a previous maintenance activity, it was applied successfully in WA to recover HMAS Farncomb ID/CED progress and then applied in SA to support the rebuild and undock phases for HMAS Rankin's FCD. This is now due to complete on time.

The Review Team was invited to witness a daily Safely on Time meeting. The meeting was supervised by an energetic production leadership and focused on work readiness, monitoring and assisting trade supervisors to meet deadlines and on close out of paperwork. The meeting was based on irrefutable data which represented a single point of truth. The approach is excellent practice and in line with industry norms.

To assess schedule adherence, we conducted an analysis of the Primavera P6 schedules for:

- HMAS Sheean IMAV 204
    - Excellent results with nearly 100% of tasks starting/finishing to plan or +/- 1 day within an 8 week activity
    - Completed to the planned finish date utilising less labour hours to planned
    - This shows excellent schedule adherence for short jobs
- HMAS Farncomb ID/CED 221
    - Good start and finish variance with 83% of tasks starting within +/- 5 days and 61% finishing within +/- 5 days overall
    - The analysis shows that a surge in resources was made part way through to complete this job on time, which we believe is a technique that is not sustainable in the long-term
    - This demonstrates good schedule adherence for dockings in WA
- HMAS Dechaineux MCD 212
    - Excellent start and finish date compliance, with 90% of tasks starting to plan and 91% of tasks finished as planned or within +/- 5 days variance to planned
    - Consistently less labour hours used to planned labour hours
    - This shows excellent adherence with schedule is being achieved for large dockings in WA
- HMAS Rankin FCD 019
    - Average start date variance was consistently reduced during the FCD and average early finish of tasks was dramatically increased.
    - There is a significant step change in the project from calendar Q3 in 2012, when actual labour units were dramatically increased over the planned units. It can be deduced that post Q3 of 2012 the project labour input was dramatically increased in order to drive early completion of tasks, again we believe this is a technique that is not sustainable in the long-term
    - ASC has demonstrated in SA that it can achieve schedule adherence despite a difficult working plan using its Safely on Time approach.

The analysis shows a considerable improvement in production behaviour which bodes well for completion of a two-year FCD providing the schedule is of the right quality in the first place.

Adequate feedback from production

For the Production staff to carry out their task in accordance with the schedule, they will need six key elements to be in place: instructions; material; tools and test equipment; plant and machinery; right people; and free access to the place of work. The work pack can then be completed, the OQE produced and the MCR closed out in ControlOpen (The ASC System) and the Maintenance Requirement Record (MRR) closed out in SIMS (The Navy System).

The process for Production to feedback any discrepancies in the six key elements above to Planning, ILS (Supply) and Engineering is described in the Work Pack Feedback Process (CMS-52513) based upon Form ASCMP1601 the requirement is also documented in CMS-5096 Work Pack Closure in SIMS and ControlOpen. These processes involve the raising of MAPs and Problem Deviation Reports (PDRs) if an engineering intervention is required. The process for close out in ControlOpen and SIMS is largely through electronic transfer, but also requires a limited amount of manual intervention.

CMS-5096 and CMS-52513 were issued in mid-2013 and it is too early to tell how effective this is/will be in refining the Maintenance Availability Work Scope, BoM and Maintenance Period Schedule. However, the processes are now in place and with close working between the various departments in ASC we would expect to see improvements over time. We believe this process should be accelerated to improve planning quality as quickly as possible.

Maintenance staff levels balanced between SA and WA

When we conducted our Study in 2012 the ASC West was highly dependent upon labour from the ASC North site and contracted-in labour (around 37%). This ability to flex the work force also suited the relatively unsteady workload profiles that were characterised by peaks and troughs.

The entire Collins Class will be operating to a 10+2 UUC by mid-2016. At this time only one submarine will be in an FCD in ASC North and five submarines will be in under the control of SUBFOR or in an ID or MCD with ASC (W). This will create a much steadier and slightly increased (16%) workload on ASC (W) and therefore as part of the ASC (W) Phase 1 planning the intention is to reduce the dependency on bought in labour to around 13%. Phase 2 of the ASC (W) workforce plan will see a further increase in the maintenance trades workforce of around 25%. With a larger permanent workforce the ASC (W) have assessed they will be able to absorb the increased maintenance load on ASC (W). This increased maintenance workforce comprises electrical and mechanical trades and an increased apprenticeship program to secure an enduring workforce capable of sustaining benchmark performance during the 10 year in-service part of the 10+2 UUC.

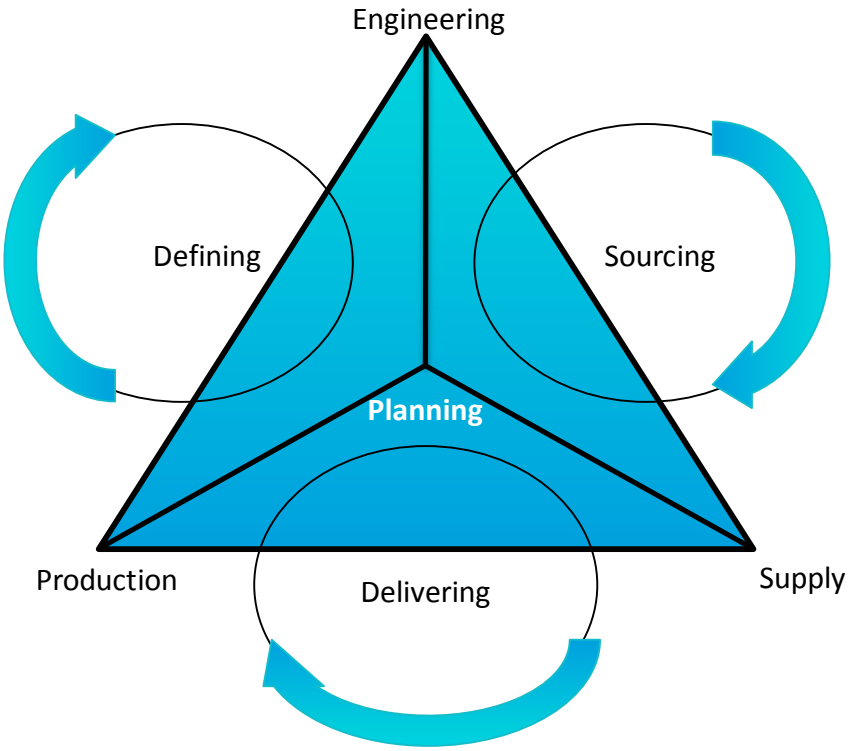
A1.2.7 Managing maintenance activities

The improvements in the availability performance of the Collins Class over the last two years are undoubtedly due to many factors: the availability of funding; the setting of clear goals; the empowerment to achieve them; productive relationships (Navy, DMO, Finance and

ASC); closer and interactive working between in-service support in WA and deep maintenance in SA; and the willingness of the ASC to accept risk and the Navy/DMO to relinquish control at the transactional level, to name a few of the overarching ones. However, to reach International Benchmark performance and sustain this indefinitely the detailed maintenance management arrangements must also be right.

Close co-operation between the Engineering; Supply; Production and Planning Departments in support of the Project Teams in the ASC and Enterprise Delivery Teams for each maintenance period is also a pre-requisite to achieving benchmark performance. This is illustrated in the maintenance management triangle shown at Figure 25.

Figure 25 – Maintenance Management Triangle



These four groups need to work closely together in the prior planning and during the maintenance periods to ensure success. This prior planning should focus on: 'Defining' the work scope, 'Sourcing' the right parts and materials at the right time; and 'Delivering' the production activities on time. An accurate 'schedule' with detail planning for individual work packs is central to achieving successfully these three activities. There also needs to be a continuous dialogue and feedback process to ensure that progressive learning is applied resulting in continuous improvement of the maintenance management.

When conducting the detail analysis in the 2012 Study we observed that for a major maintenance period the fundamental elements needed for success were not being achieved:

- **Accurate Work Scope**: The Maintenance Availability Work Scope defined at the start of the maintenance typically only represented about 60% of the actual work carried out

- **Accurate Bill of Materials**: The accuracy of the BoM at the start of the maintenance period was as low as only 38% compared to the materials actually used
- **Good Schedule Adherence**: Typically the actual work pack start date varied from the scheduled start date by over 100 days.

Clearly significant improvements were required.

We have now seen the features of good control and feedback as illustrated in Figure 25 being applied within the ASC and have discussed these in paragraphs A1.2.3 to A1.2.6. The highlights of these improvements are:

- **Accurate Work Scope**: ASC Engineering is in the process of examining the work scope for planned and corrective maintenance to determine how much 'corrective maintenance' could be moved to 'planned maintenance'. We have been advised that currently there are some 7000 planned maintenance routines (MRR-P), 46000 corrective maintenance routines (MRR-C) and 11000 ad-hoc maintenance activities (single occurrence so not formalised to a routine). The magnitude of this task is enormous and will take some time to complete. Early indications are that the regulatory of occurrence of specific MRR-Cs is such that a relatively small proportion of MRR-C will be re-classified as MRR-Ps and be built into the MAWP.
- **Accurate Bill of Materials**: Until such time as the MAWP has matured to around 90% of the actual work carried out during the maintenance period the initial BoM cannot be determined with the accuracy required to manage a maintenance period to a tight schedule. Currently the material completeness accuracy we have observed is 55%. This is good progress since 2012 when it was typically 38% accurate, but not enough accuracy upon which to base the material supply plan for a well-managed maintenance period. The ASC has adopted a three pronged approach (the Inventory Investment Plan) to resolve this issue:
    - Getting the BoM as accurate as possible given the level of unknown work that could arise
    - Using a Global Inventory to rapidly respond to AMR when the unknown arises
    - Establishing a large pool (almost 3000) of "rotables" such that "inspect and maintain as required" on board the submarine is minimised. The "rotables" are used in a "locate and replace" policy with the "inspect and repair" being done in a workshop.
- **Good Schedule Adherence**: To improve both schedule adherence and to create a maintenance plan of higher intensity (increased man/hours per month) the ASC has adopted a planning approach broadly based upon "zones" to avoid work face conflicts arising and "hammocks" to enable schedule adherence to be proactively managed at a sensible level. This planning method has also enabled the inclusion of a time allowance (float) for corrective maintenance management. This float is based upon the typical time spent on corrective maintenance related to the "hammock". This planning method and the use of "Safely on Time" for real time production control represents good practice and increases the chance of good schedule adherence being achieved.

Key point:

Close co-operation between the Engineering; Supply; Production and Planning Departments in support of the Project Teams in the ASC and Enterprise Delivery Teams for each maintenance period is also a pre-requisite to achieving benchmark performance.

A1.2.8 Force generation

RAN crews appropriately skilled and enabled

Submarines operate for 12 months between major maintenance periods, which is a lengthy time for a sophisticated machine in a punishing environment. This places great importance (perhaps underappreciated) on ships staff being able to recognise and diagnose faults, to repair small faults before they turn into major defects, and to nurse stressed equipment to the next repair opportunity.

There are a number of factors any one of which might limit completion of work (for example, insufficient time, information, skills, tools and access). The Navy SMCIP questionnaire (November 2012) gave some indications, through sailors' comments, about gaps in skills that would be worth investigating.

The Navy has commenced an up skilling program for its technical sailors and this is likely to have contributed to the reduced times to repair defects and the reduction in defects occurring.

We feel that it is essential to remove the gaps that exist in skills and competencies in at least two areas: maintenance management, particularly for senior sailors and officers; and the main storage battery.

Gaps in skills and knowledge represent risk to sustaining benchmark performance.

O-level maintenance completed

In December 2012 a report by Navy SMCIP indicated poor compliance with O-level maintenance completion, which concurred with the analysis in our November 2012 Report. SUBFOR commenced a program within Navy SMCIP to focus on readiness for maintenance activities and follow-through to completion and close-out of tasks. The program is being run by Navy SMCIP, is having good effect, but needs to be embedded into Navy. It has been conducted on six alongside maintenance periods and is planned for another five out to August 2014. Results are encouraging and all 'running' submarines show a reduction in open MCRs. Open MCRs which are obviously stale are being cleansed from the system.

Progress is well underway but will not provide sustainable benchmark performance until it is embedded as business as usual within the SUBFOR HQ Technical Planning Office. We were not advised of any plan to do so.

Feedback and at-sea record-keeping is high

The long time between major maintenance periods places greater emphasis on ships staff attention to completing and accurately recording maintenance work. Accurate recording of

work and material condition is important for feeding back into the ILS system and is good practice for embodiment of engineering improvements and planning for maintenance periods.

The high count of open MCRs recorded in 2012 for all boats was evidence that at-sea record keeping (and therefore feedback into the ILS system) was poor. Ships staffs need to be made aware of the importance of knowledge of the material condition of their submarine, and therefore the importance to meeting benchmark performance levels of sustainment. SUBFOR HQ staff intends to re-set the MCR count, commencing with HMAS Rankin and HMAS Farncomb followed by the other submarines. In the meantime, the organisational level maintenance improvement program run by Navy SMCIP for SUBFOR is focused on readiness, conduct and completion including records. Recent data shows a much improved trend in work order closeout.

In our November 2012 Report we noted that support to ships staff for reporting and completing maintenance was poor. We found the information system (SIS) provided to submarine crews to support their work in maintenance (as defined by the ABRs) and defect mitigation was inadequate and could be a direct cause for minor defects being missed or not adequately acted on. In particular we mentioned the need for A3 printers and tablets to record maintenance work and diagnostics. The deployment of the tablets is awaiting the SIMS 6 upgrade within the next few months.

Key point:

Sustaining against the benchmark position will be at risk unless material condition is accurately fed back into the maintenance planning system.

Annex 2 – Glossary

Table 3 - Acronyms

Term	Definition
ABR	Australian Book of Reference
AEO	Authorised Engineering Organisation
AMR	Additional Material Request
AMS	Asset Management Strategy
ASC	ASC Pty Ltd (formerly Australian Submarine Corporation Pty Ltd)
AWD	Air Warfare Destroyer
BoM	Bill of Materials
CCB	Configuration Control Board
CCP	Configuration Change Proposal
CCSM	Collins Class Submarines
CCSP	Collins Class Sustainment Program
CED	Certification Extension Docking
CEO	Chief Executive Officer
CLEO	Class Engineering Officer
CMCA	Contractor Managed Commonwealth Asset
CMP	Capability Management Plan
CN	Chief of Navy
CN10 PdS	Chief of Navy - 10 - Product Statement
COMSUBFOR	Commander Submarine Force
CSMP	Collins Submarine Program
CSSSC	Collins Submarine Supply Support Council
Defence	Australian Department of Defence
DGSMC	Director General Submarine Capability
DIFOTQ	Delivery In Full, On Time to Quality
DLM	Depot Level Maintenance

Term	Definition
DMO	Defence Materiel Organisation
DSME	Director Submarine Engineering
DSMS	Director Submarine Sustainment
ET/MT	Electrical Technician/Marine Technician
FCD	Full Cycle Dockings
FIC	Fundamental Inputs to Capability
Finance	Department of Finance
FLSE	Fleet Logistics Support Element
FYXX	Financial Year, where XX denotes the end year of the period covered. For example, the financial year 2010/2011 is represented as FY11.
GFE	Government Furnished Equipment
GM ASC-WA	General Manager ASC WA
HMAS	Her Majesty's Australian Submarine
HPLT	High Performance Leadership and Management Team
ID	Intermediate Docking
IIP	Inventory Investment Plan
ILM	Intermediate Level Maintenance
IMAV	Intermediate Maintenance Availability
IMS	Integrated Master Schedule
Industry	All industrial elements contributing to the Collins Class capability
ISO	International Standards Organisation
ISSC	In-Service Support Contract
IT	Information Technology
JLU(W)	Joint Logistics Unit (West)
KHI/KPI	Key Health Indicator/Key Performance Indicator
Long-term	Time period greater than four years
MACP2	Maintenance Amendment Change Proposal 2

Term	Definition
MAP	Maintenance Amendment Proposal
MAWP	Maintenance Availability Work Pack
MCD	Material Capable Day
MCD	Mid Cycle Docking
MCR	Maintenance Control Record
Medium-term	Time period between one and four years
MEL	Mission Equipment List
MILIS	Military Integrated Logistics Information System
MRD	Material Ready Days
MRR	Maintenance Requirement Record
MSA	Materiel Sustainment Agreement
MTBF	Mean Time Between Failure
NIPO	Naval Inventory Procurement Office
O-level	Operational Level Maintenance
OEM	Original Equipment Manufacturer
OQE	Objective Quality Evidence
P1 URDEF	Priority 1 URDEF
PACA	Pre-Availability Condition Assessment
Participants	The four organisations responsible for the CCSM; the RAN, DMO, Finance and ASC
PAS	Publicly Available Specification
PBC	Performance Based Contract
PMF	Performance Management Framework
PRB	Program Review Board
RAN	Royal Australian Navy
SA	South Australia
SAL	Ship Allowance List

Term	Definition
SAT	Sea Acceptance Trial
Short-term	Period of time up to one year
SIMS	Submarine Information Management System
SIS	Submarine Information System (deployable version of SIMS)
SM	Submarine
SMCIP	Submarine Capability Improvement Program
SME	Small-Medium Enterprise
SMP	Self-Maintenance Period
SRAMG	Submarine Reliability and Availability Management Group
SUBFOR	Submarine Force
TCIF	Target Cost Incentive Fee
TLSA	Through Life Support Agreement between ASC and DMO
TPO	Transformation Program Office
URDEF	Urgent Defect
UUC	Usage and Upkeep Cycle
VMI	Vendor Managed Inventory
WA	Western Australia
WDP	Wharf-side Distribution Point