

Defence Strategic Reform: Smart Maintenance as a Change Management Issue

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In May of 2009, the Australian Government released the Defence White Paper 2009, *Defending Australia in the Asia Pacific Century: Force 2030* ('the White Paper'). In addition to outlining a proposed Australian Defence Force Structure out to 2030, the White Paper also emphasised the need for Defence Management Reform, the Strategic Reform Program (SRP).

The SRP sets out to "tackle fundamental issues regarding Defence's management performance".¹ Specifically the SRP sets out to improve Defence's performance in areas such as planning, capability development, procurement, and enterprise support services. Apart from improving the performance of Defence, the SRP is necessary to free-up the additional funds required to deliver on the proposed 2030 force structure.

For the first time this document has committed funding for the life of the White Paper (2030).² Yet there will be significant challenges in achieving the savings required under the SRP. Over the ten years to 2019 the SRP sets out to deliver gross savings of \$20 billion,³ of which 20 percent or \$4.4 billion is to be achieved through what has been termed 'Smart Maintenance'.⁴

Implementing Smart Maintenance is more than just implementing new and improved maintenance concepts and strategies. It is also about effective Change Management. It is about achieving real reform across 100 platforms, over a sustained period, impacting on most of the Australian Defence Force and its supporting Australian Defence Industry.

This comment reviews the Smart Maintenance initiative from a change management perspective.

¹ Department of Defence, *Defending Australia in the Asia-Pacific Century* (Canberra: Defence Publishing Service, 2009), para. 13.2, p. 107.

² *Ibid.*, para. 18.1, p. 137.

³ *Ibid.*, para. 13.3, p. 107.

⁴ Department of Defence, *The Strategic Reform Program: Delivering Force 2030* (Canberra: Defence Publishing Service, 2009), para. 64, p. 16.

Across the life cycle of a weapon system a significant amount of money is spent on sustainment, that is, the weapon system's operation and maintenance, compared to its initial acquisition. According to the US Navy's Cost Analysis Improvement Group, operation and maintenance costs can be as high as 80 percent of the total life cycle cost of a platform. With the life of many of the platforms extended beyond twenty years, such support costs can account for as much as 90 percent of total life costs.⁵ The Australian Defence Materiel Organisation (DMO) manages the majority of the maintenance budget required to maintain the 100 platforms and systems targeted for savings under Smart Maintenance. Of the total \$22 billion annual Australian Defence budget, approximately 50 percent is spent by the DMO and of that, approximately 50 percent is in sustainment (\$4.9 billion).⁶ Just over 60 percent of this \$4.9 billion Sustainment funding is spent on the Top twenty platforms within the Australian Defence Force.⁷

The SRP is not just about delivering savings and efficiencies. It is an integral component of the White Paper. It is means by which we build an organisation capable of delivering and sustaining Force 2030.⁸

The SRP is about delivering the savings required for future capability for the Australia Defence Force. The implementation of Smart Maintenance needs to achieve this without compromising capability, safety, or support to our frontline troops.

Implementing Smart Maintenance is not about surmounting technical challenges. Better technologies and smarter maintenance methodologies that deliver performance improvements and cost savings are well documented and understood within Defence and Industry. Rather, the challenge is to understand the three sustainment cost drivers of Customer Demand Management, the Buying Organisation, and Suppliers, and how they interact with each other.

In what follows, Smart Maintenance is explained in greater detail and the three sustainment cost drivers are analysed.

What Is Smart Maintenance?

The Strategic Reform Program states that

⁵ Graduate School of Business and Public Policy, Naval Postgraduate School, Acquisition Research Program, 'Lean Six Sigma for Reduced Cycle Costs and Improved Readiness', 30 September 2006, < http://www.acquisitionresearch.net/_files/FY2006/NPS-LM-06-033.pdf > [Accessed 2 July 2010], pp. 1-2.

⁶ Department of Defence, 'Portfolio Budget Papers 2008-09, Part Two: Defence Materiel Organisation (DMO)', <http://www.defence.gov.au/budget/08-09/pbs/2008-2009_Defence_PBS_06_p2.pdf> [Accessed 30 June 2010], p. 162.

⁷ *Ibid.*, p. 191.

⁸ Senator John Faulkner, 'Implementation of the Defence Strategic Reform Program, 031/2010', Press Release, 7 April 2010, para. 5.

implementing smart maintenance techniques will create savings in maintenance and associated support costs and deliver increased equipment availability by eliminating inefficiencies in the way support is conducted.⁹

'Maintenance' is the restoration of equipment to its readiness state. "Maintenance Engineering"¹⁰ is a broader concept that considers all requirements of the maintenance activity, and how they relate to each other. In formal terms:

Maintenance Engineering is an analytical function whose objectives include: improved maintenance operations, reduce the amount and frequency of maintenance, reduce the effects of complexity, reduce the maintenance skills required, reduce the amount of supply support, establish optimum frequency and extent of preventive maintenance, improve and ensure maximum utilisation of maintenance facilities, and improve the maintenance organisation.

It follows that simply reducing the frequency of a maintenance activity may not result in savings if the resources that perform the maintenance activity cannot be utilised elsewhere. However, if the maintenance organisation and its associated facilities are also considered, then cost efficiencies may be possible.

"Smart Maintenance" is a sub-set of Maintenance Engineering. As such, the goal of Smart Maintenance is to optimise the requirements of regulatory, economic, and technical and the resources used to carry out the maintenance program; people, spares, consumables, support equipment, facilities, and publications. When maintenance optimisation is effectively implemented it will improve system availability, improve equipment reliability, improve system safety, and reduce overall life cycle costs. The SRP is quite clear that this initiative is not about compromising capability in order to save costs. The focus is on improving productivity and eliminating waste without compromising safety or quality.

The SRP outlines the major cost savings to Smart Maintenance as:

1. customer demand management (50 percent or \$2.01 billion);
2. buying organisation internal efficiency (20 percent or \$0.88 billion); and
3. better contracting processes, and supplier increased productivity (30 percent or \$1.32 billion).¹¹

⁹ Department of Defence, *The Strategic Reform Program: Delivering Force 2030*, para. 64, p. 16.

¹⁰ B. S. Dhillon, *Engineering Maintenance: A Modern Approach* (Boca Raton, FL: CRC Press LLC, 2002), p. 2.

¹¹ Department of Defence, *The Strategic Reform Program: Delivering Force 2030*, para. 68, p. 16.

CUSTOMER DEMAND MANAGEMENT

The largest proposed source of savings under the Smart Maintenance initiative is that of End Customer Demand Management. The accuracy of demand planning, estimating, and forecasting, and actual demand requirements all have a direct impact on platform costs.

Maintenance organisations, both defence and civilian, rely heavily on end user demand forecasts (e.g. planned flight hours, training activities, or kilometres driven) as a basis for resources planning and cost estimation. People skills and quantity, spares inventory holdings, and facilities design and usage are all estimated based on forecast end user demands. An overestimation of demand requirements results in waste, excess labour costs and therefore additional costs.

On the other hand, an underestimation of demand requirements results in additional surge labour hours, an increased demand for urgent spares resupplies, and an increased requirement for priority logistics such as freight and packaging. All of these additional resource requirements are typically at higher cost rates due to their unplanned and priority nature. Just like overestimation, an underestimation of the demand requirements can result in an increased cost.

On its own, platform demand is potentially an easy target for the Australian Defence Force when it comes to delivering SRP Smart Maintenance savings. Short-term savings can be claimed if demand requirements are reduced and flowed into the supply chain, thereby reducing servicing, maintenance labour, and spares inventories requirements. However to achieve this saving without compromising on capability will be difficult.

As the largest proposed driver of the SRP savings, reductions in platform demand will need to be considered carefully by Defence as this strategy has the potential to increase medium to long term costs if the many proposed demand reductions do not eventuate.

THE BUYING ORGANISATION

The second source of savings as proposed by the SRP comes from the buying organisation through increased efficiency, better contracting, and improved processes. As the buying organisation, the DMO is at the centre of the Smart Maintenance initiative. The DMO takes end user demand management requirements and engages with service and supplier organisations to deliver the required maintenance support.

Typically, individual Defence System Project Offices (SPOs) are established within the DMO to manage a specific platform or capability. For example, Air Lift SPO (ALSPO) to manage C130, Navy Aviation SPO (NASPO) to manage the Navy Helicopter Fleet, and so on.

Each SPO has had at their disposal a number of strategies to deliver on SRP, from a change to end user demand Key Performance Indicators, to changing existing platform maintenance philosophies, or a review and change to existing suppliers and/or their contract type. As a key part of its contribution to the SRP initiative, the DMO is developing Performance Based Contracts (PBC), aimed at achieving the two key objectives of enhancing the ability to meet capability preparedness requirements and reducing the total cost of ownership.¹² PBC discussion papers are currently with industry as part of the DMO consultative approach to developing future ASDEFCON (Australian Standard for Defence Contracting) Support contracting methodologies.

All of these strategies have the ability to drive out cost and deliver on SRP savings. But they are potentially limiting in savings potential by pushing the reform process down to a single platform level. This presents a reform risk where multi-platform synergies in people, process, equipment, and facilities can be missed.

As improvements are identified across the complete maintenance supply chain, how will costs be reallocated across Defence organisational boundaries? For example, if an improvement activity identifies a four person reduction saving on a maintenance flight line, but an additional two people are required by the maintenance contractor, how is the reallocation of this budget to occur?

SUPPLIERS

Suppliers are essentially the Defence Industry, and they are the third component identified in the SRP to deliver savings. SRP can be seen as a risk and an opportunity for Industry. A risk inherent in the SRP is short to medium term uncertainty associated with reducing program values and increased pressure on company profits. However, SRP also provides for significant opportunity for those organisations that are innovative in their approach to delivering Defence outcomes.

Industry will be driven by the end user demand and buying organisation initiatives already discussed. Early engagement with Australian Industry with a view to mobilising its support for and active participation in the proposed reforms will be essential to the success of the program. Over the past ten years, the DMO and Industry have executed outcome-focused, performance-based contracts. These contracts, with a component of the price hostage to achieving agreed performance measures, pass the cost risk on to Industry. If a supplier spends more than the budget to deliver the agreed outcome this results in less profit for the company, however, if that company spends less

¹² Defence Materiel Organization, *Next Generation Performance Based Support Contracts—Achieving the Outcomes that Defence Requires*, DMO PBC Discussion Paper V1.0, February 2010.

money than budgeted to deliver the agreed outcome, this will result in extra profit for the company.

For suppliers on fixed priced, long-term maintenance contracts (performance-based contracting or otherwise), investment costs for improvement implementation need to be funded. Are the additional costs required for improvement implementation, including capital investment costs, to be funded by the contract and therefore by Defence, and if not why should any savings be passed on to Defence?

How are the Outcomes of Smart Maintenance to be Achieved?

The Strategic Reform Program emphasises that Smart Maintenance is not about compromising capability to save costs, but about improved levels of capability at less cost by improving productivity and eliminating waste. In no way is quality and safety to be compromised. The SRP also states that reforms will be undertaken in a planned and structured way. To this end, Defence personnel are being trained in *Six Sigma* and *Lean* management techniques to deliver on Smart Maintenance savings. For example, the Air Lift Program Office, responsible for the management of the C130, C17, and Tanker fleet of platforms has initiated Six Sigma improvement projects with suppliers to drive out cost and improve efficiency with the C130H platforms.¹³ The essential features of the Six Sigma and Lean management techniques are summarised below.

SIX SIGMA

Six Sigma's primary goal is to improve customer satisfaction by reducing and eliminating defects with a focus on reducing variability of deliverables thus decreasing the risk of nonconforming product or services. In Six Sigma "variation is the enemy".

Under this methodology, tools are utilised to locate and eliminate root causes of process problems:

- *Sigma* (σ) is a *measurement* of total quality to know how effectively variation and defects have been eliminated;
- The *smaller* the value of sigma, the *less variation* and defects in our products or processes; and
- A defect is anything that may result in customer dissatisfaction.

¹³ Department of Defence, 'Portfolio Budget Papers 2008-09, Part Two: Defence Materiel Organisation (DMO)', p. 193.

LEAN

With Lean, the focus is on both eliminating process activities that do not add value and to increase “flow” or throughput of a process. The term ‘value’ is an important aspect of Lean. “Value” is measured or determined by the customer. To be of value, it must be a feature or a function that the customer is willing to pay for.

The challenge with Lean is to identify the value adding steps and eliminate waste or the non-value added activities. Typically non-value added activities can be categorised as defects, inventory, overproduction, waiting time, duplication, movement, transportation, and processing.¹⁴

EXAMPLES OF SMART MAINTENANCE

Both in Australia and overseas, there are countless examples of maintenance optimisation aimed at improving system availability, equipment reliability, system safety, and reducing overall life cycle costs. Although the RAAF, the RAN, and the Army use different maintenance philosophies they all have a common problem with fragmented value streams requiring optimisation from operational units, to system program offices, through to suppliers.

For example, like its overseas counterparts, the Australian Army has traditionally utilised a four-level maintenance system consisting of first, second, third, and fourth line maintenance.¹⁵ But the US Army has collapsed the levels of maintenance as a strategy to improve efficiency and reduce cost. Over the past decade the US Army has been moving to a two-level maintenance system. For example, as part of Force XXI design, first line and second line maintainers from the mechanised infantry, armour, and engineering battalions were combined into a single unit, called the forward support company. This merging into a single unit not only improves efficiency, but also reduces the overall support footprint in the area of operations.¹⁶

This approach to optimising maintenance is supported by Mathaisel in *Sustaining the Military Enterprise*, where The Lean Sustainment Enterprise Model is assessed.¹⁷ The Lean Sustainment Enterprise Model proposes the consolidation of Maintenance functions (Engineering, Maintenance, Supply,

¹⁴ Naval Postgraduate School of Business and Public Policy, ‘Lean Six Sigma for Reduced Cycle Costs and Improved Readiness’, p. 10.

¹⁵ Department of Defence, Australian Defence Doctrine Publications, ‘Fundamentals of Materiel Engineering and Maintenance, ADDP 4.5—Materiel Engineering and Maintenance’, para. 1.49, p. 19.

¹⁶ Major General Mitchell H. Stevenson, ‘Army Maintenance Transformation’, para. 7, p. 1. <<http://www.almc.army.mil/alog/issues/SepOct02/MS838.htm>> [Accessed 2 July 2010].

¹⁷ Dennis F. X. Mathaisel, *Sustaining the Military Enterprise* (Boca Raton, FL: Auerbach Publications, 2008), p. 36.

and Management) to achieve lower cost of ownership whilst improving overall performance.

The introduction of a new platform, such as the recently introduced Boeing C17 Globemaster III provides a unique opportunity to start from the ground up when implementing a maintenance philosophy. If the SRP is to succeed, however, existing support methodologies and their application to existing platforms need to be reformed.

Change Management and Implementing SRP Smart Maintenance

Techniques such as Six Sigma and Lean, and strategies such as the Lean Enterprise Maintenance model are well proven. However to achieve the desired SRP outcomes, effective change management remains the challenge for the Australian Defence Force, the DMO, and the Defence Industry. Effective change management processes are absolutely essential to overcome non-optimised value streams, multiple organisational responsibilities and budgets, and a jaded Defence work force that has endured a number of reform programs in recent decades.

To achieve the desired reforms, it will be necessary to explore opportunities for efficiency gains across platforms, across contracts, and across the different Defence organisations and their associated budgets. A challenge for the SRP will be for Defence to work across these different budgets and organisational boundaries to encourage initiative and achieve greater savings.

As the following example shows, these formidable change management challenges can be, and are being met.

A SUCCESSFUL CHANGE MANAGEMENT INITIATIVE—SUPPORT TO THE AUSTRALIAN NAVY HELICOPTERS

The Royal Australian Navy's Retention and Motivation Initiative (RMI) shows how the Australian Defence Organisation and Australian industry can work together to achieve a Smart Maintenance outcome. The RMI program provides 1500 hours per annum of flying time for Naval Helicopter pilots out of HMAS Albatross, Nowra, New South Wales. Although the program was established utilising the Lean Sustainment Enterprise Model, as the maintenance functions had been collapsed into a single enterprise to provide efficient, low cost support to the Navy, after twelve months of operation the Navy wanted to improve program outcomes. To this end, in late 2008, the Royal Australia Navy, Raytheon Australia, and the Helicopter manufacturer combined to form a Six Sigma team to enhance the support provided by the RMI program.

The improvement project was focussed on reviewing and optimising the spares supply chain from flight line, to maintenance depot, to overseas Original Equipment Manufacturer (OEM). Failure history was analysed, spares inventories reviewed, particularly the quantity and location of critical spares, and an improved process was developed for the expedition of priority spare resupplies.

Over a six-month period, the combined team was able to achieve significant benefits for the Navy pilots, including:

- a 57 percent reduction in monthly unscheduled maintenance (7.2 days per month to 3 days per month);
- a 35 percent reduction in supply lead times (13 days to 8.5 days per order);
- developing and deploying an effective sortie and maintenance planning process and tool;
- a 15 percent increase in aircraft availability; and
- a tailored a spare parts delivery process from overseas to Australia to reduce lead times.

Due to the tight integration and open communication that existed between the end user, the contracted engineering, maintenance, and logistics functions, and the platform OEM, the proposed improvements were rapidly deployed delivering maximum benefits for all parties.

From a change management perspective, the RMI Six Sigma project scores highly across the categories and components of change. In particular this program had a number of additional elements that helped ensure its success. These were:

- Strong leadership support from all of the organisations involved. This included Navy (CMDR) and Raytheon Australia (General Manager) sponsorship and support of the project;
- Strong Six Sigma leadership through the use of a trained Six Sigma expert who was accountable (along with the Project Manager) for delivering the required outcomes. This expert was responsible for facilitating all workshop improvement sessions, for guiding the local workforce (Navy and Industry) through the Six Sigma process, and for ensuring all improvement outcomes were deployed and sustained; and

- High levels of local workforce engagement (Naval and Industry) to ensure their involvement and commitment to the changes and the resulting process.

Conclusion

The Strategic Reform Program is about delivering the savings required to deliver future capability for the Australia Defence Force. The implementation of Smart Maintenance needs to achieve this without compromising capability, safety, or support to our frontline troops.

The techniques associated with methodologies such as Six Sigma and Lean, and with changes to existing support models to capture the benefits available from methodologies such as the Lean Sustainment Enterprise Model, will provide a platform from which the SRP Smart Maintenance outcomes can be reached. The challenges associated with implementing Smart Maintenance are not technical challenges. Better technologies and smarter maintenance methodologies that deliver performance improvements and cost savings are well documented and understood in the Defence community.

The challenges are with understanding the three sustainment cost drivers of Customer Demand Management, the Buying Organisation, and Suppliers, and how they interact with each other. In delivering on the required outcomes the ADF, the DMO, and Defence Industry will need to take a holistic and strategic approach to Smart Maintenance. All stakeholders need to change structures and cross boundaries, and not take a program by program, DMO Program Office by DMO Program Office, approach to the reform.

Finally, the biggest challenge of all is with implementing effective change management. It is essential that Defence and industry leadership lead the change, mobilise commitment across the defence and industry workforces through empowerment and Industry engagement, and sustain the Strategic Reform Program to ensure the delivery of Force 2030.

In 2009, Craig Wilkinson was the inaugural Visiting Industry Fellow at the Australian Defence College, Canberra. This comment was informed and written during his time at the Australian Defence College. Craig Wilkinson has since returned to Industry as General Manager for Raytheon Australia's Mission Support business. Craig began his career as a Graduate Electrical Engineer in 1988 and has over 20 years of Industry Experience. Craig has Bachelor of Engineering—Electrical (Queensland University of Technology), a Masters of Business and Technology (University of New South Wales), and is recognised as Six Sigma "Black Belt" by the US Six Sigma Academy. This work is the sole opinion of the author and does not necessarily represent the views of the Australian Defence College, the Department of Defence, or Raytheon Australia. Craig.Wilkinson@raytheon.com.au.