Asset Management for Defence Engineering Support

Utilising Assets to Deliver Value and Achieve Defence Objectives

This White paper was created in response to the Engineering Support (Transformation) Discovery Phase Report[1] that identified Asset Management (AM), as one of 11 themes with cashable benefits to MOD Engineering Support. This document is the result of a 3 month collaborative task between MOD and Industry, guided by the Team Defence mandate[2] agreed through the Engineering Support Transformation User Forum (ESTUF).

Introduction to Asset Management

The advent of the formal discipline of AM over 25 years ago resulted in national and global standards (BSi PAS 55 in 2004; and then ISO 55000 in 2014) as well as the development of structured approaches to ensure a focus on deriving value from assets. Hence, AM is defined as "using assets to deliver value and achieve the organisation's business objectives"[3]. This definition has been familiar to and adopted by the public services, utilities and oil and gas sectors across the UK and the wider world.

AM is now growing in Defence, including the Defence Infrastructure Organisation (DIO) and the Submarine Delivery Agency (SDA) in the UK, the U.S. Army Corps of Engineers, the U.S. Air Force and the Department of Defence (DoD) in Australia. The suitability of ISO 55000 for adoption into a Defence context is supported by the Australian DoD CASG, who have mandated that all support arrangements need to be "ISO 55001 convergent" in the future. The Australian DoD 2030 Materiel Logistics Roadmap states that by 2025-2030 "informed Asset Management decision making frameworks [will be] the business as usual" and that "the organisation and the individuals [will be] unconsciously competent in the new ways of working".

But currently, most of the MOD organisations remain unfamiliar with AM. Having said this, the activities relating to procurement and operation of assets already successfully delivered by the UK Defence sector can be clearly associated to those outlined in ISO 55000.

Team Defence defines AM within the UK Defence context through this collaborative white paper between the MOD and Industry. Provided, will be six examples from UK Industry and the wider world experience with regards to Asset Management, alongside associated benefits, challenges and lessons applicable to Defence. This includes the complexity of MOD as an organisation taking on a change transformation programme and differentiating between Asset Management vs Managing Assets. Suggestions for next steps that need be taken to start realising the savings, improve capability availability and mission effect.

Team Defence believes there is an opportunity for Equipment Support to leverage the concepts of AM to build upon existing stregnths in many areas and bring a rigorous, value-driven approach to both the usage of assets and the maintenance, repair, and operations (MRO) processes applied to these assets. AM can align Engineering Support activities with organisational strategies and financial value, leading to better decision making, as alluded to in the Engineering Support Transformation Vision paper[4].

[1] ES(T) Discovery Phase Report Version Mar 2019 MOD
[2] Asset and Fleet Management Mandate Version 2 Dec 2019 Team Defence
[3] Asset Management – an anatomy Version 3 Dec 15 The IAM
[4] Vision for Engineering Support Version 1 Jan 2018 MOD

What ISO 55000 Asset Management means for Defence

By looking at the definitions of Asset and Asset Management between ISO 55000 and Defence in *Table 1*, a certain amount of confusion can be uncovered in the terminology around what an asset represents. By bringing the definition of Capability Management into this, some clear parallels emerge with ISO 55000, such as the strategic view of required capability through life and the alignment with the Defence objectives. Furthermore, Capability is not a system or equipment and therefore covers tangible and intangible assets.

ISO 55000	Joint Service Publications	KiD – Capability Management
Asset Item, thing or entity that has potential or actual value to an organisation. The value will vary between different organizations and their stakeholders, and can be tangible or intangible, financial or non-financial.	**Asset** A resource currently controlled by the Department from which future economic benefits are expected to flow to the Department. JSP471 All property, tangible or intangible, which has some value (not necessarily financial). JSP886, Vol1, Part1A	**Capability** The ability to achieve an effect at a strategic or campaign level in terms of Defence planning. Fin Mil Cap Operating Model (FOM)
Asset Management The coordinated activity of an organisation to realise value from assets. Notes: realisation of value will normally involve a balancing of costs, risks, opportunities and performance benefits with the term activity having a broad meaning and can include for example, the approach, the planning, the plans and their implementation.	**Asset Management** A function of equipment management, which includes the responsibility for the proper management of resources allocated to meet a liability. Often undertaken as part of vehicle fleet management, it implies the capability to record, track and forecast the replacement of MOD owned equipment. JSP886, Vol1, Part1A[5]	**Capability Management** Capability Management is how Defence develops, delivers, generates and operates military capability through life in order to meet the Strategic Requirements and Objectives that articulate Defence Policy. Generic Capability Model v4.0

Table 1: Asset related Definitions and Sources

In order to understand what ISO 55000 means in Defence terminology, this paper provides at *Annex A* a high-level mapping of the MOD activities with the 39 Asset Management Subjects. These 39 Subjects are grouped into six Subject Groups (see Figure 1)[6] that constitute together the Institute of Asset Management (IAM) conceptual model. Some of the Subjects, such as Systems and Reliability Engineering are already well established in MOD and within the Defence Enterprise. Some others, such as Strategic Planning, may be misinterpreted

[5] JSP 886 was withdrawn in 2016 and replaced by the Defence Logistics Framework (DLF) however an updated comparable definition for Asset Management cannot be found.
[6] Asset Management – an anatomy Version 3 Dec 15 The IAM

without the Subjects description in the IAM anatomy with further details available from the Global Forum's Asset Management Landscape[7].

This high-level mapping has been developed based on MOD information available to the Defence Industry and therefore may not represent the full extent of MOD activities relevant to AM. It is likely that there is more synergy between the Asset Management disciplines and current MOD activity than that discovered by this white paper.

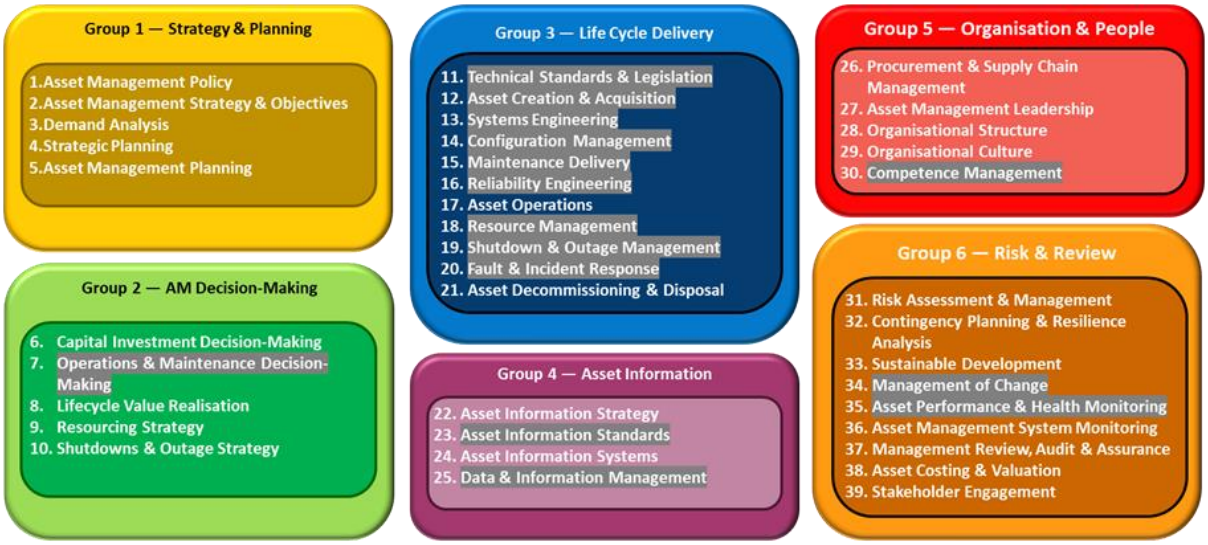


Figure 1: The 39 Asset Management Subjects with the 6 Subject Groups

The AM Subjects highlighted, identify the relevant Subjects to Engineering Support, defined as the 'Engineering activities to ensure that performance and safety margins are known and managed'[8]. Engineering Support has surely wider touch points with other AM Subjects, however the highlighted Subjects focus on the Engineering Support scope.

There was an intention at the outset of this task to map the S-Series ILS specifications as a parallel task to the mapping of MOD activities against the 39 Asset Management Subjects; references to ASD specifications can be found in *Annex A* where this activity has been completed.

The overarching document for S-Series specifications is SX000i – International Guide for the use of the S-Series Integrated Logistic Support (ILS) Specifications. SX000i provides the framework for the global ILS process, as well as the guidelines for the selection and use of the suite of ILS Specifications; it also defines the global specification governance, as well as the mechanisms that are used to ensure that the suite of ILS Specifications is both integrated and interoperable.

Content within SX000i includes:

- Introduction to the Guide
- Integrated Logistic Support Framework
- Usage of the Suite of ILS Specifications in an ILS Program
- Governance of the ASD/AIA Suite of ILS Specifications
- Terms, abbreviations and acronyms
- Comparison of specification terminology

[7] The Asset Management Landscape 2nd Edition Mar 2014 GFMAM
[8] Vision for Engineering Support Version 1 Jan 2018 MOD

With consideration to the term ILS, used throughout the S-Series specifications, it is important to understand how it is defined.

SX000i defines ILS as:

The management and technical process of support activities for a product throughout its lifecycle.

Whilst JSP 886 Volume 1 Part 1a (withdrawn 2016) defines ILS as:

The management and technical process through which supportability and logistic support considerations are integrated into the design and taken into account throughout the life cycle of systems/equipment and by which all elements of logistic support are planned, acquired, tested and provided in a timely and cost effective manner.

When reading these definitions, comparisons can be drawn with Engineering Support which is defined as:

Engineering activities to ensure that performance and safety margins are known and managed by:

- Ensuring the design of the equipment is influenced by the way it is supported.
- Managing the way the design evolves through life to ensure the original design intent is preserved.
- Managing the material state of the equipment through maintenance, repair, replacement and control of components crucial to its performance.
- Evaluating, testing or monitoring performance of components, equipment, systems or platforms.

Also in *Annex A*, it is evident that MOD or some of the MOD organisations cover most of the 39 AM Subjects and therefore have existing capabilities against these 39 Subjects. The mapping also identifies some different capabilities across MOD organisations that address the same AM Subjects but are not fully aligned.

To further the benefits of this mapping, an illustrative maturity assessment of the MOD in relation to IAM's Asset Management – An Anatomy has been undertaken from an industry perspective to provide some qualitative feedback around the strengths and weaknesses to show where MOD could leverage experience and add value. The approach taken has been to assess the building blocks of good Asset Management through the 39 Subjects that form the Asset Management landscape as defined by the Global Forum On Maintenance and Asset Management (GFMAM), rather than the Asset Management System as defined by ISO 55000 (see *Annex B*).

The broad definitions of the maturity scale as used in this review are:

- 0 – no recognition by the organisation that there is an issue
- 1 – recognition of deficiencies with a plan in place to address
- 2 – elements of good practice demonstrated in silos
- 3 – good practice demonstrated and connected across the organisation
- 4 – industry best practice.

Noting that level 3 maturity broadly aligns to the level required to achieve certification against the requirements of ISO 55001. The content of this maturity assessment is contained at *Annex B* of this paper and the results are summarised in a radar chart (see *Figure 2*) to identify overall strengths and weaknesses. The findings of this review provided for illustration purposes are summarised below:

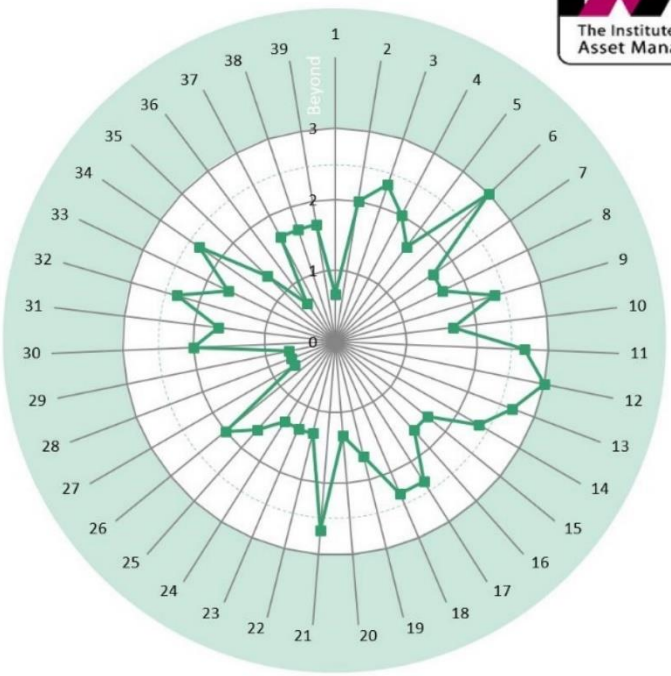


Figure 2: Illustrative MOD Maturity Gaps – Radar Chart.
Subject numbers are aligned with Figure 1.

General: there are no significant areas of the organisation that do not recognise the value of the building blocks of Asset Management. They may be known under other names and are not recognised formally within a conventional Asset Management framework. On this basis there is a broad recognition that MOD has the elements required to deliver effective AM, pragmatically. We believe MOD is good at managing assets but need to develop its capabilities in AM to provide a more coherent mechanism for effectively utilising resources to deliver capability

Organisation: to reflect the varying levels of performance of the organisation an average has been presented. This has been supported by notional variations in performance across the organisational silos. There were very few elements of the assessment that recognised that good practice was connected across the MOD.

Strengths: the commercial and legislative aspects are thought to be well embedded and strongly connected throughout the organisation.

Weaknesses: the coordination, strategy and leadership of AM was thought to be amongst the weakest area, which reflects the current adoption levels of Asset Management and no formal framework being in place. The key principles of risk, line of sight and decisions from a position of knowledge are not necessarily recognised by MOD as important to maintain within a single common framework.

Variability: the assessment recognised that certain areas of the organisation demonstrate best in class performance in silos, but this may not be common across the whole organisation. For example, the processes developed within ILS (including Supportability Analysis) and Reliability & Maintainability (R&M) domains can be viewed as one of the key strengths of defence procurement, potentially significantly ahead of several commercial sectors. However, the transition to in-service can lose some of the rationale, and line of sight. Coupled with a culture that does not proactively evolve these plans through life, instead focusses more on delivering the agreed plan. The adaptability of such plans, supported by line of sight is especially important as objectives, missions and environment can change, then the management of the assets and support solution needs to evolve with it.

In summary, this illustrative assessment shows that the building blocks of AM are present in MOD, however the lack of connection across the organisation, the siloed and disparate AM leadership capability and knowledge are potentially preventing the value of the organisation from being unlocked. However, it must be noted that from wider sector experience, a 3-4 year plus timescale is not uncommon to achieve a Maturity Level 3. This is especially so for those at the start of the AM/ISO 55000 journey and largely depends on the size and complexity of the organisation.

What ISO 55000 could mean for Defence

Outlined in ISO 55000 are the principles by which an organisation intend on implementing Asset Management to achieve organisational objectives. This should be set out in an Asset Management Policy. As an illustrative example, an AM Policy has been provided below to exemplify what an AM Policy Statement could look like for the MOD. This was developed by combining the works of Industry Best Practice, the Dŵr Cymru Welsh Water AM Policy Statement[9] and the transcript of Chief Defence Logistic & Support Lt Gen Richard Wardlaw's presentation at LOGNet 2020[10].

In general, the wording selected for an AM Policy is intended to be high level and easily understood to provide intent. The complex and critical component to the success of an AM Policy stems from the process of staffing and seeking senior management buy-in and commitment. There needs to be a focus on end-to-end authorisation throughout the development to ensure true buy-in and acceptance of the AM Policy and the objectives it outlines. A important aspect of this buy-in will also involve allocating an appropriate owner of this AM Policy, which remains to be decided in the MOD.

[9] https://www.dwrcymru.com/en/Library/IMS.aspx
[10] https://www.teamdefence.info/

MOD ASSET MANAGEMENT POLICY STATEMENT

To support the achievement of the Strategic Defence & Security's vision for a secure and prosperous United Kingdom, with global reach and influence, the Defence Support Enterprise will:

- Guide the support ambitions of each of the Military Commands.
- Drive policy and performance standards across Defence, such that we design in requirements that we know will optimise through life availability.
- Shape the skills, competencies, culture and training of our people so that they march confidently into the digitised and increasingly networked world which will be the defining feature of the first of half of the 21st century.

We will achieve this by:

- Complying with current and relevant statutory and regulatory requirements and other requirements deemed necessary by the Defence Enterprise.
- Evolving our Defence Support Enterprise into the best in class Asset Management System with a digitally enabled end to end logistics supply chain. Achieving this by unlocking and continuously improving our good practices through our Transformation programmes: DSOM and BMfS.
- Establishing objective decision-making processes that are devoid from interservice politics and considers cost of procurement, performance and cost of ownership. Doing the right thing and doing things right will be increasingly the hallmark of the investment decisions we make.
- Making risk-based decisions from a position of knowledge that are data driven, information and insight led and increasingly enabled by digitally transformed engineering and logistic information systems and that encompasses the true cost of through life support.
- Ensuring that our Asset Management workforce is intelligent and digitally aware in order to develop, implement and continually improve our Defence Asset Management System. Through education of our workforce, embedding language consistency across defence and AM domain.
- Playing our part to ensure the way Defence operates addresses the existential crisis that is climate change and takes the necessary steps to meet and exceed the Carbon Net Zero 50 ambitions by exploiting the best in class industrial innovation.
- Aligning our Defence Asset Management System and associated asset objectives with the achievement of the National Security Objectives documented in the latest Strategic Defence & Security Review (SDSR) and share our vision and strategy via a collaborative network across defence, including Industry, to drive and motivate improvement.

MOD establishes and maintains Asset Management objectives and targets which are documented and reviewed through the current headmark of Joint Force 25 and the MOD Equipment Plan 2019-2029. The performance of the Defence Asset Management System will also be monitored to drive continuous improvement, effective Asset solutions at reduced cost with a smaller footprint and lower environmental impact. This Policy will be communicated to the eighteen separate organisations that make-up MOD (Head Office, the Four Military Commands, the Defence Nuclear Organisation (DNO) and the twelve Enabling Organisations), to all MOD employees and to those working on behalf of MOD, including Defence Industry and contractors.

This policy will be reviewed annually and as part of the regulatory cycle. It will also be reviewed after the next SDSR takes place.

In cases where the AM Policy is written in isolation and is simply authorised or signed off, the benefits associated are diminished. Overcoming this hurdle is the first step of the communication story for AM. To ensure the AM Policy becomes relevant for the entire Organisation, seek Senior Management genuine buy-in and commitment, so that they execute it in their day to day activities. See Case Study 3.

Establishing the Benefits of adopting ISO 55000 for Defence

In his speech at LOGNET 2020, Lt Gen Richard Wardlaw, Chief of Defence Support and Logistics (CDLS), summarised the challenges faced by Defence Support. Figure 3 illustrates these key challenges:

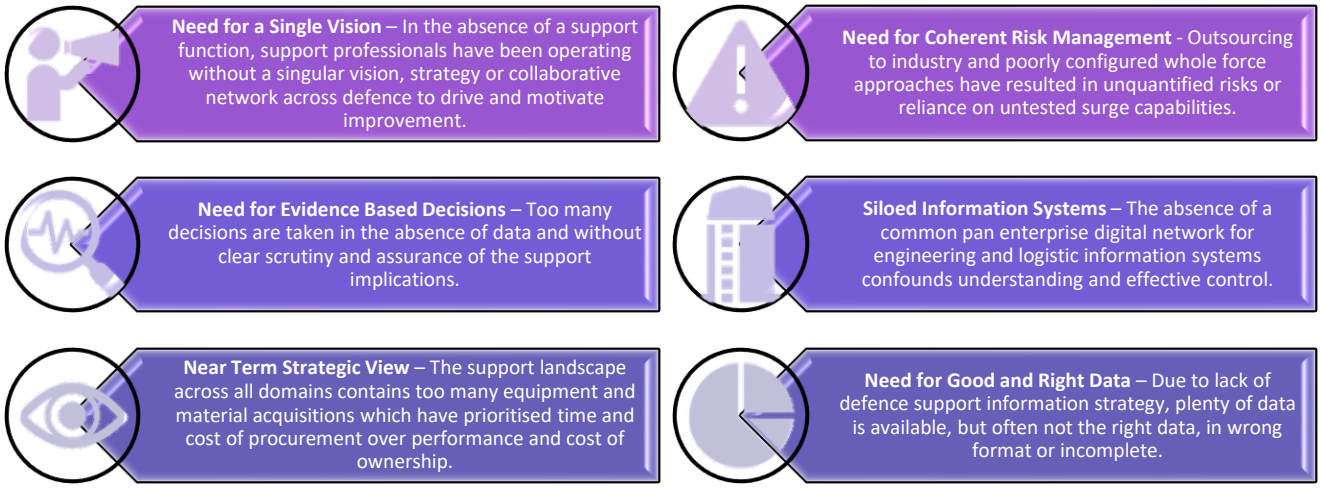


Figure 3: Defence Support Challenges

By drawing upon industry case studies Table 2 shows how applying the AM Framework's 39 subjects across Defence and specifically Engineering Support will help overcome these challenges and has the potential to deliver significant benefits and savings.

Defence Support Challenges	Opportunities from applying Asset Management	Evidenced Outcome in Case Study
Need for a Single Vision	Aligned Objectives and Top Level Ownership	Case Study 1— The AM Leadership for sharing the vision and getting buy-in within Sodexo was crucial to the success of their phased rollout Asset Management System (AMS) across their global enterprise covering diverse segments.
Need for Evidence Based Decisions	Transparent and Coherent Decision Making	Case Study 2 — The integrated decision making from the Downers partnership work on Water Resource Management at a major public stadium was utilised to optimise asset outcomes, resulting in 47% operational cost savings.
Near Term Strategic View	Long Term Strategic View	Case Study 3 — A Collaborative Enterprise was established to strengthen the life-cycle management execution of the Collins Class fleet, resulting in an improvement of two deployable submarines availability from 60% to 90% over four years. Case Study 4 – SACO City departments are now looking at assets on the basis of sustainability, life cycle costs and financial effects into the future.

Defence Support Challenges	Opportunities from applying Asset Management	Evidenced Outcome in Case Study
Need for Coherent Risk Management	Risk-based decision making from a position of knowledge	Case Study 5 — Taking a risk-based approach to maintenance regimes resulted in the reduction of maintenance volumes between 5-10% for this Public Transport Organisation, serving one of the UK's largest cities. Case Study 6 –Alpiq's position of knowledge helped reducing expenditure whilst increasing the value produced from the infrastructures. The ratio between savings achieved and costs incurred is in excess of ten for one.
Siloed Information Systems	Aligned Objectives and Decision making from a position of knowledge	Case Study 3 — the collaborative Enterprise brought together the Royal Australian Navy, CASG, Defense Material Organisation, ASC and the Department of Finance to maintain alignment of AM objectives and counter the tendency to create organisational silos.
Need for Good and Right Data	Decision making from a position of knowledge	Case Study 1 — Clear definition of asset performance criteria and data collection requirements to ensure effective feedback helped reduce failure rates by 20%.

Table 2: How Asset Management can overcome these Challenges faced by Defence Support

In addition to the benefits identified in *Table 2* and summarised in *Figure 4*[11], there are two main advantages associated with being aligned with an internationally recognised standard like ISO 55000.

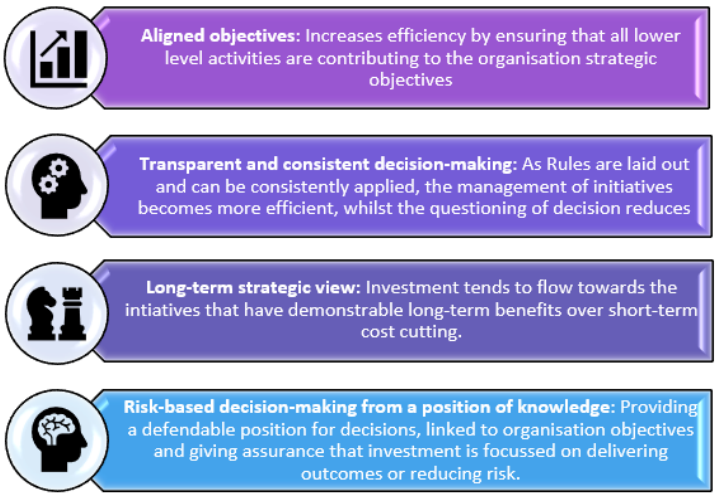


Figure 4: *Benefits Realised*

The first advantage is that moving away from purely defence standards to incorporate international standards aligns with the MODs policy outlined in the JSP 920 to "use civilian standards wherever practicable and military standards only when necessary"[12], avoiding the need for MOD to develop and maintain bespoke standards. Secondly, by adopting an internationally recognised standard, the MOD will open doors to a wider and more diverse pool of SQEP resources. ISO 55000 is recognised and practiced throughout a multitude of sectors such as utilities, oil and gas, railway and nuclear, as demonstrated by the broad civilian domain coverage of case studies in this white paper.

[11] ISO 55000 Asset Management – A Biography, Rhys Davies and Danielle Humphrey
[12] JSP 920, MOD Standardisation Management Policy Version 4.0 Mar 2020



CASE STUDY 1: SODEXO

SECTOR: FACILITIES MANAGEMENT

ASSET TYPES:

- Catering Facilities & Equipment
- Mailroom Facilities
- Grounds Maintenance Equipment
- Waste Management Equipment
- Laundry Facilities

BACKGROUND:

Sodexo is a leader in quality-of-life services and has become one of the first services provider to offer a global asset management service in compliance with ISO 55001. At the end of a two-year journey, the company has received the accreditation for its global asset management framework. Sodexo is leading the way in offering comprehensive asset management capabilities globally and to clients in diverse segments ranging from corporate and healthcare, to manufacturing, mining, and oil and gas.

APPROACH:

A phased rollout programme was implemented, which was detailed country by country and supported by training (including e-learning). An assessment model was developed to monitor the effectiveness of the initiative. The phased approach ensured review and confirmation of the completion of each stage before committing to the next.

This was coordinated through a Worldwide Technical steering group to direct the programme, supported by a wider pool of subject matter experts drawn from 10 countries – the Global Asset Management Team. Leadership was needed throughout the exercise to set direction, communicate the vision and maintain enthusiasm. This required not only winning of hearts and minds within Sodexo, but also sharing of the vision to gain support of customers during the development stages.

BENEFITS:

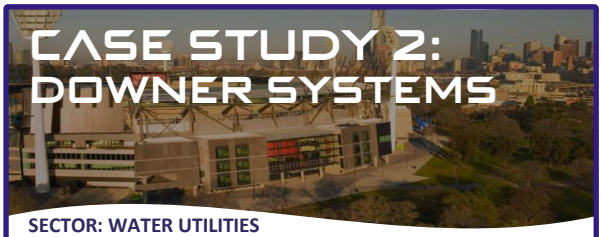
- 10% average Improvement of control of day-to-day activities and business efficiencies.
- 40% reduction of risk-related costs due to risk management for assets.
- Defined improvement in customer service and 100% compliance in regulatory activities.
- Clear definition of asset performance criteria and data collection requirements to ensure effective feedback which helped reduce failure rates by 20%.

KEY TAKEAWAYS:

Sodexo has demonstrated increased benefit for clients in the implementation of best-practice asset management. What's more, Sodexo achieved a marked improvement in the internal engagement scores for the global technical community as a result of the introduction of the asset management programme.

LESSONS APPLICABLE FOR DEFENCE:

Leadership for sharing the vision and getting buy-in within Sodexo was crucial to the success of this project. Also, setting-up clear asset performance criteria allowed Sodexo to define effective requirements for data collection and establish an accurate position of knowledge for decision making.



CASE STUDY 2: DOWNER SYSTEMS

SECTOR: WATER UTILITIES

ASSET TYPES:

- Water Recycling Facility

BACKGROUND:

Downer maintains is Victoria's largest underground Water Recycling Facility (WRF), capable of producing 180 ML of Class A recycled water annually. The project was designed to meet the requirements of the Melbourne Cricket Club (MCC) and the various regulators, with the water used to provide secure, long- term sustainable supply to the heritage listed Yarra Park, Punt Road Oval and amenities at the iconic Melbourne Cricket Ground (MCG).

APPROACH:

The ISO 55001 Asset Management System (AMS) certification illustrates the integrated decision making to form the MCC and Downers partnership, to optimise asset outcomes. As a result, the asset management system applied, coordinates asset management processes, practices and decision rules to ensure the facility efficiently and effectively utilises the WRF to achieve stakeholder expectations and objectives. This was accomplished by; optimised planning and utilisation of consumables, efficient practices e.g. timing and delivery of maintenance and optimal operation of the asset to meet delivery expectations.

BENEFITS:

- 47% operational cost savings through improved monitoring and management
- 40% reduction in reactive work from improved risk management and reliability, with work delivered more efficiently towards higher 'risk to operations' activities.
- More benefits realised from an increased focus on continuous improvement activities.
- With better risk management and control Downer can prioritise procurement to ensure the downtime of the asset is reduced as much as practicable.
- The WRF saw a 41% reliability improvement over 36 months.
- Improved engagement processes have resulted in asset operators experience better engagement through better understanding their effort and alignment with the asset outcomes.

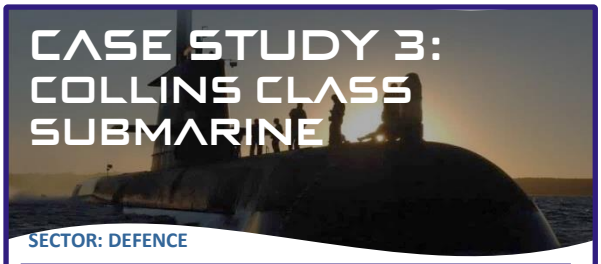
KEY TAKEAWAYS:

The facility incorporates a number of innovative design and construction features, and is now recognized with an international standard for best practice, in the way the WRF is managed as an asset and holds the first ISO 55001 certification in Australia that has been recently renewed.

LESSONS APPLICABLE FOR DEFENCE:

Downer have demonstrated that their applied AMS made operations more resilient, effective and efficient. These improvements were delivered at reduced cost with a smaller consumables footprint and lower environmental impact, while providing the engine to drive continuous improvement, such as their data driven risk-based decisions making for procurement.

CASE STUDY 3: COLLINS CLASS SUBMARINE



SECTOR: DEFENCE

ASSET TYPES:

- Submarines
- Dockyard Assets

BACKGROUND:

A collaborative Enterprise has been established to rectify legacy Collins sustainment issues and strengthen the life-cycle management execution of the fleet. This required cooperation and coordination between the Royal Australian Navy (RAN), the Capability Acquisition and Sustainment Group (CASG), Defense Material Organisation (DMO), Australian Submarine Corporation (ASC) and the Department of Finance. A partnership with the Asset Management Council of Australia formed also to drive continuous improvement.

APPROACH:

A dedicated Life Cycle Management Office was established and assigned a Life Cycle Engineer to each Collins Class submarine, ensuring the best interests of the submarine are met at all times.
A Review Team identified 25 recommendations to resolve a range of root cause issues impacting the performance of the Collins sustainment program. From 2012 to 2016, progress against these recommendations has been assessed against international benchmarks with the majority being met or exceeded.

The contractor ASC also decided to certify their Asset Management System under the International standard ISO 55001.

BENEFITS:

- Steady improvement in two deployable submarine availability from 60% in 2012 to 90% in 2016.
- Reduction in maintenance time required to achieve a two-year Full Cycle Docking (FCD) with approximately 370,000 (30%) hours savings.
- Improved reliability by reducing the allowance for days lost to defects by half
- Reduction in defects arisings, e.g. P1 URDEFs (Urgent Defects) average arisings reduced from ten arising per month to less than one per month.
- Improved stores responsiveness with a reduction in time taken to receive stores in response to P1 defects of approximately 70%.
- Increase in the demand satisfaction rate from Supply (from an average of 50% to approaching 100% for P1 URDEFs).

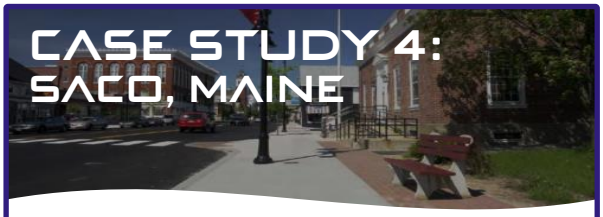
KEY TAKEAWAYS:

Significant improvements in availability, reductions in maintenance overruns and defects can be seen from 2012 to 2016. Aiming to further improve capability, availability and affordability. ASC became the first Australian defence company to be awarded formal Asset Management ISO55001 certification.

LESSONS APPLICABLE FOR DEFENCE:

The Collins Class Sustainment programme proved they could evolve their collaborative enterprise into a best in class Asset Management System, as assessed against international benchmarks.

CASE STUDY 4: SACO, MAINE



SECTOR: WASTEWATER & TRANSPORTATION

ASSET TYPES:

- Commercial Pier
- Landfill and Transfer Station
- Public Works Facility
- Sanitary Collection Systems
- Wastewater Treatment Facility
- Stormwater Collection System
- Street Lights
- Traffic Signals
- Transportation

BACKGROUND:

The City's multisector AM program was initiated after an Advanced Asset Management workshop held by EPA and sponsored by NEWEA. The workshop espoused the AM principles promoted in the International Infrastructure Management Manual. The managers were excited by the ideas presented, felt that the AM principles made sense and were a natural progression for the City's vision of AM.

APPROACH:

The City's AM approach is very much a collaborative, top down approach—that is, considerable effort has gone into establishing a common framework (including definitions and a 10-step roadmap for implementation) before implementing department-specific initiatives to strengthen AM practices.

The framework adopted was that promulgated by EPA. Saco's modest size means that the same staff that created the framework is also executing its implementation.

CHALLENGES REPORTED:

The asset inventory project hit a roadblock due to server capacity issues. The City had to purchase and install a new server to accommodate its database needs. This caused a delay in implementation and access to the databases.

BENEFITS:

- City departments are looking at assets on the basis of sustainability, life cycle costs and financial effects into the future.
- Knowledge of what assets the City has is incredibly useful in making resource decisions for budgeting. The AM tools help prepare for the future.
- The community does not want to see spikes in tax bills, so everyone is better served by applying AM principles to plan to avoid spikes in taxes from projects that were not planned and budgeted.

KEY TAKEAWAYS:

Saco City, Maine, has come a long way in a short time. The shortened time frame is likely due to the use of an existing framework provided by the Environmental Protection Agency (EPA) workshop and materials. Saco demonstrates that small communities can successfully apply AM principles and develop AM programs.

LESSONS APPLICABLE FOR DEFENCE:

SACO have successfully integrated Sustainability / Environmental criteria into its Through Life Cost modelling and AM decision-making process.



CASE STUDY 5: METRO RAIL

SECTOR: TRANSPORT

ASSET TYPES:

- Rolling stock
- Track
- Stations
- Signalling Systems
- Electrification and Power

BACKGROUND:

Serving one of the UK's largest cities, this Public Transport Organisation sought to improve the way it operates and maintains its assets. With falling revenues and budget constraints the organisation needed to rethink and reboot its approach to modernisation to accelerate the transformation and secure some tangible, 'cashable' benefits in the short-term.

APPROACH:

Expenditure was baselined for each asset type to determine spend on staff, materials and logistics, overheads and outsourced services. Existing end to end maintenance processes from specification through to delivery were reviewed to identify strategies to improve processes and reduce costs. This included a review of strategic asset management approaches and taking a risk-based approach to maintenance regimes. E.g. some rolling stock maintenance regimes were based on OEM specifications, which were now out of warranty and could be extended due to better knowledge of actual asset risks in operation. Initiatives and savings were quantified and prioritised.

BENEFITS:

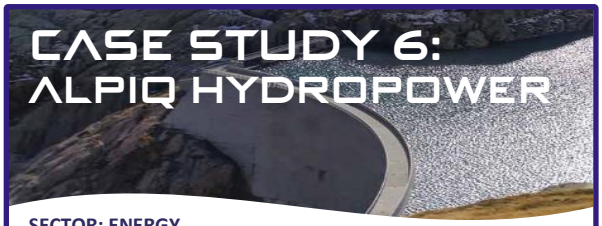
- Cost reduction opportunities of 15%-25% across the asset base.
- 5%-10% reduction in maintenance volumes through changing delivery model.
- Reduction in resources per activity.
- Ability to redeploy capacity generated through streamlining to reduce backlog.
- 5% reduction in number of products and suppliers through streamlining delivery.
- Reduction in wasted materials.
- 50% reduction of the amount of critical equipment by bringing back 'Planned Closures'

KEY TAKEAWAYS:

Prioritisation and target deployment of resources on improvement projects, that would accelerate realisation of benefits, needed to be rethought. Application of risk- based approaches to larger maintenance activities yielded more benefits through opportunities to defer or phase maintenance delivery into more efficient work packages. Strategic reviews on alternative ways of working identified different methods of doing things.

LESSONS APPLICABLE FOR DEFENCE:

Comparable organisational challenges included activities occurring in different organisational areas and coordination activities being unclear. Complex long-life vehicle fleets with a strong reliance on maintenance regimes and supply chains delivered by OEMs. Long-term realisation of benefits required mechanisms in outsourced maintenance contracts. Near-term benefits realised through insourcing appropriate work.



CASE STUDY 6: ALPIQ HYDROPOWER

SECTOR: ENERGY

ASSET TYPES:

- Hydropower Facility

BACKGROUND:

With the current energy market experiencing low prices, not expected to increase in the near future, value creation will not come from the market place or the political arena; rather, they will be provided by asset managers representing the owners of hydropower assets. This led Alpiq, specialized in value unlocking from assets, and Hydro Exploitation SA, in charge of operation and maintenance of hydropower infrastructures managed by Alpiq, to embrace tnew tools.

APPROACH:

Alpiq has adopted an asset management system, compliant with ISO 55001 ("Asset Management System") and enriched with international best practices associated with this standard (in particular: clarification of roles and responsibilities, enhanced processes, performance indicator tracking, continuous improvement, aligning decisions with a value function for the company).
Also adopted is an advanced method to manage assets with a Performance-Based Maintenance. This method can be used to optimize the expenditures required to manage the lifecycle of infrastructures in order to create as much value as possible without compromising asset sustainability. Alpiq's solution aims to optimize the economic and technical performance of assets under management, whilst guaranteeing the people and equipment safety and satisfying the risk-tolerance and decision-making limits set by the Board of Directors.

BENEFITS:

- Better knowledge regarding the positive and negative events which could influence the value produced from their infrastructures.
- Expenditure reductions over the next five years whilst simultaneously increasing the value produced from the infrastructures. The ratio between savings achieved and costs incurred is in excess of ten for one.
- For some infrastructures, Alpiq was able to suggest new maintenance scenarios respecting short-term constraints whilst increasing the NPV on asset life cycle by more than 15%.

KEY TAKEAWAYS:

The Alpiq asset management system, ISO 55001 certified is the first corner stone to manage hydropower infrastructures in current market conditions where profitability of hydropower plants is under pressure. The system provides optimized processes, applied by stakeholders with clear roles and responsibilities.

LESSONS APPLICABLE FOR DEFENCE:

The use of Performance-Based Maintenance allowed Alpiq to optimise their expenditures without compromising the sustainability of their assets, while improvements were achieved with a healthy Return On Investment.

AM and the Management System

Implementing AM also bring the benefit of using a Management System (MS) approach (see *Figure 5*[13]) that provides consistency across the organisation, while supporting the realisation of the four benefits mentioned above:

- **Aligned objectives** - A management system enforces the communication of objectives and the measurement thereof (*Case Study 1*[14])
- **Transparent and consistent decision making** – A MS supports this through the capture into process of budgeting, decision making to support Asset Investment Planning and Asset Performance Management *Case Study 2*[15]).
- **Long-term strategic view** – A MS encourages and enforces this by making Through Life Cost part of the investment planning or the design optimisation processes, providing corporate memory when senior management changes (*Case Studies 3*[16] *and 4*[17]).
- **Risk-based decision making from a position of knowledge** – A MS captures all of this into execution processes and planning processes so it becomes a part of the way the organisation works (*Case Studies 5*[18] *and 6*[19]).

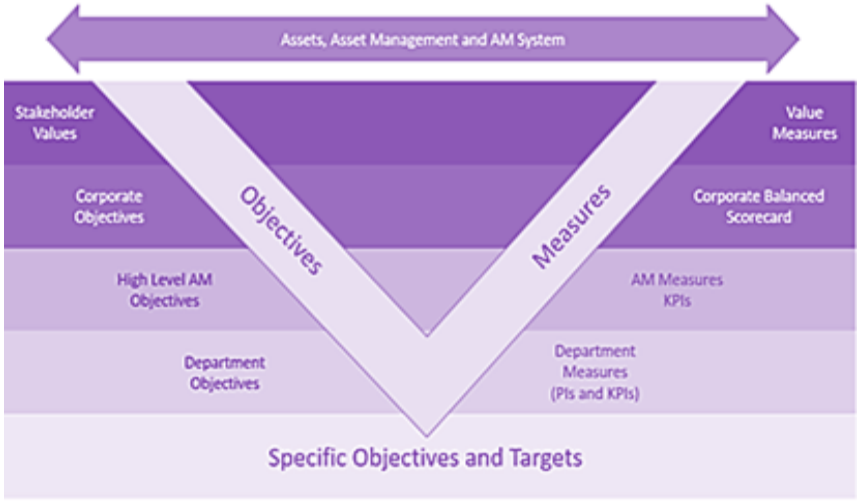


Figure 5: The Management System supports the AM Benefits

MOD Challenges in implementing Asset Management

With any uptake of AM, there will be challenges to be faced. The organisation itself and its culture can sometimes pose the biggest challenge. The MOD is composed of a manifold of organisations, including four Military Commands and twelve Enabling Organisations (e.g. DE&S, Defence Digital), and engages with an intricate stakeholder network to acquire and maintain their assets. This organisational complexity will make adoption of Asset Management across the whole of MOD more problematic. From LOGNet 2020, it is perceived the CDLS Organisation is well placed to support this. However, as a new organisation, promoting and implementing AM will require time as the organisation develops and builds its AM capability, even if DIO and SDA are already onboard. With SDSR due for release in 2020, the revised Defence objectives may also alter the direction and focus of the organisation.

[13] ISO 55000 Asset Management – A Biography, Rhys Davies and Danielle Humphrey
[14] Quantified Benefits from Asset Management – The Sodexo Journey, 2015
[15] Downer Systems, ISO 55001 Case Study, committee.iso.org
[16] Study into the Business of Sustaining Australia's Strategic Collins Class Submarine Capability–Beyond Benchmark. Canberra: Commonwealth of Australia, 2012 & 2016 Reports
[17] Multisector Asset Management Case Studies, U.S. EPA & U.S. DOT, Chapter 6
[18] Provided by KPMG
[19] Managing Hydropower Assets, Bulletin 2016

AM should be an evolution of the current MOD processes. However, due to previous and current top down transformation initiatives, fatigue is felt from these continuous changes leading to an unwillingness towards more changes. In the same way, the perception is also that there is little time for bottom up feedback with these entirely top down approaches. Winning the hearts and minds of all those involved is essential for the success of transforming an organisation. Another important aspect is a common desire for benefits to be realised straight away. There is a trade-off between short-term benefits and the long-term vision that Asset Management will require to grant true value through life to the organisation.

Misalignment of definitions across the MOD also leads to confusion. The words Asset and Management when used in different contexts, carry a challenge. There is a fundamental difference in departments managing assets versus Asset Management as part of the ISO 55000 standard. The former can be carried out regardless of a structural organisation strategy being present and the latter outlines a structured framework to put a focus on deriving value for the organisation[20].

Along with any organisational change, challenges are faced in relation to the MOD legacy LogIS tools and their lack of enterprise architecture. This is already recognised by MOD with the establishment of the Business Modernisation for Support (BMfS) programme, one of the pillars of Defence Support Transformation. A summary of all these key challenges can be seen in Figure 6.



Figure 6: Key Challenges

Implementation Strategy

Keeping to mind the challeges highlighted in the previous section, the actual implementation of the AM initiative will need to be considered carefully to ensure success. The following seven fundamental steps (see *Figure 7*) are necessary to implement AM and realise the benefits identified that AM bring:

- **Step 1 – Defining scope of organisation to which AM is applied**
  Recognising the complexity of the MOD organisation, the scope to which AM will be applied needs to be carefully established, balancing the need to involve the organisations involved in delivering a capability with the complexity of connecting these organisations. The scope and complexity will also determine the level of effort for the next steps.

[20] ISO Asset Management – Managing Assets in the context of Asset Management May 2017

- **Step 2 – Conduct Maturity Assessment of organisation**
  Undertake a formal Maturity Assessment with multiple MOD interviewees, where interviewees maybe single individuals or a group/panel of individuals, chosen from across the MOD organisation within the scope defined during Step 1. This is a key activity to identify the strengths, areas of best practices and opportunities to improve and align the organisation with best practice.

- **Step 3 – Determine the targeted levels of maturity**
  Based on the specificities of the organisation in scope, identify the levels of maturity that the organisation wants to achieve. This is not as simple as pursuing a level of compliance with ISO 55001 as it may be that the nature of the required MoD capability in AM may need particular strengths in some areas of the AM landscape whilst it can be possible to accept lower levels of capability in others.

- **Step 4 – Conduct Gap Assessment**
  Using the outputs from Steps 2 and 3, identify the gaps in the organisation between current levels of maturity and the targeted levels of maturity.

- **Step 5 – Write AM improvement Plan**
  Based on findings of the Gap Assessment (Step 4), develop an Improvement Plan to meet and/or exceed the targeted levels of AM maturity. This improvement areas would typically include reference to improving asset performance/condition; improving AM capability in terms of processes, tools, techniques, information systems as well as improving AM competence of those involved in AM related activity to complement existing SQEP.

- **Step 6 – Seek Senior Management genuine buy-in and commitment**
  Senior Management needs to be involved in the development of the AM Improvement Plan, its authorisation and to truly buy in to what the plan says, including its resourcing and funding. This also applies to the definition of Asset Values and the Asset Management Policy.

- **Step 7 – Execute the AM Improvement Plan**
  The resource and funded AM Improvement Plan needs to be successfully executed and lessons learnt captured to improve its implementation.



Figure 7: Fundamental Steps in implementing AM

Next Steps & Recommendations

Engineering Support needs to work with the three pillars of the newly formed Defence Support Organisation (Support Operations, Support Transformation and Joint Support) in order to kick off the first fundamental step of the implementation strategy: Defining scope of organisation to which AM is applied. The first actions are listed below and summarised at *Figure 8*:

- MOD Engagement – Engineering Support engages with DIO and SDA regarding their experience in applying AM/ISO 55000 in their organisations. Capturing the benefits that DIO and SDA have realised and/or perceived in implementing AM will support the authoring of any Business Cases that Engineering Support will submit, while supporting the identification of DIO and SDA AM projects that could be replicated in other MOD Organisations, as accelerator projects.

- International Collaboration – Engineering Support assists Support Operations in utilising international engagement and Memorandum of Understanding (MoU) to gather insight and lessons from partner nation AM initiatives. Access to their guidance, realised benefits and lessons learnt on implementation approaches could accelerate the deployment of AM across MOD.

- Industrial Engagement. Engineering Support facilitates the initiation by the Joint Support Enterprise Architecture of Practice (EAP) and Team Defence of a Defence Support AM Community of Practice to share best practice from across Defence (e.g. DIO and SDA) and other industry sectors that have successfully adopted AM and in order to incorporate AM into the business and process architectures. Team Defence would also provide the linkeage to the IAM South West Branch for collaboration with the AM professional body. This could be the precursor for the creation of a Center of Expertise (CoE) to provide technical excellence in Asset Management across MOD.

- Pilots. Engineering Support to submit suitable pilots to the Support Transformation board that will prioritise and fund suitable discovery, pilots or capability investigation activities to build the evidence base and business case for AM.



Figure 8: Recommendations for Engineering Support

With Australia already applying AM to the Joint Strike Fighter (JSF), the Collins Class Submarines and Land 400 Phase 3 Armoured Fighting Vehicles, UK SDA on submarines, then potential UK MOD pilots could consider JSF, MRV-P and/or Type 45. Pulling through lessons across these Defence specific assets will deliver a sound foundation to develop and implement Defence policy and processes.

These actions would allow Defence Support and Engineering Support to progress to step 2 and undertake a formal Maturity Assessment (as illustrated in Annex B) with multiple MOD interviewees, where interviewees maybe single individuals or a group/panel of individuals, chosen from across the MOD organisation to be compared and contrasted.

Ultimately, this will allow Support Operations Strategic Policy and Plans team to develop the AM Policy, provide guidance in the Support Solutions Envelope, update the tube map and where appropriate add processes in the Defence Logistic Framework (DLF).

Finally, the above recommendations should be aligned with the Defence Support Operating Model (DSOM)[21] and the wider Defence Support Transformation programme, as these provide potential vehicles for delivering the required policy, governance, process and organisational changes required to implement Strategic Asset Management.

Engineering Support (Transformation) User Group (ESTUF)

This paper was produced as part of our ESTUF Working Group. To develop the ideas and concepts presented in this paper or to get more involved please contact steve.green@teamdefence.info or admin@teamdefence.info

Acknowlegements

This paper was developed by **Team Defence**, with input from:

Atkins part of the SNC-Lavalin Group	*MOD DE&S Support Directorate*
Babcock International	*IAM South West Branch*
AMS/1 Chairman	*ISO/TC251 Chair*
Asset Insights	*Camcode*
KPMG	*BMT*

[21] DSOM: Lt Gen Richard Wardlaw, Chief of Defence Logistics and Support (CDLS) is leading the Defence Support Transformation Programme, which includes the Defence Support Operating Model (DSOM) implementation. This currently has several workstreams which are setting out how Support will be directed and delivered across Defence.

Annex A – Mapping of the 39 AM Subjects with MOD Activities

The mapping of MOD activities against the 39 Asset Management Subjects has been generated as a collaboration between Industry and MOD representatives participating on this paper, using MOD documentation and websites available to Defence Industry, such as Knowledge in Defence (KiD). It needs to be recognised that this mapping has not considered the entire MOD documentation due to accessibility and time constraints. Below is a summary of this collaborative mapping exercise;

Group 1 — Strategy & Planning

The Strategy & Planning subject group is the core of an asset management system. It covers the activities required to align the system with the organization, implement and improve the system.

1 — Asset Management (AM) Policy

Asset Management – an anatomy definition: This comprises the principles and mandated requirements derived from and consistent with the organisational plan. To provide a framework for the development and implementation of the strategic asset management plan (SAMP) and the setting of the asset management objectives.

Industry perspective on MOD current state: As described in the Defence Operating Model, Policy provides the overarching context and framework for MOD to operate. Defence and National Security Policy, and all the other supporting policies, outline the key challenges and subsequent strategic objectives for the MOD, its constituent organisations and cross-cutting activities and Functions. MOD's approach to capability management is recorded in a Generic Capability Management (GCM) Model, from which this guidance is developed. The GCM Model is designed to enable the traceability of National Security Strategy through Defence blueprint/Strategic Objectives/CMSs/CMPs/Architecture/Programme Mandates to the setting of requirements across DLoD.

2 — AM Strategy & Objectives

Asset Management – an anatomy definition: The strategic plan for the management of an organisation's assets to achieve the organisational objectives. ISO 55000 refers to this asset management strategy as the SAMP. The Strategy describes the long-term approach to management of the physical assets, specifies how organisational objectives are to be converted into asset management objectives, the approach for developing asset management plan(s), and the role of the AMS in supporting achievement of the asset management objectives.

Industry perspective on MOD current state: The Defence Strategic Direction (DSD) describes how MOD will use its existing Military Capability and sets out how it will achieve the Future Force described in the Strategic Defence and Security Review (SDSR). The Defence Infrastructure Organisation (DIO) is the only MOD organisation that published a Strategic Asset Management Plan (SAMP).

3 — Demand Analysis

Asset Management – an anatomy definition: The processes an organisation uses to both assess and influence the demand for, and level of service from, an organisation's assets. It typically includes the analysis of future demand for the product or services being offered and the requirements this demand will place on the asset portfolio.

Industry perspective on MOD current state: The Assured Capability process considers through-life protection decisions of Military Capability primarily against evolving threats. It measures overall capability shortfalls and surpluses against current direction and guidance to prioritise for action accordingly. Exportability analysis for equipment assets is undertaken to understand whether exportability should be pursued. In relation to supportability resource requirements and future needs forecasting, the Forecast and Resource Planning (F&RP) programme recently initiated aims to improve the way Defence forecasts and resources its support requirements.

4 — Strategic Planning

Asset Management – an anatomy definition: The processes an organisation uses to undertake strategic asset management planning, to establish asset management objectives and develop the asset management strategy (SAMP). It includes how the organisation is to address the outputs from demand analysis; the processes for determining long-term renewal, enhancement and maintenance work volumes; and the associated risks and costs to meet the asset management objectives. Asset management strategic planning is usually undertaken as part of the overall organisational strategic planning process.

Industry perspective on MOD current state: The Defence Plan is based around the 25 Defence Tasks set out in DSD, captures the broader Policy and Strategy intent of Head Office and is constructed in close conjunction with the Annual Budget Cycle (ABC) process to prioritise Defence spending, and allocate budgets to the Military Commands and Enabling Organisations. The Defence Plan directs and informs the development of the Command Plans and Enabling Organisations' Corporate Plans.

5 — Asset Management Planning

Asset Management – an anatomy definition: The activities to develop the asset management plan(s) that specify the detailed activities, resources, responsibilities, timescales and risks for the achievement of the asset management objectives. Asset management planning follows on the strategic planning process.

Industry perspective on MOD current state: The annual Defence Equipment Plan describes the agreed programme of record for the next 10 year planned financial investment that MOD will make in future military equipment and equipment support, and any changes from previous years. It is an important subsidiary plan to the Defence Plan.

Group 2 — AM Decision-Making

Making decisions that impact the lifecycle of the asset is a common activity that takes place frequently. To make these decisions, common frameworks, analysis and strategies should be in place. Having these commons tools and strategies will ensure that the decisions are aligned with the organization's objectives, regardless who is make the decision.

6 — Capital Investment Decision-Making

Asset Management – an anatomy definition: The processes and decisions to evaluate and analyse scenarios for decisions related to capital investments of an organisation. These processes and decisions may relate to new assets for the organisation (eg Greenfield projects) and/or replacement of assets at end of life (CAPEX sustaining programmes).
Industry perspective on MOD current state: For capital programmes and investment decision, JSP655 Defence Investment Approvals describes the process of requesting approval for CAPEX investment business case and option approvals. adopting HM Treasury Green Book 3-Stage Approvals process.

7 — Operations & Maintenance Decision-Making

Asset Management – an anatomy definition: The management activities and processes involved in determining the operations and maintenance requirements in support of the asset management objectives and goals.

Industry perspective on MOD current state: At Capability level and through the Requirements & Acceptance process, the User Requirements Document (URD) articulates the Operational need and defines the Combined Operational Effectiveness and Investment Appraisal (COEIA) to be conducted. At programme level, Integrated Logistic Support (ILS) determines the maintenance requirements in support of the Equipment through application of Supportability Analysis. DefStan00-600, ASD S3000L.

8 — Lifecycle Value Realisation

Asset Management – an anatomy definition: The activities undertaken by an organisation to balance the costs and benefits of different renewal, maintenance, overhaul and disposal interventions. It includes the methods used to ensure the best total value is obtained, by consideration of the interaction between the life cycle activities, and determination of the optimal combination, including costs, risk, performance and sustainability effects. The total value usually needs to be considered at the level of the asset system or asset portfolio.

Industry perspective on MOD current state: As per JSP507 Investment Appraisal and Evaluation, the COEIA compares the alternative investment options within the context of defence policy, by plotting the Measure of Effectiveness against Whole Life Cost.

9 — Resourcing Strategy

Asset Management – an anatomy definition: Determining and documenting the activities and processes to be undertaken by an organisation in order to procure and use people, plant, tools and materials to deliver the asset management objectives and asset management plan(s). The resourcing strategy should consider the costs and risks of out-sourcing the provision of resources, and how to best integrate the available resources across the organisation in order to cost effectively deliver the asset management plan(s).

Industry perspective on MOD current state: The SDSR provides the strategy for resourcing at organisation level and Forecasting & Resource Planning (F&RP) will provide Defence with an integrated business planning capability, with a common process for equipment demand and support planning for individual equipment types.

10 — Shutdowns & Outage Strategy

Asset Management – an anatomy definition: The activities taken by an organisation to develop a strategy for shutdown and outages. It includes consideration of reducing downtime and outages, and the cost to carry out the activities in the asset management plan efficiently and safely during the planned outages.

Industry perspective on MOD current state: Defence Digital has documented their Planned Outages Process ISSP 153 in order to assess, coordinate and approve any planned outages requested by the Applications owners with a minimum of 20-day notice.

Group 3 — Lifecycle Delivery

During the operational phase of the asset, it is up to the asset managers to look for efficiencies and improve the performance, cost or risk of the asset. Since the operational phase is typically the longest, it is vital that there are systems in place to manage the asset with the long term in mind.
During the operational phase, maintenance activities come into play, and can be a major source of inefficiency in both the assets and the support services of the assets.

11 — Technical Standards & Legislation

Asset Management – an anatomy definition: The processes used by an organisation to ensure its asset management activities are compliant with the relevant technical standards and legislation.

Industry perspective on MOD current state: MOD's Standardisation Management Policy JSP920 provides the order of preference for selecting technical standards and legislations. The UK Defence Standardisation (DSTAN) provides services for verification of standards. The Defence Safety Authority ensures the enforcement of Defence Regulations for Health, Safety & Environmental Protection JSP920.

12 — Asset Creation & Acquisition

Asset Management – an anatomy definition: An organisation's processes for the acquisition, creation, installation and commissioning of assets. It also includes elements of approval and releasing of funding, arrangements for hand-over to operations, the monitoring and capture of actual costs and benefits analysis.

Industry perspective on MOD current state: The Acquisition System Operating Model (ASOM) sets out the principles for the Acquisition System by which the MOD acquires equipment, logistic support and information services. The Acquisition System Handbook (ASH) provides guidance. The Defence Authority is accountable for the implementation and continuous improvement of the Acquisition System. In KiD, the Requirements & Acceptance End-to-End (E2E) process provides a guide of activities to be undertaken throughout Capability Development and Delivery. JSP920.

13 — Systems Engineering

Asset Management – an anatomy definition: An interdisciplinary, collaborative approach to derive, evolve and verify a life cycle balanced system solution that satisfies customer expectations and meets public acceptability. It describes policies and processes for the requirements analysis, design and evaluation of assets. Verification and validation execution is considered as part of asset creation and acquisition.

Industry perspective on MOD current state: Systems Engineering considers Military Capability needs and, through the application of design and trade-off processes, shapes these into definitions of coherent products and services against which contracts can be agreed. ISO15288.

14 — Configuration Management (CM)

Asset Management – an anatomy definition: A management process for establishing and maintaining consistency of a product's physical and functional attributes with its design and operational information throughout its life. It is closely aligned with the principles and requirements of systems engineering.

Industry perspective on MOD current state: CM is the through life management of changes to the requirements, the product as-designed, as-built and as-maintained / operated standard. DefStan05-057, JSP945.

15 — Maintenance Delivery

Asset Management – an anatomy definition: The management of maintenance activities including both preventive and corrective maintenance management methodologies. It includes the definition of maintenance specification and schedules, maintenance execution procedures, procedures for missed maintenance and the capture and utilisation of maintenance and inspection measurements and results.

Industry perspective on MOD current state: It is MOD policy that all maintenance activity from the undertaking of maintenance design through to maintenance exploitation be integrated into, and managed within, a suitable Maintenance Management System. DefStan 00-600.

16 — Reliability Engineering

Asset Management – an anatomy definition: The processes for ensuring that an item shall operate to a defined standard for a defined period of time in a defined environment. Reliability engineering starts at the conceptual phase of design and continues through the life cycle. The goal is to identify potential reliability problems as early as possible in the life cycle and ensure that the reliability requirements will be met.

Industry perspective on MOD current state: R&M are vital characteristics of defence equipment in that they are instrumental both in providing sustained delivery of the required performance of equipment in the field, in being major drivers of the cost of ownership through life and are also an intrinsic element of safe operations. DefStan00-40 series.

17 — Asset Operations

Asset Management – an anatomy definition: The processes used by an organisation to operate its assets to achieve the business objectives. It includes the processes that provide instructions to operators about how to operate the assets within the appropriate design, maintenance and operational parameters.

Industry perspective on MOD current state: Asset are operated by SQEP individuals, JSP 822 Defence Direction and Guidance on Training and Education is the authoritative policy that directs and guides Defence people., underpinned by the Defence Systems Approach to Training (DSAT). Defence Technical Publications to support the operation and maintenance of assets are developed through the ILS approach, as specified in DefStan 00-600.
Integrated Logistic Support - Defence Standard 00-600 covers elements that contribute to delivering successful asset operations Series.

18 — Resource Management

Asset Management – an anatomy definition: Implementing the resourcing strategy to manage the use of funds, people, plant, tools and materials in delivering asset management activities. It includes integrating the resource utilisation across the organisation and across all asset management activities.

Industry perspective on MOD current state: At an organisation level the MOD uses the Defence Operating Model to manage the way it achieves its outputs. This includes finances, people and timeframes. At equipment level, F&RP will provide Defence with a common process for equipment demand and support planning.

19 — Shutdown & Outage Management

Asset Management – an anatomy definition: An organisation's processes for identification, planning, scheduling, execution and control of work related to shutdowns or outages. It includes policies and processes for the implementation of the shutdown and outage strategy to ensure the effective management of shutdowns and outages.

Industry perspective on MOD current state: Defence Digital has documented their Planned Outages Process ISSP 153 to support the Network Operating Authority charged with coordinating and approving planned outages of Defence Digital Services.

20 — Fault & Incident Reporting

Asset Management – an anatomy definition: Responding to failures and incidents in a systematic manner, including incident detection and identification, fault analysis, use of standard responses, temporary and permanent repairs as well as taking over and handing back of sites. It includes developing plans to respond to unplanned events and managing the resources required for the response to the events, and escalation criteria.

Industry perspective on MOD current state: Army raises a JAMES Component Report (SOP 7, Process 10) for JAMES Managed Equipment or an AFG8267/8 Equipment Failure Report for other equipment. RN raises OPDEF (Operational Defects) (BP 19) or UMMS Work Requisition Form (S340) for UMMS managed equipment. RAF routinely reports faults using the MOD Form 707 series of forms or raises a Serious Fault Report (SFR) for serious faults.
Defence Digital's Incident Management is documented in ISSP 150 and based on ITIL Framework.

21 — Asset Decommissioning & Disposal

Asset Management – an anatomy definition: The process used by an organisation to decommission and dispose of assets due to ageing or changes in performance and capacity requirements.

Industry perspective on MOD current state: Governing Policy 2.7 at KSA2 of the Support Solution Envelope (SSE) sets out the approach to ensure that Disposal is considered during design, development, production and in-service support with the Defence Equipment Sales Authority (DESA), as the Sponsoring Authority. JSP916.

Group 4 — Asset Information

Being able to perform decisions and carry out the life cycle activities, require information. Having the right data and information is vital to being successful. The diverse set of data must be accessible, and have a single source of truth. This is where the Asset Information comes in. Asset information lays out everything required to make data-driven decisions

22 — Asset Information Strategy

Asset Management – an anatomy definition: The strategic approach to the definition, collection, management, reporting and overall governance of asset information necessary to support the implementation of an organisation's asset management strategy and objectives.

Industry perspective on MOD current state: Support Information Strategy is set out at KSA4 of the Support Solution Envelope (SSE) with the policy requesting Logistic Information Requirements Planning to enable delivery teams to understand and manage their logistics information needs to support their capability through life. JSP440, JSP441, JSP604, DMBOK.

23 — Asset Information Standards

Asset Management – an anatomy definition: The specification of a consistent structure and format for collecting and storing asset information and for reporting on the quality and accuracy of asset information.

Industry perspective on MOD current state: MOD Asset Information Standards are set out through JSP248, JSP441, JSP604, DefStan 05-132 and LCIA via the detail contained in KSA4 of the SSE. ASD standards via DefStan00-600 complete the set of standards for Equipment information, while DIO uses BIM ISO19650. Project ATHENA pre Unique Item Identifier (UII) claims the data confidence was as low as 58% but post UII they have a 98%.

24 — Asset Information Systems

Asset Management – an anatomy definition: The asset information system an organisation has in place to support the asset management activities and decision-making processes in accordance with the asset information strategy.

Industry perspective on MOD current state: MOD Asset Information Systems are currently delivered and supported by the Supply Chain Information Services (SCIS), but their future architecture has moved under the BMfS Team (Business Modernisation for Support). LENICA.

25 — Data & Information Management

Asset Management – an anatomy definition: The data and information held within an organisation's asset information systems and the processes for the management and governance of that data and information.

Industry perspective on MOD current state: Support Data & Information Management is set out through JSP440, JSP441, JSP604 and LCIA via the detail contained in KSA4 of the SSE.

Group 5 — Organisation & People

Asset management relies on the right organization, roles, and people supporting and work towards the common objectives of the organization.

26 — Procurement & Supply Chain Management

Asset Management – an anatomy definition: The processes used by an organisation to ensure that all outsourced asst management activities are aligned with the asset management objectives of the organisation and to monitor the outcomes of these activites against these objectives.

Industry perspective on MOD current state: Contracting, Purchasing and Finance (CP&F) provides a single online end to end procurement system for all MOD procurement activity. Defence Business Services Finance and Procurement Services (FPS) provides expert information on Procurement, advice and services to and on behalf of MOD business areas. DLF

27 — Asset Management Leadership

Asset Management – an anatomy definition: The leadership of an organisation required to promote a whole life asset management approach to deliver the organisational and asset management objectives of the organisation.

Industry perspective on MOD current state: The MOD Chief of Defence Logistics and Support (CDLS) is the principal staff officer for strategic military logistics and support advice.
Within DIO, Strategic Asset Management is owned by Maj Gen Nicolas Cavangh, Director Strategy and Planning.

28 — Organisational Structure

Asset Management – an anatomy definition: The structure of an organisation in terms of its ability to deliver the organisational and asset management objectives.

Industry perspective on MOD current state: The MOD is made up of eighteen separate organisations: Head Office, 4 Military Commands, DNO and 12 Enabling Organisations. Only DIO has formally adopted ISO55000 Asset Management.

29— Organisational Culture

Asset Management – an anatomy definition: The culture of an organisation in terms of its ability to deliver the organisational and asset management objectives.

Industry perspective on MOD current state: The 18 MOD organisations have published their own values, documented in various documents, such as the Code of Business Conduct or Business Ethics, Civil Service Code.

30 — Competence Management

Asset Management – an anatomy definition: The processes used by an organisation to systematically develop and maintain an adequate supply of competent and motivated people to fulfil its asset management objectives including arrangements for managing competence in the boardroom and the workplace.

Industry perspective on MOD current state: The training and education of our people to deliver Defence outputs is a key activity. Underpinning all training and education activities is the Defence Systems Approach to Training (DSAT). JSP822.

Group 6 — Risk & Review

How the risk is managed, and performance reviewed will allow asset managers to continue to improve not only the assets but the system as well.

31 — Risk Assessment & Management

Asset Management – an anatomy definition: The policies and processes for identifying, quantifying and mitigating risk and exploiting opportunities.

Industry perspective on MOD current state: The MOD risk management framework is aligned with the overarching principles of the HM Treasury's Orange Book and the Cabinet Office's Management of Risk in Government. JSP892, ISO IEC-62198.

32 — Contingency Planning & Resilience Analysis

Asset Management – an anatomy definition: The processes and systems to ensure an organisation is able to continue to either operate its assets to deliver the required level of service in the event of an adverse impact or maintain the safety and integrity of the assets.

Industry perspective on MOD current state: The Defence Concepts and Doctrine Centre defines Defence resilience as the ability of defence assets/infrastructure, networks and systems, and processes and people to deter, anticipate, mitigate, absorb, adapt and overcome a disruptive event or multiple events, to enable the continuation of Defence critical outputs and activities. JSP440, ISO22301.

33 — Sustainable Development

Asset Management – an anatomy definition: The interdisciplinary, collaborative processes used by an organisation to ensure an enduring, balanced approach to economic activity, environmental responsibility and social progress to ensure all activities are sustainable in perpetuity.

Industry perspective on MOD current state: In the Sustainable MOD strategy 2015 to 2025, the MOD is committed to "Deliver Defence in the most effective, efficient and sustainable way", as managing socio-economic and environmental effects at an organisational level supports a modern military and achievement of the Department's strategic objectives. JSP418, ISO 14001.

34 — Management of Change

Asset Management – an anatomy definition: An organisation's processes for the identification, assessment, implementation and communication of changes to people, processes and assets.

Industry perspective on MOD current state: MOD defines the management of change to the formal established configuration baseline as the systematic evaluation, co-ordination, approval/disapproval and dissemination of all proposed changes to a Configure Item and/or its configuration documentation and the verification of the implementation of all approved changes. DefStan05-057, JSP945.

35 — Asset Performance & Health Monitoring

Asset Management – an anatomy definition: The processes and measures used by an organisation to assess the performance and health of its assets using performance indicators. The indicators can be leading or lagging and allow for the prediction of future asset performance and health as well as the assessment of current or historic performance.

Industry perspective on MOD current state: Individual services seem to drive the approaches:

- Sea - BR1313: Maintenance Management in Surface Ships.
- Land - AESP 0200-A-100-013: Equipment Care Inspection and Mandatory Equipment Inspection.
- Air - Continuing Airworthiness Engineering (CAE) - 4000 Series Regulatory Articles - Manual of Maintenance and Airworthiness Processes (+ AP 100B-01).

36 — AM System Monitoring

Asset Management – an anatomy definition: The processes and measures used by an organisation to assess the performance and health of its AMS. The primary aim is to evaluate the extent to which the AMS is fit for purpose and that the organisation is delivering its asset management objectives.

Industry perspective on MOD current state: Without formal AMS (outside of DIO), monitoring of the performance of the management system itself would likely be via standard ISO9000 Quality Management System approaches.

Group 6 — Risk & Review

How the risk is managed, and performance reviewed will allow asset managers to continue to improve not only the assets but the system as well.

37 — Management Review, Audit & Assurance

Asset Management – an anatomy definition: An organisation's processes for reviewing and auditing the effectiveness of its asset management processes and AMS.

Industry perspective on MOD current state: MOD P3M Framework provides covers Management Reviews and Assurance Management. Defence Internal Audit (DIA) provides assurance that an organisation's key business risks are being managed and that the internal control framework is operating effectively.JSP940, ISO9001, ISO19011.

38 — Asset Costing & Valuation

Asset Management – an anatomy definition: An organisation's processes for defining and capturing 'as built', maintenance and renewal unit costs and the methods used by an organisation for the valuation and depreciation of its assets. This includes ensuring that the quality of financial information is appropriate for the financial reporting frame.

Industry perspective on MOD current state: MOD Finance conducts Evaluation, which is a retrospective analysis of how well a policy, programme or project is delivering against its performance, time and cost parameters. It is conducted at key stages throughout the project lifecycle and includes an assessment of the reasons for any variance from the expected outcomes, and any lessons learned. JSP507.

39 — Stakeholder Engagement

Asset Management – an anatomy definition: The methods an organisation uses to engage with stakeholders.

Industry perspective on MOD current state: The Programme Senior Responsible Owner is responsible for engaging with and managing the stakeholder relationship with key high-level stakeholders including the Sponsor or Sponsoring Group. Prince2, APM Body of Knowledge.

Annex B – MOD Maturity Assessment

There are a number of maturity assessments and this paper utilised the Asset Management – An Anatomy (AMA) maturity assessment that assesses the organisation overall Asset Management capabilities and performance (the wider AM discipline, covering all 39 Subjects). The maturity of the Asset Management System (conformance with ISO 55001 representing a 'Competent' level of maturity) was not considered, as MOD has not widely adopted ISO 55000 in this moment in time.

The MOD maturity assessment developed for this paper is an Industry high level view on MOD maturity against the 39 Subjects of the AM Landscape and only provided for illustration purposes. As such, it is a subjective view based on the experience of Industry representatives that work for the MOD (as contractors and consultants), but also for other civilian domains, such as Railway and Nuclear. No interviews with MOD workforce have been carried out to inform this maturity assessment.

The maturity assessment detail is provided in *Table 3* below and is the source for the Radar graphic used in this paper.

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
1	Asset Management Policy	The principles and mandated requirements derived from and consistent with the organizational strategic plan, providing a framework for the development and implementation of the asset management strategy and the setting of the asset management objectives.	- Should be: Connected AM policy - Best: Evidence of good practice, not connected across organisation - Average: recognise it may be useful and may provide value, but unconvinced in the main - Worst: don't recognise value of AM	0	0.5	2
2	Asset Management Strategy & Objectives	The strategic plan for the management of assets of an organisation that will be used to achieve the organizational / corporate objectives.	- Should be: Connected AM policy - Best: Lots of good strategic thinking, occaisionally connected across the organisation - Average: Lots of good strategic thinking, not necessarily connected across the organisation - Worst: Lots of good strategic thinking, not necessarily connected across the organisation	2	2	2.5
3	Demand Analysis	The processes an organization uses to both assess and influence the demand for, and level of service from, an organization's assets.	- Should be: - Best: Good threat analysis an understanding of external demands of the organisation, communicated well across the organisation - Average: Good threat analysis an understanding of external demands of the organisation, notenecessarity communicated across the organisation - Worst: Good threat analysis an understanding of external demands of the organisation, notenecessarity communicated across the organisation	2	2.5	3
4	Strategic Planning	The processes an organization uses to undertake strategic asset management planning.	- Should be: Connected AM policy - Best: Lots of good strategic thinking, occaisionally connected across the organisation - Average: Lots of good strategic thinking, not necessarily connected across the organisation - Worst: Lots of good strategic	2	2	2.5

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
			thinking, not necessarily connected across the organisation			
5	Asset Management Planning	The activities to develop the Asset Management plans that specify the detailed activities and resources, responsibilities and timescales and risks for the achievement of the asset management objectives.	- Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition	1	1.5	3
6	Capital Investment Decision-Making	The processes and decisions to evaluate and analyse scenarios for decisions related to capital investments of an organization. These processes and decisions may relate to new assets for the organization (e.g. Greenfield projects) and/or replacements of assets at end of life (CAPEX sustaining programs).	- Should be: Life cycle, and risk based decision making - Best: Life cycle, and risk based decision making - Average: Life cycle, and risk based decision making - Worst: Life cycle, and risk based decision making	3	3	3
7	Operations & Maintenance Decision-Making	The management activities and processes involved in determining the Operations and Maintenance requirements in support of the Asset Management objectives and goals.	- Should be: Dynamic decision making that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition	1	1.5	3
8	Life Cycle Value Realisation	The activities undertaken by the organization to balance the costs and benefits of different renewal, maintenance, overhaul and disposal interventions.	- Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition	1	1.5	3
9	Resourcing Strategy	Determining and documenting the activities and processes to be undertaken by an organization in order to procure and use people, plant, tools and materials to deliver the Asset Management objectives and Asset Management Plan(s).	- Should be: Resourcing driven by demand, and planning - Best: Pockets of good practice, driving resourcing levels from a point of knowledge. Strategically predicting through SDSR resourcing levels - Average: Pockets of good practice, driving resourcing levels from a point of knowledge. not necessarily connected across silos of the	2	2	3

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
			organisation at a tactical level - Worst: as per avg			
10	Shutdowns & Outage Strategy	The activities taken by an organisation to develop a strategy for shutdown and outages.	Noting shutdown has been interpreted as planned maintenance periods e.g. overhaul, refit/refurbish. - Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition	1	1.5	3
11	Technical Standards & Legislation	The processes used by an organisation to ensure its asset management activities are compliant with the relevant technical standards and legislation.	- Should be: clear understanding of the impact of legislation on maintenance, operational & Design decision - Best: Good practices across the organisation - Average: Good practices across the organisation - Worst:Actions taken in acordance with standards however not clearly communicated or connected across the organisation	2	3	3
12	Asset Creation & Acquisition	An organisation's processes for the acquisition, installation and commissioning of assets.	- Should be: Life cycle, and risk based decision making - Best: Life cycle, and risk based decision making - Average: Life cycle, and risk based decision making - Worst: Life cycle, and risk based decision making	3	3	3
13	Systems Engineering	An interdisciplinary, collaborative approach to derive, evolve and verify a life-cycle balanced system solution which satisfies customer expectations and meets public acceptability.	- Should be: fully connected systems engineering processes based on life cycle approach - Best: Generally leaders in this field - Average: Proven connected good practice - Worst: good practice not connected, e.g. impact of change	2	3	4
14	Configuration Management	A management process for establishing and maintaining consistency of a product's physical and functional attributes with its design and operational information throughout its life.	- Should be: clear connection of configuration - Best: Good practices across the organisation - Average: Good practices across the organisation - Worst: come areas of the organisation e.g. IT where configuration is not makaged with the same rigour, and not thought to be an isse, but with provedn significant impacts	0	2	3
15	Maintenance Delivery	The management of maintenance activities including both preventive and corrective maintenance management methodologies.	- Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or	1	1.5	3

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
			condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition			
16	Reliability Engineering	The processes for ensuring that an item shall operate to a defined standard for a defined period of time in a defined environment.	- Should be: Driven from a point of knowledge - Best: Pockets of world leading practice, especially in design, and requirment verification & validation - Average: Pockets of good practice, driven from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: Inservice assets not taking advantage of reliability information and potentially driven by outdated information and data. Not forcussed on improvment and development	0	2	4
17	Asset Operation	The processes used by an organisation to operate its assets to achieve the business objectives.	- Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: good local operational planning constrained by process - Worst: good local operational planning constrained by process	2	2	3
18	Resource Management	Implementing the Resourcing Strategy to manage the use of funds, people, plant, tools and materials in delivering asset management activities.	- Should be: Resourcing driven by demand, and planning - Best: Pockets of good practice, driving resourcing levels from a point of knowledge. Strategically predicting through SDSR resourcing levels - Average: Pockets of good practice, driving resourcing levels from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: as per avg	2	2	3
19	Shutdown & Outage Management	An organisation's processes for identification, planning, scheduling, execution and control of work related to shutdowns or outages	Noting shutdown has been interpreted as planned maintenance periods e.g. overhaul, refit/refurbish. - Should be: Dynamic plans that adapt to threat and risk posed from equipment condition - Best: Good local control and maintenance planning, with flexible support contracts - Average: Executed plans that are not dynamic based on threat or condition. However recogition that adaptive mantenance (e.g. CBM) is beificial, constrained by process - Worst: Executed plans that are not dynamic based on threat or condition	0	1.5	3
20	Fault & Incident Response	Responding to failures and incidents in a systematic manner, including incident detection and identification, fault analysis, use of standard responses, temporary and	- Should be: using fault and incident reporting to influence and drive improvements - Best: good practice - Average:Good processes however local demands overtake process	0	1.5	3

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
		permanent repairs as well as the taking over and handing back of sites.	- Worst: Actively bypassing feedback processes			
21	Asset Decommissioning & Disposal	The processes used by an organisation to decommission and dispose of assets due to ageing or changes in performance and capacity requirements.	- Should be: clear understanding of the impact of legislation on maintenance, operational & Design decision - Best: Good practices across the organisation - Average: Good practices across the organisation - Worst:Actions taken in acordance with standards however not clearly communicated or connected across the organisation	2	3	3
22	Asset Information Strategy	The strategic approach to the definition, collection, management, reporting and overall governance of asset information necessary to support the implementation of an organisation's asset management strategy and objectives.	- Should be: Connected, structured information systems and strategies - Best: siloed information with no clear strategy - Average: siloed information, not connected across organisation, partially driven from historical security midsets - Worst: lack of understanding of the value of interconnected information systems	0	2	2
23	Asset Information Standards	The specification of a consistent structure and format for collecting and storing asset information and for reporting on the quality and accuracy of asset information.	- Should be: Connected, structured information systems and strategies - Best: Some areas of good practice - Average: siloed information, not connected across systems - Worst: lack of implementation of the information standards	0	2	2
24	Asset Information Systems	The asset information systems an organization has in place to support the asset management activities and decision-making processes in accordance with the Asset Information Strategy.	- Should be: Connected, structured information systems and strategies - Best: siloed information with no clear strategy - Average: siloed information, not connected across organisation, partially driven from historical security midsets - Worst: lack of understanding of the value of interconnected information systems	0	2	2
25	Data & Information	The data and information held within an organization's asset information systems and the processes for the management and governance of that data and information.	- Should be: Connected, structured information systems and strategies - Best: siloed information with no clear strategy - Average: siloed information, not connected across organisation, partially driven from historical security midsets - Worst: lack of understanding of the value of interconnected information systems	**1**	2	2
26	Procurement and supply chain management	The processes used by an organisation to ensure that all outsourced asset management activities are aligned with the asset management objectives of the organisation and to monitor the outcomes of these activities against these objectives	- Should be:Connected supply chain aligned to AM principles of Risk, whole life cost - Best: Good supply chain aligned to AM principles - Average:Good practice with project and programme risks - Worst:Good practice procurement not connected across the organisation, with long term contracts and changing personnel	1.5	2.5	3

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
27	Asset Management Leadership	The leadership of an organisation required to promote a whole life asset management approach to deliver the organisational and asset management objectives of the organisation	- Should be:Connected proactiev leadership, with consistent messaging - Best: Pockets of good practice - Average: Core parts of MOD that do not recognise value AM, some areas starting to recognise there is a gap - Worst: Core parts of MOD that do not recognise value AM, and due to the constant change in personnel, a potential lack of accountabiltiy	0	0.5	2
28	Organisational Structure	The structure of an organisation in terms of its ability to deliver the organizational and asset management objectives.	- Should be:Connected proactiev leadership, with consistent messaging - Best: Pockets of good practice - Average: Core parts of MOD that do not recognise value AM, some areas starting to recognise there is a gap - Worst: Core parts of MOD that do not recognise value AM	0.5	2	2
29	Organizational Culture	The culture of an organization in terms of its ability to deliver the organizational and asset management objectives	- Should be:Connected proactiev leadership, with consistent messaging - Best: Pockets of good practice - Average: Core parts of MOD that do not recognise value AM, some areas starting to recognise there is a gap - Worst: Core parts of MOD that do not recognise value AM, and due to the constant change in personnel, a potential lack of accountabiltiy	0	2	2
30	Competence Management	The processes used by an organisation to systematically develop and maintain an adequate supply of competent and motivated people to fulfil its asset management objectives including arrangements for managing competence in the boardroom and the workplace.	- Should be: clear understanding of the requirements onpersonnel, with industry leading processes for the likees of TNA & Defence systems approach to training (DSAT) - Best: Good practices across the organisation - Average: Good practices across the organisation - Worst:Actions taken in acordance with standards however not clearly communicated or connected across the organisation	0	3	3
31	Risk Assessment and Management	The policies and processes for identifying, quantifying and mitigating risk and exploiting opportunities.	- Should be: Risks connected with the programmes and delivery, across the organisation - Best: Pockets of very good risk management practice not consistently connected across the organisation functional silos aswell as across the different domains - Average: - Worst: Risk management limited to project risks. Not focussed on AM through life	1	2	2
32	Contingency Planning & Resilience Analysis	The processes and systems put in place by an organization to ensure it is able to continue to either operate its assets to deliver the required level of service in the event of an adverse impact or maintain the safety and integrity of the	- Should be: Resourcing driven by risk - Best: Pockets of good practice, driving resourcing levels from a point of knowledge. Strategically predicting through SDSR resourcing levels - Average: Pockets of good practice,	2	2	3

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
		assets (whether or not they operate).	driving resourcing levels from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: as per avg			
33	Sustainable Development	The interdisciplinary, collaborative processes used by an organisation to ensure an enduring, balanced approach to economic activity, environmental responsibility and social progress to ensure all activities are sustainable in perpetuity.	- Should be: Resourcing driven by risk - Best: Pockets of good practice, driving resourcing levels from a point of knowledge. Strategically predicting through SDSR resourcing levels - Average: Pockets of good practice, driving resourcing levels from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: as per avg	0	2	3
34	Management of Change	An organization's processes for the identification, assessment, implementation and communication of changes to people, processes and assets.	- Should be: clear connection of configuration - Best: Good practices across the organisation - Average: Good practices across the organisation - Worst: come areas of the organisation e.g. IT where configuration is not makaged with the same rigour, and not thought to be an isse, but with provedn significant impacts	0	2	3
35	Assets Performance & Health Monitoring	The processes and measures used by an organization to assess the performance and health of its assets using performance indicators.	- Should be: Driven from a point of knowledge - Best: Pockets of world leading practice, especially in design, and requirment verification & validation - Average: Pockets of good practice, driven from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: Inservice assets not taking advantage of reliability information and potentially driven by outdated information and data. Not forcussed on improvment and development	0	1	3
36	Asset Management System Monitoring	The processes and measures used by an organization to assess the performance and health of its Asset Management System.	- Should be: Driven from a point of knowledge - Best: Pockets of world leading practice, especially in design, and requirment verification & validation - Average: Pockets of good practice, driven from a point of knowledge. not necessarily connected across silos of the organisation at a tactical level - Worst: Inservice assets not taking advantage of reliability information and potentially driven by outdated information and data. Not forcussed on improvment and development	0	0	2
37	Management Review, Audit and Assurance	An organization's processes for reviewing and auditing the effectiveness of its asset management processes and asset management system.	- Should be: - Best: good evidence of management reviews - Average: Management reviews, and audit however not against AM	0.5	2	2

For illustration only

Clause No	Subsection	Question	Evidence – Industry View	Score - Min	Score - Avg	Score - Max
			related KPI's and objectives - Worst:Management reviews, and audit however not against AM related KPI's and objectives			
38	Asset Costing and Valuation	An organization's processes for defining and capturing 'as built', maintenance and renewal unit costs and the methods used by an organization for the valuation and depreciation of its assets.	- Should be: - Best: Good understanding of external demands of the organisation, communicated well across the organisation - Average: Good analysis and understanding of external demands of the organisation, not necessarity communicated across the organisation - Worst: limited whole life costing and valuation	0	2.5	3
39	Stakeholder Engagement	The methods an organization uses to engage with stakeholders.	- Should be: - Best: Good threat analysis an understanding of external demands of the organisation, communicated well across the organisation - Average: Good threat analysis an understanding of external demands of the organisation, notenecessarity communicated across the organisation - Worst: Good threat analysis an understanding of external demands of the organisation, notenecessarity communicated across the organisation	0	2.5	3

For illustration only

Table 3: MOD Maturity Assessment Source

Figure 9 below displays the MOD average score per clause in 'purple' and the score range in 'red'. This enables the reader to easily tell whether a poor score has been masked due to the calculation of average scores, such as Subject 15: Maintenance Delivery.

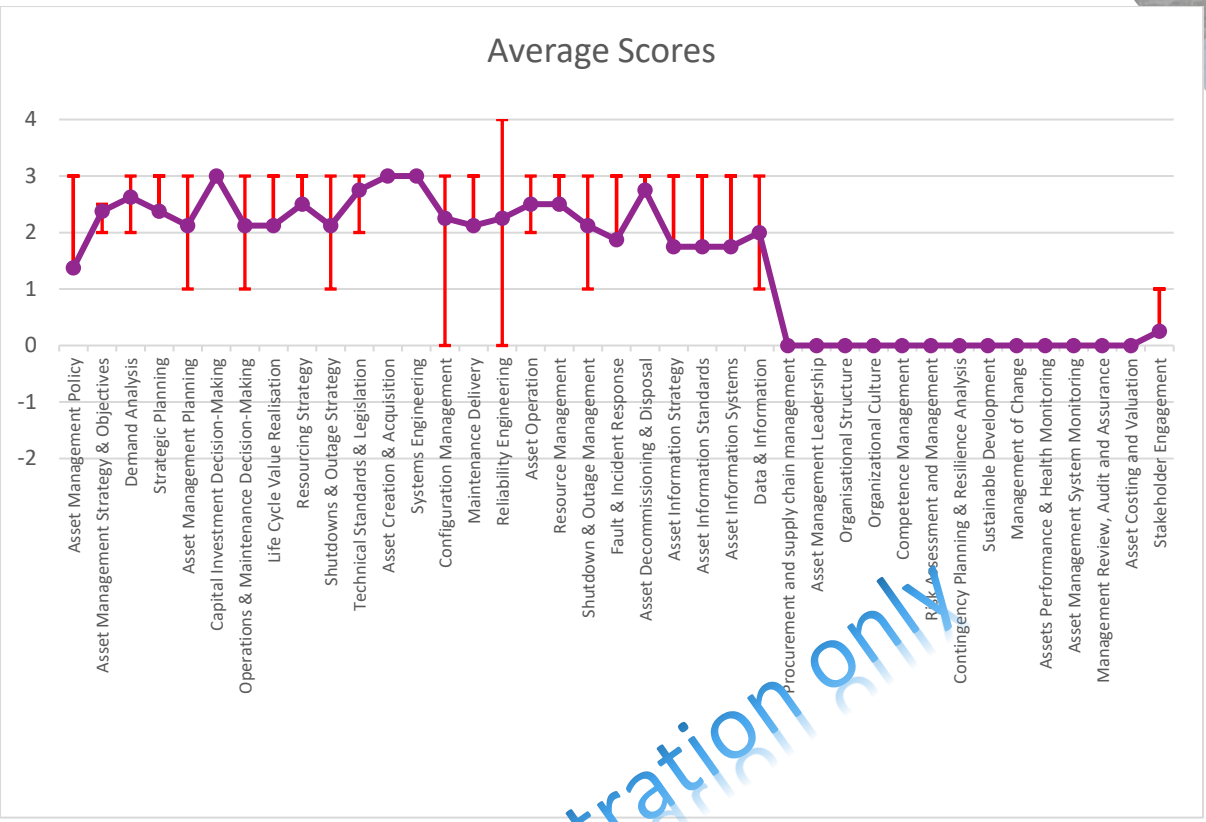


Figure 9: MOD AMA Maturity Gaps – Bar Chart

For illustration only