www.pwc.com/me

Using technology to innovate industrial localisation for Defence equipment support

pwc

Introduction

A significant part of the defence industrial sector in the Middle East is focused on the support of equipment which has been bought off-the-shelf through Foreign Military Sales (FMS) from Original Equipment Manufacturers (OEMs). Equipment support is sometimes thought of as less strategically important than the manufacture of the original equipment, however there are significant opportunities to create wide reaching benefits from increased investment and focus in this area.

Defining Equipment Support

Equipment support includes the maintenance, repair and overhaul of platforms such as aircraft or vehicles to ensure commanders have military capability available for training and operations. Equipment support occurs at different levels of depth[1]:

Level 1 – The servicing and day to day preparation of equipment including testing, replenishment, rearming, role changing, minor modification and fault diagnosis.

Level 2 – Corrective maintenance by replacement, adjustment or minor repair including fault diagnosis and minor modifications using readily available resources.

Level 3 – Corrective maintenance including repair, partial reconditioning and modification requiring specialist skills, specialist equipment or an infrequently used capability.

Level 4 – Overhaul including full reconditioning, major conversions or major repairs which require complete strip, reconditioning and re-assembly.

[1] Ministry of Defence, JSP 886 Defence Logistics Support Chain Manual, Version 2.2, February 2014

Rationale

The rationale for accelerating investment in equipment support technology and capabilities is based on a number of operational and industrial benefits. Investment in equipment support would increase the readiness of military forces, create opportunities for localisation based on demand which is more consistent than platform manufacture, and provide opportunities for significant innovation.

Increased readiness	Maintaining high levels of equipment readiness is a constant challenge for military forces. Platforms often cycle through a fixed maintenance regime resulting in only a small percentage of a fleet of platforms being at high readiness at any one time. If more reliable equipment or maintenance methods can be developed it would increase readiness resulting in either more available platforms or less platforms required for the same readiness.
Consistent demand	The manufacture of defence equipment is often dependent on cyclical national defence spending that expands and contracts depending on the threat environment and the lifetime of platform generations. This can create difficulties in the sustainment of manufacturing capabilities if gaps in domestic demand cannot be filled with export orders. The demand for equipment support is more consistent because platforms have fixed maintenance regimes through life.
Localisation	Many Middle Eastern nations have ambitions to localise defence spending in order to develop a domestic defence industrial base. Equipment support is often already localised at level 1, 2 and 3, however complex component repair is often carried out by OEMs offshore. Localising the full support chain creates opportunities to develop complex repair and manufacturing capabilities.
Innovation	There are a number of emerging technologies in equipment support such as condition-based maintenance, augmented reality, additive manufacturing and self-healing materials. Targeting research and development in these areas creates an opportunity to develop Intellectual Property in an area of growing importance. This could lead to the development of technology which can be used to increase readiness domestically as well as being exported to partner nations.

Innovative technologies

There are a number of innovative technologies in the area of equipment support which Middle Eastern nations could invest in to improve the readiness of military equipment and potentially create opportunities for Intellectual Property (IP) creation and exports.

Condition-based maintenance

A network of sensors integrated with a platform which collect a number of real time measurements such as temperature, vibration and strain for every component. The data streamed from the sensors creates an evolving digital profile of a platform (also known as a digital twin) which can be used to diagnose faults and predict when maintenance is required. This can drive the optimisation of both the maintenance schedules and the spares supply chain, and also influence design.

Augmented reality

An enhanced version of reality where live direct or indirect views of physical real-world environments are augmented with superimposed computer-generated images. This allows maintainers to access specific information on a component or platform such as historical repairs or step-by-step instructions on how to carry out a certain type of repair. Real-time two-way audio and video capabilities also allow remote specialists to support maintainers virtually.

Additive manufacturing

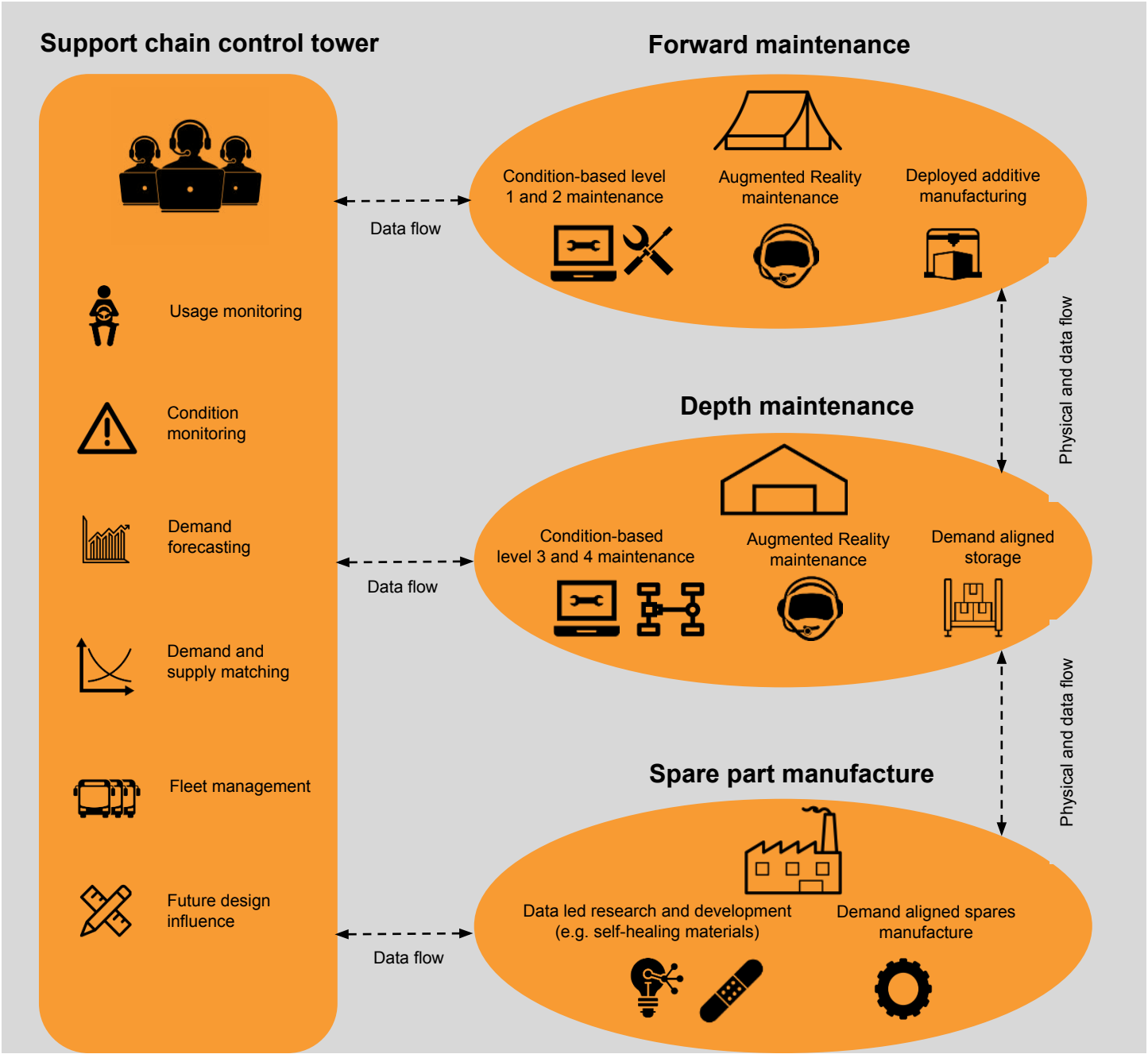
The use of computer aided design software or 3D object scanners to print material, layer upon layer, creating precise geometric components. This creates opportunities for spare parts to be printed on-demand and in-situ from raw materials improving supply chain reactivity and reducing inventory, obsolescence risk and cost. Additive manufacturing can also speed up research and development through rapid prototyping.

Self-healing materials

Artificially created substances which have the built-in ability to automatically repair damage to themselves without any external diagnosis of the problem or human intervention. Materials can be embedded with a glue-like chemical in capsules or vascular tubes that can repair damage. Alternatively some materials can return to an original form after being heated by fiber optic cables. This creates opportunities to improve survivability and sustainability.

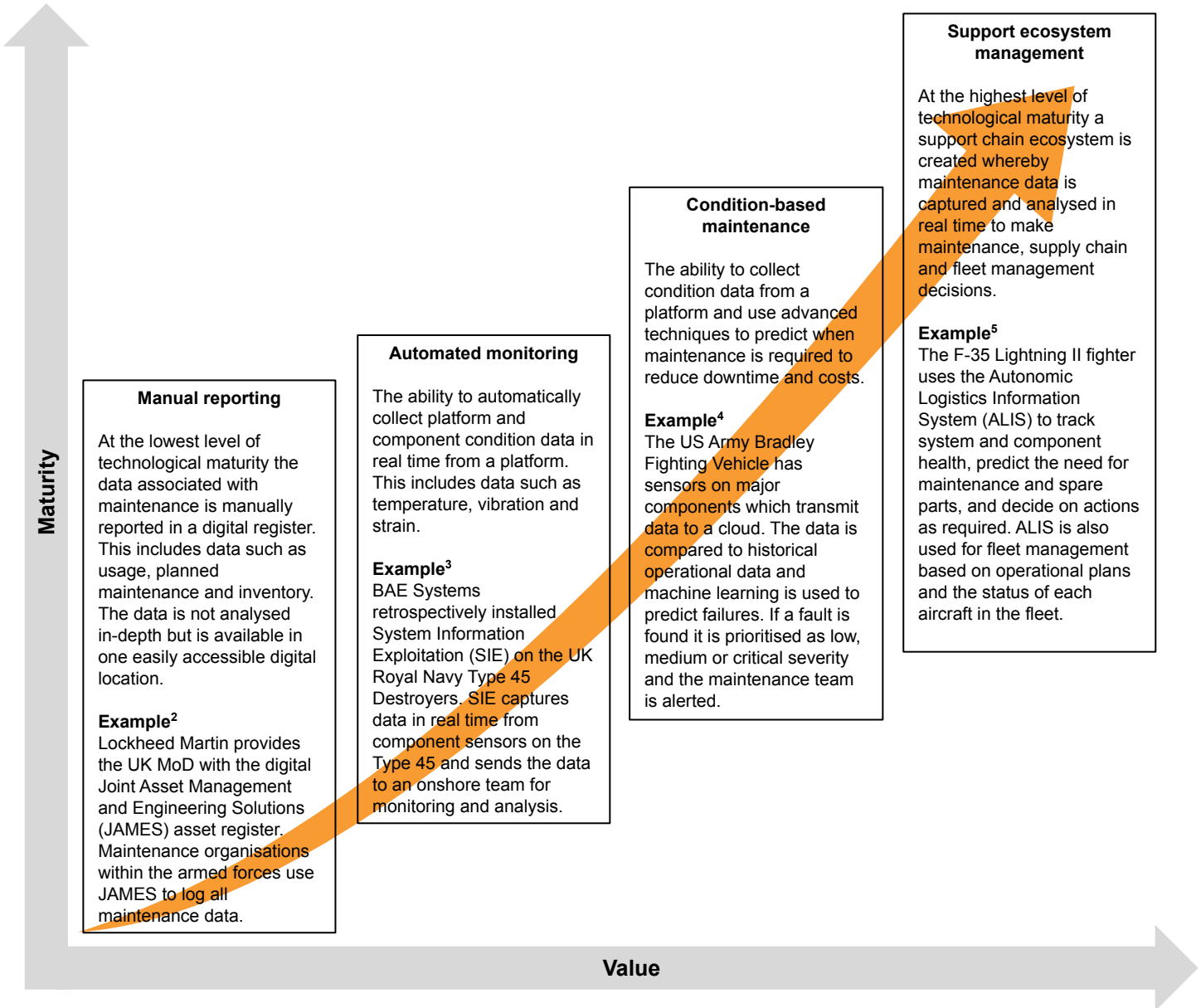
Future ecosystem

Equipment support is made up of an ecosystem of users, maintainers and suppliers that work together to ensure military capability is available for training and operations. In best practice military organisations a support chain control tower makes optimised decisions in a number of areas based on the analysis and modelling of historical and real time data.



Maturity curve

The technology maturity curve for equipment support outlines the steps which need to be taken to increase technological maturity and the value that is achieved with regards to increased readiness and reduced costs. At the lowest level of maturity military forces capture maintenance data manually in a digital register. The next level of maturity is the automated monitoring of equipment using sensors. The level beyond this is the analysis of data captured to predict when maintenance is required. The final level of maturity is the use of maintenance data and complex modelling to drive decisions across the support ecosystem.



[2] Army Technology, UK MoD extends use of Lockheed's logistics technology, July 2015
[3] BAE Systems, Real-time analytical tool monitors health of Royal Navy ships, July 2016
[4] Defence Systems, Army leverages machine learning to predict component failure, July 2018
[5] The Register, ALIS through the looking glass, June 2019

Gaining advantage

In order to gain full advantage from equipment support, the technology readiness scale needs to be tackled from both ends. Prioritised investment in emerging technologies needs to be combined with mature technologies obtained through offsets. In addition, support capabilities need to be geographically and organisationally centralised to create equipment support centers of excellence that operate and develop innovative technologies, and are aligned with platform acquisition.

Targeted Investment	In order to stimulate research and development in equipment support military organisations need to invest in promising early stage technologies. Technology investment needs to be prioritised according to domestic demand, existing research capability and export potential. Effective research and development requires collaboration across industry, academia and government, facilitated by commercial mechanisms such as supplier frameworks and public challenges.
Offsets	Defence offsets can sometimes be used sub-optimally resulting in new manufacturing facilities being built that may not have any orders to fill. There is a significant opportunity to use offsets to develop advanced equipment support capabilities such as support chain control towers. Offsets can be used to bring mature technology from overseas that can be integrated with maturing technologies which have been developed domestically.
Domestic Demand	Military organisations in the Middle East often make acquisition decisions based on the availability of off-the-shelf platforms from foreign OEMs. A shift is required to ensure that the acquisition process takes into account domestic equipment support capabilities. The aim is to ensure that the equipment being acquired is sustained using existing domestic capabilities and can be integrated with emerging technologies.
Centralisation	Military equipment support facilities and capabilities are often dispersed across Middle Eastern nations. There is an opportunity to create equipment support hubs where centers of excellence can be established to create economies of scale. To take full advantage of equipment support centers of excellence, military organisations must also consolidate spending across forces and departments. This will ensure that fewer equipment types are procured in larger numbers to drive support efficiencies.

PwC Defence capabilities

PwC has operated in the Middle East for over 40 years. Collectively, our regional network employs over 5,200 people, working from 23 offices across 12 countries. Our tailored defence solutions help clients to meet the challenges and opportunities of doing business in the Middle East market and beyond.

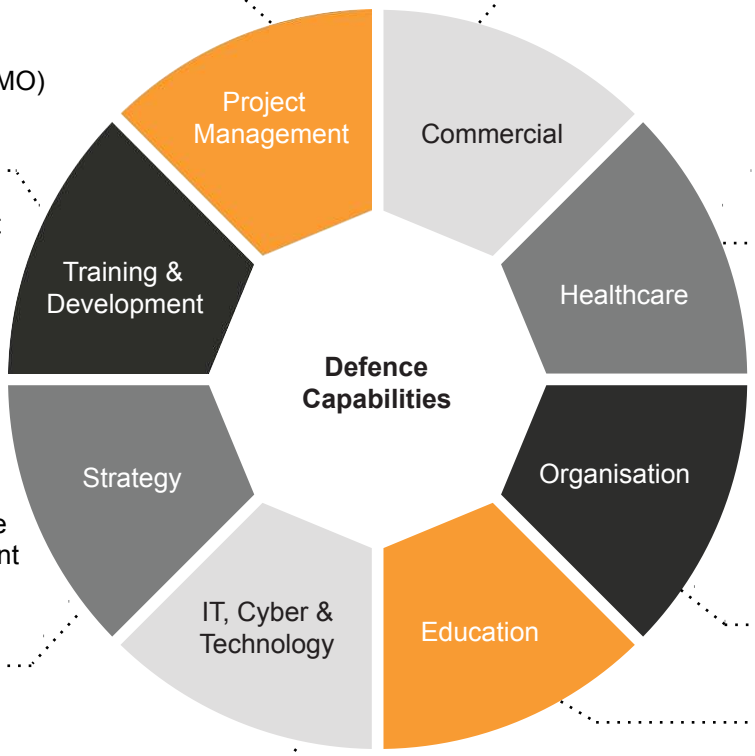
PwC's Middle East Defence practice provides advisory services across a wide range of areas:

- Project Management Office (PMO)
- Transformation Management Office (TMO)
- Strategic Management Office (SMO)

- Military personnel training & development
- Military future leader training programs

- Localisation & offsets
- Capability expansion
- Strategic planning
- National security centre design and development
- Strategic capability considerations
- Acquisition strategy

- Military IT, cyber & technology solutions
- Military logistics systems



- Acquisition & procurement
- Contracts & negotiations
- Commercial scrutiny
- Cost reduction
- Best value procurement
- Commercial modelling

- Military medical advisory services

- Organisation design
- Organisation transformation
- Capacity & capability planning across ministries and functions
- Personnel & suitability assessment

- Military colleges
- Military education courses and curriculums
- Establishment of military academies
- Establishment of intelligence academies

Utilising our extensive expertise and deep industry insights, we collaborate as one multi-disciplinary team to bring a holistic view to any challenges and opportunities you may be facing. Whether you need assistance in legal, tax, assurance, cyber, data privacy or any number of areas, please reach out to see how we can deliver an integrated and sustainable solution for you.

Contact details

Susanna Mason
Lead Partner ME Defence Practice, Abu Dhabi
M: +971 0 52 650 4920
susanna.mason@pwc.com

Susanna has worked in defence for the last 22 years. Before rejoining PwC she spent eight years in the UK Ministry of defence across a range of commercial strategy and defence export roles before leaving as 3* Director General Commercial. She has wide ranging commercial, procurement, negotiation and restructuring experience at the highest level of government across EMEA and Australia.

Susanna has worked closely with the major defence equipment and service providers at CEO level. She also has designed and implemented legal regulation for single sourced military equipment and services. She is a experienced bid manager for multi million dollar bids, and has been a lead negotiator for the UK government.

Jay Edwards
Manager ME Defence Practice, Abu Dhabi
M: +971 0 54 793 3244
jay.edwards@pwc.com

Jay has worked with defence sector clients for the last 10 years to develop supply chain and procurement operating models that deliver sustained transformation. Leveraging analytical and digital capabilities he has designed and implemented projects to improve performance, reduce cost and manage risk.

Jay has delivered major transformation projects in the UK and internationally for both military and defence industry clients including the UK Ministry of defence, NATO and BAE Systems. He has experience of working with all levels of client organisations to shape, plan and deliver critical change.

CDC 1765 022019