FEATURE

Sustainment in the military

Maintain technological advantage over the life span of military systems

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Modern military systems face a dilemma: They must stay at the cutting edge of performance yet serve for ever longer life spans. Solving that dilemma relies on linking sustainment strategy, operations, and execution.

APRIL 10 WAS the 60th birthday of a faithful civil servant: The T-38, America's first supersonic jet trainer, first flew on that date in 1959.[1] Over the next decade, over 11,000 of these complex aircraft were manufactured, supporting critical training and preparation for missions from as early as Vietnam and as recent as 21st-century conflicts in the Middle East. Today, the T-38 still serves as one of the primary training platforms for military pilots and will continue to do so for years to come. Through modifications, upgrades, and enhancements, training squadrons and maintenance communities have fought hard to keep the aircraft available, safe for pilots, and technically relevant to modern-day missions. However, the extended life span of the T-38 has also increased the sustainment burden to keep it in the air, with cost-per-flight-hour increasing and reliability decreasing.[2]

These challenges are not the fault of the T-38 or its designers. It was never anticipated that the platform would still be in such frequent use six decades after its first flight, and unfortunately the T-38 is by no means the exception. These extended life cycles represent one of the biggest challenges in modern military history.

In essence, the military is making a bet on sustainment. For that bet to pay off, and those platforms to continue to perform throughout their life span, the military needs to deliver on three different fronts: sustainment strategy, operational construct, and tactical implementation. A breakdown on any one front can leave aircraft, tanks, and ships out of service. But with all three working together, the bet on sustainment can pay off with decades of tactical advantage.

More than just maintenance: Coordinating an ecosystem

Weapons system sustainment is and has been an incredibly complex, multifaceted problem for the US Department of Defense (DoD). With systems expected to last almost half a century and many serving well beyond that, decision-makers must not only create sustainment plans to support aging equipment but also navigate the decades of budget battles and changing requirements that may threaten to undermine these plans.

From the onset, leaders are tasked with making complicated programmatic decisions that span the entire life of the system. Faced with immediate near-term pressures, such as those related to R&D, production, and system acquisition costs, they must make real-time trade-offs against the future impacts those decisions may have on sustainment cost and performance 10, 20, even 30 years in the future. While simply understanding these trade-offs can be difficult, justifying and defending a 30- to 40-year return on investment against the very immediate resource demands of today is even more challenging.

Even in operation, budgetary constraints and trade-offs continue to impact the sustainment enterprise. As leadership works to divvy up operations and maintenance dollars between portfolios (such as aviation, ground, ships, infrastructure), resource allocation constantly shifts to prioritize operationally deployed platforms and address fleet modernization and force structure changes. In this environment, where the needs of the military change with world events, sustainment strategies must be flexible enough to adapt to the times, yet effective enough to ensure high levels of readiness. So, while maintainers can certainly keep one particular aircraft at 100 percent reliability, that may come at the cost of foregoing maintenance on other critically needed assets.

Creating a sound sustainment plan sounds like a difficult task but executing against one can be even more complex. A vast array of stakeholders—from the units that operate equipment, to depots that repair it, to the companies that produce the equipment or spare parts—is needed to keep a system in the field. The challenge is that each of these stakeholders bring with them their own unique incentives that often compete against one another. It falls to program managers and materiel commands to coordinate this labyrinth of stakeholders and balance the needs of the industrial base, technical communities, contracting commands, and end users to deliver an effective support strategy.

You can't rely only on technology

In an era when sports cars can add horsepower via software updates, it is tempting to believe that the challenges of long-term sustainment are a thing of the past, and that new technology will simply come along and solve many of the issues of long-term sustainment. This point of view can be tempting when we read about the positive impact of new technologies. For example, digital data taken directly from equipment can transition readiness reporting from a lagging historical snapshot to a real-time information source; supply shortfalls can now be mitigated with advanced manufacturing processes such as additive manufacturing and computer numerical control; and technical communities can leverage social platforms to source and qualify new technologies at a rapid pace.

However, none of these new technologies work in isolation. With weapons systems operating for many decades, most sustainment delivery is, and will likely continue to be, managed with outdated technology and processes. Failure logs and records are often handwritten and manually maintained; reporting mechanisms are often slow; and inventory piles onto shelves in some locations as parts shortages continue to plague operational availability in others. To effectively deal with significant challenges such as sustainment, the military needs not only new technology but also new ways of understanding, operating, and managing.

Tackling this massive endeavor requires military leaders to have clear and detailed understanding of the various levels of sustainment delivery from planning to execution (figure 1). This requires having a coordinated approach that doesn't make isolated strategic decisions but instead shares and incorporates the necessary feedback vertically throughout the process. This integration is key to developing a sustainment approach that is both effective and flexible enough to support the operators and their missions throughout the life of the program. The approach should incorporate the following factors:

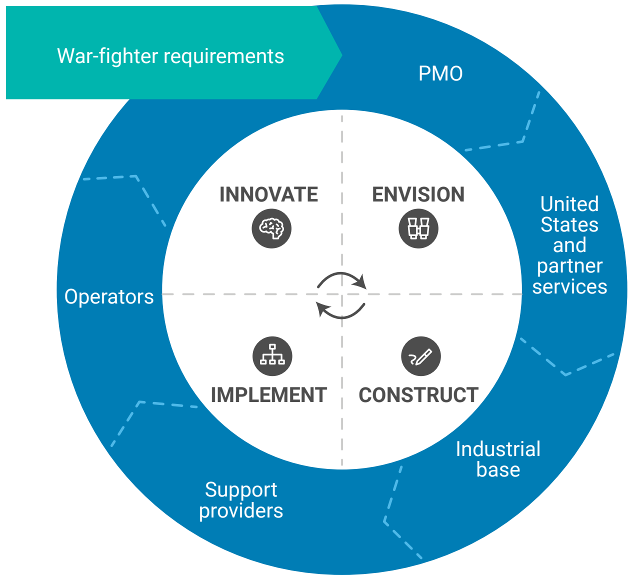
- **Strategic vision.** Crafting a flexible, effective, and enduring sustainment strategy that balances competing demands on a weapon system throughout its life cycle readiness.
- **Operational construct.** Addressing diverse stakeholder incentives by assigning ownership responsibilities that support the overall strategy.
- **Tactical execution.** Constantly ensuring the right people, business processes, and enabling technology are properly inserted to make it all happen.

Strategic vision

The initial step in a sustainment strategy is to create a strategic vision for the program that adapts to the changing needs of the military. When you

FIGURE 1

Military leaders must understand the complete sustainment delivery life cycle



Source: Deloitte analysis.

consider the sheer number of competing needs, you can get a sense of the scale of this challenge. Take the extreme example of the F-35, which exists in three variants flown by three different services, US Air Force, Navy, and Marine Corps, each with their own operational needs. There are also 11 partner nations flying the aircraft, not only each flying a slightly different variant in a different way but also with different security considerations to take into account.[3]

So quickly, the single phrase "military needs" can proliferate in many hundreds of permutations that must be balanced across the F-35 program.

As military leaders design and develop sustainment strategies, it is imperative they understand how these competing requirements can create readiness and affordability gaps. A structured analysis of business factors such as last-part allocation, work-share requirements from partnership agreements, funding mechanisms, total funds available, and risk tolerance can help create a single, flexible strategy that balances cost and performance for each operator of the system.

Operational construct

Even the best strategy is useless if it does not translate into action. In sustainment, the operational construct translates the goals of the strategy into roles and responsibilities for all the stakeholders involved. These stakeholders go beyond just maintenance staff to include trained end users, maintenance depots, military service materiel/systems commands, program managers, OEMs, and industry parts manufacturers. Now, more than ever, the DoD is challenged with striking the right balance between organic and industry support—blurring historical lines of "appropriate" roles and responsibilities to leverage and invest in both DoD's infrastructure and its skills, while simultaneously drawing from the expertise and organizational flexibility of the industry.

CRITICAL STRATEGIC DECISION FACTORS

Diverse operator requirements. As system use varies by specific mission, service and military, so do the accompanying requirements and supporting infrastructure of the operators. To create an approach that accounts for this diversity, requirements must be well known and documented to efficiently translate them into the overarching strategy.

Technical data access. Sustainment decision-makers face the constant challenge of access to weapon system technical data. Access to tech data in sustainment is often linked to historical decisions of acquisition functions, determining whether or not to purchase data rights. Tech-data access can quickly become a strategic impediment, impacting the feasibility of future maintenance concepts as programs look to establish organic capabilities or alternative sources.

Industry partner relationships. Critical to the success of every single sustainment strategy is a healthy relationship between the DoD and the original equipment manufacturer (OEM) or supplier base. This starts early in the acquisition process, with well-defined roles and responsibilities built from the sustainment strategy and clearly articulated in contract-performance requirements.

The formality of the relationships between these stakeholders ranges from contractual agreements, such as those between industry OEMs and program offices, to intraservice agreements and governance processes. Take, for instance, the dynamic relationship between program offices and the service materiel/systems commands that support them. While execution is engrained in sustainment design, program administration, and platform modernization, program offices often hand off the responsibility for large facets of the sustainment strategy to the service materiel commands. Proper communication and adequate opportunity to influence strategy throughout the sustainment-design process can smoothen the transition of activities, while, conversely, siloed decision-making can strain the transition of execution responsibility. As a result, key tasks may slip through the cracks unless roles and responsibilities are clearly defined and accurately updated.

Even in a perfectly defined environment, a lack of alignment between stakeholders can create "cylinders of excellence," in which achievement of individual, task-oriented goals take precedence over the overall objectives of the program. For example, an end user may advocate for the early replacement of certain subsystems to increase system capabilities but doing so across the whole fleet could have a downstream impact on readiness as OEMs scramble to produce sufficient parts in a short period of time. To avoid deviation from the

TECHNICAL, PERFORMANCE, AND COST BASELINES

A key component to building the right business model is understanding the technical, performance, and cost baselines for a program. In the early stages of any weapon system, it can be difficult to define these important factors, making the transfer of performance responsibility to industrial partners risky and thus costly. As a program matures and the sustainment enterprise establishes a more sound and solid understanding of the technical, performance, and cost environment, uncertainty decreases, providing more opportunity to transfer sustainment responsibilities and performance risk to external partners. Greater maturity and understanding translate to greater potential for risk transfer.

larger strategy, laying out the specific roles, responsibilities, and metrics for each stakeholder is critical to sustainment governance, keeping everyone aligned on the overall balance of cost, risk, and performance laid out in the sustainment strategy.

Tactical implementation

With roles and responsibilities in place for each stakeholder, the final step is to ensure they have the tools necessary to act. Every stakeholder will have different needs for trained personnel, up-to-date business processes, and supporting technology to meet their obligations. Too often, a strong product-support strategy is identified, but because of inconsistent governance or immature delivery capability, the implementation of the strategy is flawed, and the weapon system ends up not meeting performance expectations.

If a stakeholder lacks any of the elements described above, flaws can cascade to other areas of sustainment, putting excess strain on other stakeholders. For example, program managers may observe a supply shortfall in key parts, but often the true root cause is not a lack of production capacity for those parts. Rather, the root cause may be traced back to drivers further up the sustainment delivery chain, such as poor maintenance practices, lack of training, or poor documentation of maintenance tasks. If multiple stakeholders lack the right tools, not only can this create significant disruptions to operations, it can also make diagnosing the root cause of any problems difficult.

Fortunately, a well-defined operational construct can help stakeholders understand exactly what is required of them, and therefore what training, processes, and tools they need to meet operational requirements.

The future of sustainment

Successful sustainment depends on a complex web of stakeholders, technologies, and processes. While infusing innovation throughout the sustainment enterprise can help identify root-cause problems and provide spot solutions, it cannot be viewed as the end-all answer to the sustainment challenges of today. More important than any one innovation or digital technology are the well-structured frameworks and business process used to manage weapon system sustainment. Managing against clearly defined processes that align to war-fighter outcomes can help ensure a sustainment plan that meets both the long-term needs of the various stakeholders and the program at large.

That said, fine-tuning the capabilities and expertise that execute sustainment strategies can promote greater use of digital innovation. It is this critical balance between future investment in leading-edge technologies and a continued focus on the functional processes that will drive DoD into a new age of 21st-century sustainment.

DIGITAL TECHNOLOGY: AN ACCELERATOR OF SUCCESS

If coordinating sustainment all the way from strategy to tactical implementation sounds daunting, there is good news. While we have seen that digital technology alone cannot solve sustainment problems, it can be an invaluable tool in coordinating the three levels of sustainment through real-time, seamless connections. For example, sensors on a tank can create a real-time picture of use, allowing all the stakeholders to operate from a common baseline of knowledge and proactively produce parts that will be needed in upcoming repairs, or train drivers to avoid maneuvers harmful to the gearbox. To read more about how a connected digital sustainment approach can help, see *Military readiness: How emerging technologies can transform defense capabilities*.

Endnotes

1. J. M. Eddins Jr., “T-38 Talon: Airframe profiles,” *Airman Magazine*, September 4, 2018.
2. John Venable, *Ensuring success for the Air Force’s next training aircraft*, Heritage Foundation, November 16, 2018.
3. F-35 Lightning II, “The centerpiece of 21st century global security,” accessed June 27, 2019.

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