An Analysis of Through-Life Support – Capability Management at the U.K.'s Ministry of Defense

By:
Jacques S. Gansler, William Lucyshyn, and Lisa H. Harrington

Center for Public Policy and Private Enterprise
School of Public Policy

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Executive Summary

This report provides an in-depth look at the current state of through-life support (TLS) and through-life capability management (TLCM) as it relates to the U.K. Ministry of Defence's (MoD) weapons systems sustainment. TLS and TLCM represent a transformative approach to weapons systems acquisition that is based on acquiring "outcomes" and capability over the life of a platform in order to reduce cost and improve performance. TLS refers to supporting a weapons system platform throughout its entire lifecycle. TLCM represents a still further evolution of the through life concept to delivering not just weapons system availability, but delivering capability – e.g., the capability to blow up a target.

The U.K. MoD began the journey toward TLS-TLCM more than 10 years ago. This paper reviews the history of TLS-TLCM, looks at its success to date in reducing costs and improving weapons systems availability and performance, and discusses challenges and lessons learned in implementing this transformation of defense acquisition. It explains the specific components of TLS and analyzes the effectiveness of TLS-based contracts. It presents TLS-TLCM case studies that analyze how this approach has been applied to several major U.K. weapons systems platforms, including Tornado and Harrier fast jets, and Merlin helicopters. The cases outline the benefits achieved on these two platforms—including savings in the £billions.

The report discusses the supplier perspective on the through-life management approach, describing the evolution of the supplier role from transaction supplier to capability provider. It includes a compare/contrast section vis-a-vis TLS-TLCM and the U.S. Department of Defense's (DoD) performance-based logistics (PBL) acquisition/contracting approach. It then discusses the challenges and barriers to success in implementing TLS-TLCM.

Finally, the report draws conclusions and offers suggestions for potentially applying TLS-TLCM lessons learned to DoD's acquisition *modus operandi.*

Context for Change

In analyzing TLS-TLCM as a radically new approach to defense acquisition, one must set the stage with some historical context.

In the years following the end of the Cold War, the United Kingdom experienced a significant post-Cold War peace dividend—it reduced its defense spending by almost 30 percent between 1988 and 1998. However, starting about 2000, the U.K.'s involvement in several conflicts, including Afghanistan and Iraq, began to push defense spending upward again.

As the U.K.'s defense spending commitments escalated, the country's economy declined when Europe and the rest of the world dropped into deep recession in 2008.

Rapidly escalating budget constraints created tremendous pressure to re-engineer U.K. defense spending in order to deliver needed capability while significantly improving cost performance. While this pressure had begun to emerge early in the decade, the global economic meltdown brought it to a crisis stage.

The 1998 Strategic Defence Review (SDR) initiated a series of major changes designed to improve both organizations and processes, by adopting a through-life approach. In 1999, the Defence Logistics Organisation (now Defence Equipment and Support [DE&S]) established a goal of reducing costs by 20 percent by 2006, which marked the beginning of "availability contracting."

The MoD believed that paying for a given level of availability over long-term contracts would provide industry with incentives to reduce support chain costs while also making weapons systems more reliable and efficient. The MoD also shifted its acquisition focus from buying "inputs" (parts, labor, services) to contracting for "outputs" (availability, capability). This shift, in time, led to the development of the through-life support concept.

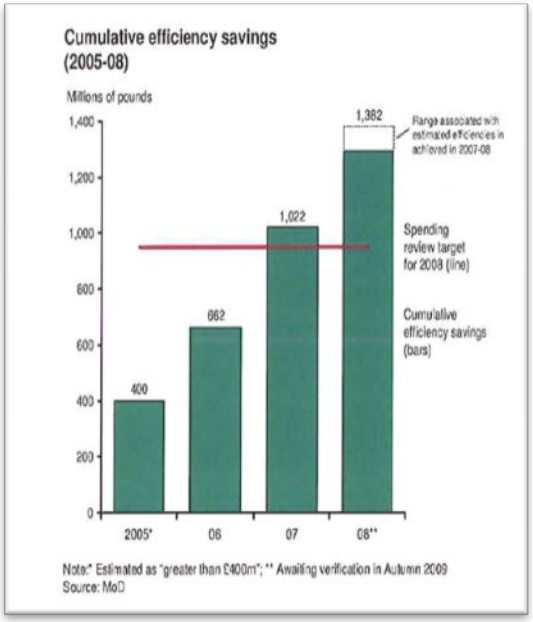
Through-life support (TLS) and through-life capability management (TLCM), into which TLS evolved, is an integrated, performance-driven approach to the activities associated with supporting a product during the operational phases of its life-cycle. TLS-TLCM constitutes a new approach to acquisition that is based on partnering with industry to achieve better outcomes and deliver defence capability, while providing better value for money and greater control of defence acquisition expenditures.

Traditionally, weapons systems support was provided in the context of a buyer-seller relationship. The MoD held the majority of the risk, and industry provided spares and maintenance services, which the MoD purchased on a transactional basis that focused on lowest unit purchase price.

In contrast, "contracting for availability" partners the MoD with industry in joint working teams. The contractor assumes more risk for providing availability or capability, but is incentivized to meet specified availability and reliability targets while driving down the long-term costs of support. In return for assuming more risk—at least in the early stage of a contract—the contractor would be awarded a long-term contract, on the order of 15 to 25 years. The MoD—the "decider"—contracts for "outputs" rather than "inputs" from the provider/contractor.

On the projects in which TLS-TLCM was adopted and implemented, the benefits it generated were impressive. Between 2005 and 2008, these TLS-TLCM programs had generated cumulative savings of about £1.4 billion, according to the 2007–2008 Ministry of Defence Annual Report and Accounts, as shown in Figure 1, while simultaneously achieving performance improvements.

Figure 1. Cumulative efficiency savings of defense logistics transformation



Source: U.K. Ministry of Defence, *Annual Report and Accounts 2007–2008*, July 2008.

On two specific equipment programs, the Tornado and Harrier fast jets, and the Merlin helicopter, TLCM generated positive results in terms of both cost and performance. . Overall, the incorporation of lean techniques significantly extended the number of flying hours for both aircraft between scheduled maintenance while at the same time improving in-service aircraft performance. The RAF broadly maintained the operational availability of both Harrier and Tornado, while at the same time reducing maintenance times by as much as 37 percent in some cases.

- Tornado: Cumulative savings realized between 2001 and 2007—£1.3 billion; anticipated savings 2007–2011—an additional £250 million; cost per flying hour reduced 51 percent.
- Harrier[1]: Cumulative savings of £109 million; cost per flying hour reduced 44 percent.
- Merlin: £12 million annual savings.

Organizational Structure of the Report

As a comprehensive exploration of TLS-TLCM, this report is divided into eight sections.

Part I provides a brief overview of the pressures and challenges currently facing the U.K. MoD with regard to weapons systems sustainment.

Part II traces the history of U.K. defense spending and rapidly escalating cost inflation for weapons systems acquisition and sustainment. It defines TLS-TLCM and explains why and how it emerged as the U.K. MoD's major acquisition contracting strategy and methodology.

Part III discusses the evolution in the supplier role and relationship with the MoD.

Part IV highlights how TLS-TLCM compares to the U.S. DoD's performance-based logistics (PBL) contracting, including key similarities and differences.

Part V offers two case studies that illustrate how TLS-TLCM has been applied and what results were achieved.

Part VI summarizes the results achieved through TLS-TLCM acquisition overall, and looks at implementation challenges and lessons learned by the U.K. MoD in

[1] The Harrier fast jet fleet is no longer in service. The fleet was sold to the United States in 2011.

transitioning to TLS-TLCM. It provides the authors' insights into how the lessons learned in the U.K. should be applied to the U.S. DoD.

Part VII concludes the report with overall observations TLS-TLCM and its ramifications for future weapons systems sustainment best practice.

I. Introduction

The global economic meltdown of 2008 and ensuing recession in the United States and around the world has placed significant strain on the U.S. federal budget. At the same time, after sustaining more than 10 years of warfare in Iraq and Afghanistan, the U.S. Department of Defense (DoD) faces a future of dwindling funds and stretched resources.

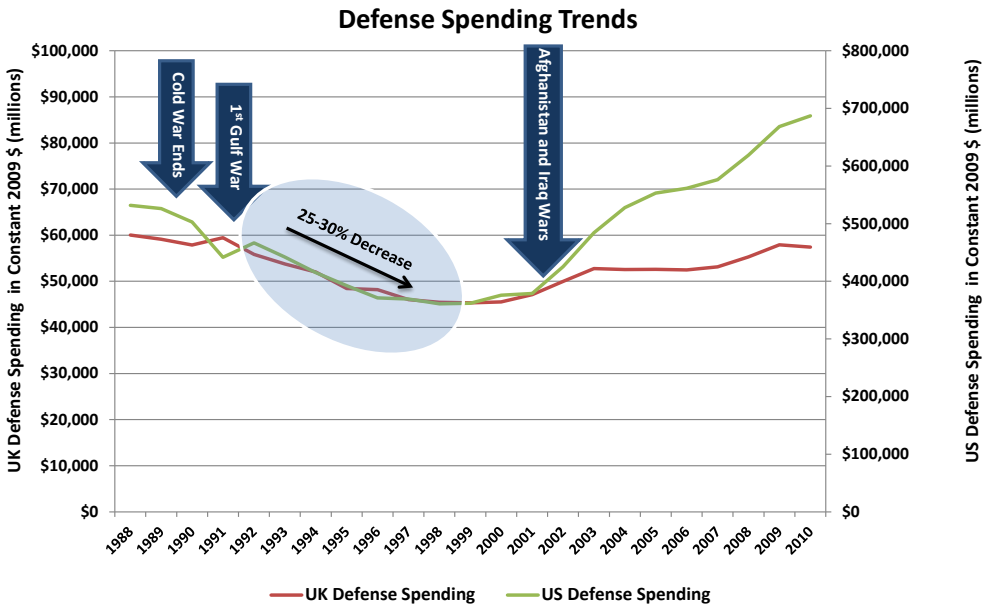
In this context, DoD must confront the challenge of maintaining aging equipment and weapons system platforms in an efficient and effective fashion, while maximizing scarce financial resources.

The United Kingdom has faced a similar environment of budget constraints and escalating spending and sustainment costs over the last decade, albeit on a much smaller scale, as can be seen in Figure 2. Thanks to the wars in Afghanistan and Iraq, U.K. defense spending as a percent of U.K. gross domestic product (GDP) rose from a low of about 2.5 percent to nearly 3 percent in 2009, as shown in Figure 3. Over the 10 years to 2009, U.K. defense spending in real terms rose by 19 percent. But, most of this increase was a result of the additional costs of operations in Iraq and Afghanistan, which totaled £4.5 billion in 2009. "Core" defense spending (excluding operational costs) rose by only 5 percent in real terms over the decade—an annual rate of increase, amounting to a modest 0.5 percent.[2]

Rapidly escalating budget constraints have created pressure to re-engineer U.K. defense spending to deliver needed capability while significantly improving cost performance. While this pressure had begun to emerge early in the decade, the global economic meltdown brought it to a crisis stage.

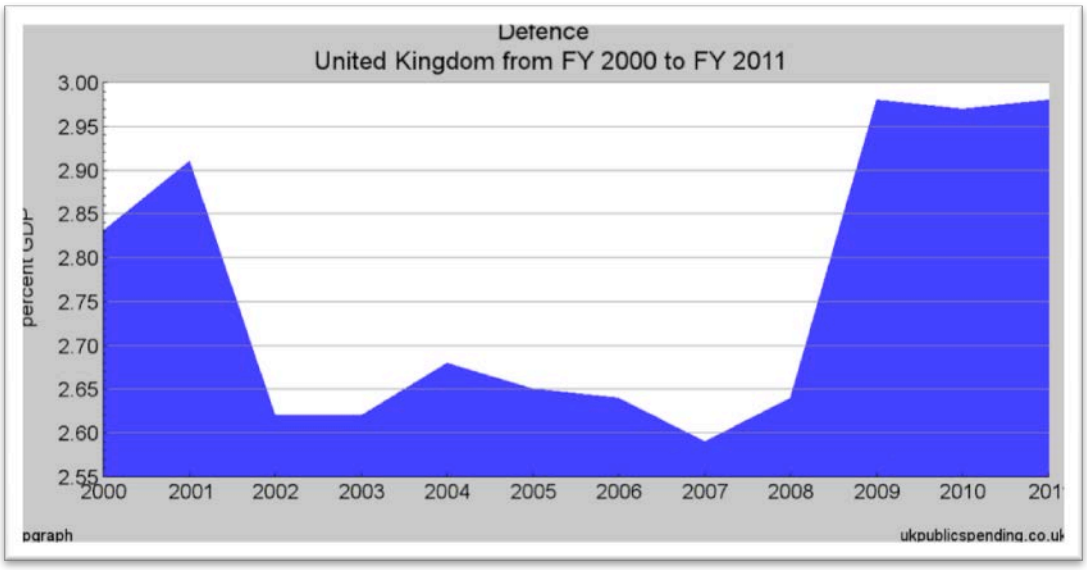
[2] Chalmers, Malcolm, "Preparing for the Lean Years," *Future Defence Review Royal United Services Institute* Working Paper Number 1, July 2009, 3.

Figure 2. Defense spending trends—U.S and U.K.



Source: Data from Stockholm International Peace Research Institute, available at http://www.sipri.org/databases/milex, accessed 3/1/2012

Figure 3. U.K. defense spending as a percent of GDP



Source: U.K. Ministry of Defence, http://www.ukpublicspending.co.uk/uk_defence_spending_30.html, accessed 6/1/2012.

The U.K. realized that its defense spending would be financially unsupportable, given the country's economic environment. Consequently, the government, through a series of initiatives and reviews, drastically reordered its defense priorities and spending approach beginning in the early 1990s.

The major cornerstone of this new approach is a fundamentally new strategy for weapons system life-cycle acquisition, called "through-life management" (TLM). For the purposes of this report, we define TLM as follows:

> *"Through-life management involves the life-cycle management of the products, services, and activities required to deliver a fully integrated capability to the customer, while reducing the cost of ownership for the customer."* [3]

Under this concept, the sustainment support aspect of TLM has come to be known as *through life support* (TLS); with the follow-on, more comprehensive strategy for delivering defense capability termed *through-life capabilities management* (TLCM) [4]. TLS and TLCM represent an integrated, performance-driven approach to activities associated with supporting a product during the operational phase of that product's life-cycle. In this report we will refer to the sustainment support as TLS-TLCM.

"We moved to a more through-life approach because we were broke," recalls Major General (Ret.) David Shouesmith, Vice President/Director at PwC's PRTM Management Consultants. Shouesmith, formerly Assistant Chief of Defence Staff–Log Ops/British Army, U.K. MoD, notes, "It wasn't that we felt it was the right thing to do, but if you're broke, you look at different ways of doing things. This concept (TLS-TLCM) is about how you get more value for your money."[5]

The MoD's transition to TLS-TLCM has been neither easy nor a straight-line path. The transformation has produced impressive results, however: present and future

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[3] University of Bath School of Management, *Through-life Management: A Catalyst for Process Excellence in Customer Support and Maintenance, Repair & Overhaul (MRO)*, 10. http://www.bath.ac.U.K./management/aerospace/pdf/TLM_Report_Final_DraftMay06.pdf.

[4] *TLCM is an approach to the acquisition and in-service management of military capability in which every aspect of new and existing military capability is planned and managed coherently across all Defence Lines of Development (DLOD) from cradle to grave*. http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf

[5] Interviews with David Shouesmith, July–August 2011.

savings on the order of £billions, plus greater weapons systems availability and performance.

The purpose of this report, then, is to examine the U.K.'s experience with the TLS-TLCM approach to sustainment as a potential model for improving current sustainment practice at DoD. The report will look at how the MoD's transformational acquisition strategy and methodology has been developed and implemented, what benefits it has produced, what challenges the MoD and private industry have encountered in adopting this model, and what implications this concept could have for the U.S. Department of Defense as it goes forward with budget realignments and cuts.

Project Methodology and Data Sources

This study looks at how TLS-TLCM came into being and how it has performed in specific application case studies, discusses issues and challenges relating to its implementation, explores lessons learned, and looks at how similar contracting practices might be applied within the U.S. Department of Defense.

A range of research methods was employed to meet the study objectives. These included:

- A comprehensive literature review of relevant publications
- A thorough review of key reports relating to defense acquisition policy, organization structure, finance, process reengineering, and related matters
- Interviews with key stakeholders and subject-matter experts
- Data analysis

II. History and Background

Since 1945, the U.K. has reviewed its defense strategy approximately every 10 years. After the Cold War ended, defense expenditures decreased and priorities changed.

In 1990, however, the U.K. began to reassess its defense spending. Two significant reviews of defense policy during the 1990s guided this reassessment: Options for Change (1990–92), and the Strategic Defence Review (1997–98).

The more important of the two reviews was the 1998 Strategic Defence Review (SDR), which stated that there was no longer a direct military threat to the U.K. and that future military efforts were likely to arise from religious conflict, drugs, and terrorism. Since publication of the 1998 SDR, the U.K. has been involved in three major military conflicts: the Balkans, Afghanistan, and Iraq. These three conflicts represent the new type of warfare, which has been described as "war among the people"[6] where the enemy combatants often engage in asymmetric warfare.

Asymmetric warfare is defined as a conflict between two foes of vastly different capabilities, where belligerents can interact and attempt to exploit each other's characteristic weaknesses. .

Because of the unpredictability of this type of warfare, it is difficult or impossible to develop requirements and systems, on the basis of equally countering a potential enemy's military capability (as was the approach during the "Cold War").

In recognizing this fact, the 1998 SDR prompted the British government to reform its approach to defense, with particular regard to the logistics and acquisition systems. The reforms represented major changes to the structure and operational mission of the U.K. MoD, and to the attendant acquisition programs that support that structure and mission.

[6] Smith, General Sir Rupert (2005). The Utility of Force. Allen Lane. ISBN 0-7139-9836-9.

U.K. Ministry of Defence Transformation: Reining in Costs

More needed to be done, however. By 2009, it had become alarmingly apparent that the U.K. MoD's equipment program—which included a number of major, costly equipment projects that had been contracted for in the early 2000s--prior to the introduction of through-life acquisition—was "substantially overheated," with too many types of equipment being ordered, for too large a range of tasks, at too high a specification.[7]

In terms of time, the average major equipment program experienced an 80 percent overrun rate—about five years from the time specified at initial approval through to in-service dates. The average increase in cost of these programs was 40 percent, or about £300m. The "frictional costs" (ripple effect) to the MoD of this systematic delay were estimated to be costing between £900m and £2.2 billion per annum.[8]

This "overheating" stemmed from numerous systemic problems in acquisition policy, incentives, budgeting procedures, and execution.

The U.K. MoD had reached a tipping point. Drastic measures were needed to get the defense equipment program under better financial control. The rate of inflation for project costs was deemed financially unsupportable for the country. In 2009, Bernard Gray authored *Review of Acquisition for the Secretary of State for Defence,* a seminal report on the state of MoD acquisition, raising significant concerns as to the future of MoD defense programs and the ability of the country to foot the burgeoning bill for those programs.

According to the Gray Report:

> This [planned] programme is unaffordable on any likely projection of future budgets. This overheating arises from a mixture of incentives within the Ministry of Defence. In particular, the Armed Forces, competing for scarce funding, quite naturally seek to secure the largest share of resources for their own needs, and have a systematic incentive to underestimate the likely cost of equipment.
>
> As the MoD almost never cancels an equipment order, the process of over-ordering and under-costing is not constrained by fear on the part of those ordering equipment that the programme will be lost.
>
> With each force bidding for the highest specification product as a result of the system incentives, there is insufficient clarity over which systems need to be the most technologically advanced, and

[7] Gray, Bernard, *Review of Acquisition for the Secretary of State for Defence*, 2009, 6.
[8] Ibid., 7.

> which could be used sensibly with an "80% solution" that would field a certain capability that could be grown over time.
>
> These forces and incentives create an over-large equipment programme, which contains within it a significant underestimate of the likely out-turn, making the programme even less affordable than it appears at any given moment in time. When this over-large and inflating programme meets the hard cash planning totals that the MoD can spend each year, the Department is left with no choice but to slow down its rate of spend on programmers across the board.
>
> The result is that programmes take significantly longer than originally estimated, because the Department cannot afford to build them at the originally planned rate. They also cost more than they would otherwise, because the overhead and working capital costs of keeping teams within industry and the MoD working on programmers for a much longer period soaks up additional cash. The MoD also has to bear significant costs in running on old equipment because the new equipment is not yet ready for service. [9]

As well as costing significant sums, this squeeze on short-term cash expenditure in an effort to manage an overly large program has a number of other undesirable impacts, Gray reported. It reduces funds available for technology demonstration or risk-reduction activities, which might reduce risk in new procurements. It depresses spend in areas such as research and technology, where by their nature, budgets tend to be committed less far ahead, and so are vulnerable to a cash squeeze.

In the past four years alone, the future plans for Armed Forces equipment increased by 80 percent, before a recent central MoD cost-savings effort reined that escalation back to a more modest 66 percent. Gray argued that neither increase was likely to be affordable on any realistic funding path.[10]

Gray went on to write:

> Each April the DE&S team enters the new financial year with plans to conduct activity some 10 per cent greater than the available, and known, budget for that year. As a result, a considerable amount of time and effort goes on through the year to reduce expenditure within that accounting year. Principally, this "re-profiling" involves the delay of activity from the current year into future years, with a number of unsatisfactory consequences. Firstly, it slows delivery of programmes; secondly it obliges DE&S to seek contract variations from industry on already agreed activity.
>
> Because the MoD is acting as a supplicant in seeking this change, it has little negotiating leverage over contractors in this matter. This presents industry with a golden opportunity to redress aspects of contracts and pricing it did not like at earlier points, and to hide any shortcomings in its own performance. Inevitably, this process lengthens time and boosts total eventual costs.
>
> Thirdly, it creates pressures that make projects more likely to experience problems. Activities such as technology demonstrators, risk reduction exercises, the holding of financial contingencies against technical risk; all of these sensible precautions are squeezed by the constant downward

[9] Ibid., 6–7.
[10] Ibid., 27.

> pressure on cash spending. The result is that more risk is carried later into programmes where it can do more financial damage than if it had been resolved earlier.
>
> As a result, the forces have an incentive to bid for as many equipments at as high a specification as they can; they also have an incentive to underestimate the cost of delivering this system. This is at the heart of the problem in the U.K.
>
> Simply granting the MoD more resources cannot therefore, solve this problem. More resources will probably lead to more military output, but since the ambitions will also expand and the behaviors have not been changed or controlled, the same problems of delay and cost overruns will reassert themselves at the higher level of funding. [11]

In this acquisition environment, Gray explained, the Armed Forces fears that if it does not get any particular item of equipment specified to as high a level as possible at the beginning, then it will never get additional funding to upgrade a more limited piece of equipment later. "All of the incentives within the MoD system operate against the idea of fielding something now and working to improve it over time. Yet such 'spiral' development is widely recognized as being a worthwhile objective that should be pursued."[12]

Consequently, Gray argued, sensible processes such as "spiral development" and "technology insertion" are heavily discouraged by the traditional acquisition process and budgeting structure.

> Development risk (and hence cost overrun/delay) could be reduced by introducing equipment into service, with space allocated within it to introduce more sophisticated technologies later, and to learn from using the equipment rather than trying to guess at all ends before the first of type is ever fielded. But bitter experience shows that any restraint shown in this way will be punished by the loss of uncommitted budget to some other more immediate requirement at a later date."[13]

Genesis of the MoD's Equipment Budget Crisis

The budget crisis to which Bernard Gray refers did not develop overnight. It is inextricably linked to and a result of the larger defense picture—the fundamental shift in the nature of warfare that occurred over the last 15 years.

In a paper published in 2010, Group Captain N. McG. Connell discussed this shift in the nature of war and its impact on U.K. military strategy and tactics.

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[11] Ibid., 28–29.
[12] Ibid., 31–32.
[13] Ibid., 32.

> The major outcome of the 1998 review was to accelerate the change toward a military posture biased toward the projection of power. This was designed to rid the U.K.'s military machine of the last unwanted vestiges of the Cold War during which most NATO countries deployed large static forces against a fixed and known adversary. The 1998 SDR recognised the transition from a highly militarised but largely stable and highly polarized geopolitical situation to a less predictable world in which responses would need to be flexible but at the same time credible and sustainable. In essence, the SDR marked the point at which the U.K.'s military machine needed, for reasons of cost, to make this paradigm shift with little extra resource and thus to divest itself of structural and doctrinal inefficiencies to pay for the necessary changes." [14]

What resulted, the McG. Connell report continued, was a "balanced force" tailored to meet the U.K.'s standing commitments and with the capacity to mount significant deployed operations. The 1998 SDR committed the U.K. to a number of long-term, expensive, and technically advanced equipment procurement programs. The cost would be covered through a combination of force structure modifications, manpower cuts, and, most importantly, significant efficiencies in the areas of procurement and logistics support. Thus, it was assumed that through these savings, in concert with a trajectory of reducing costs in real terms, the vision of the SDR would be delivered and would provide balanced and highly capable military forces for many years to come.[15]

The most crucial element of the SDR was that for the first time the MoD laid out detailed planning assumptions for its operations and attempted to capture the logistics and sustainability implications. Thus, by acknowledging the significant burden and cost of supporting operations from deployed locations, it set out to define what it could do, with whom, at what distance, and for how long.[16]

The 1998 SDR sharply criticized the MoD's procurement system, and "Smart Procurement" (later renamed "Smart Acquisition") was subsequently introduced as the mechanism with which to effect substantial improvements in the delivery of future equipment capabilities. In particular, these improvements were seen as a way to rein in cost growth in key projects. They involved both organizational and procurement process changes.

From an organizational perspective, logistics commands traditionally were divided into three separate services. In an effort to enhance support services for joint

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[14] McG. Connell, Group Captain N., *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?*, Royal Air Force, College of Defence Studies, July 2010, 1.
[15] Ibid.
[16] Ibid., 4.

operations the three services were combined into the Defence Logistics Organisation (DLO). A similar structural change was directed at procurement activities, which previously had been coordinated by the Procurement Executive, which was a part of the MoD.

However, after the release of the SDR the MoD decided to transfer procurement activities to the independent Defence Procurement Agency (DPA), creating a direct supplier/customer relationship between the DPA and MoD.[17]

Introduction of Smart Acquisition and TLS

In addition, the SDR prompted the implementation of an initiative known as Smart Acquisition, which is a long-term initiative to improve the way in which the MoD acquires defense capability. The Smart system implements a ***through-life approach*** to acquisition (mentioned above and explained in detail later in this report) as opposed to focusing resources on the initial purchase.[18]

This through-life approach recognized the fact that the cost for maintaining a weapon system over its entire life is far higher than its initial purchase price. In broad order terms, initial procurement (concept to development and manufacture) costs account for approximately 40 percent of the whole-life cost. The remaining 60 percent is spent on in-service running costs and disposal, as illustrated in Figure 4.

Figure 4. Comparison of initial acquisition costs against in-service costs

Equipment type	Costs[A] in "CADM" part of acquisition cycle	Costs[A] in "ID" part of acquisition cycle
Surface ship	40%	60%
Maritime electronics	40%	60%
Rotary wing[B]	20%	80%
Submarine	30–40%	60–70%

[A] Based on constant cash costs and excludes any indirect costs. Based on 25-year life of the system, and includes crew/system operator/front line command costs.
[B] Based on a variant of an existing helicopter. If this were a new design, the development costs would be significantly higher and would push the costs well toward the CADM 40%, ID 60% split.

Source: U.K. Ministry of Defence—Enabling Acquisition Change Team Leader, *Enabling Acquisition Change: An examination of the Ministry of Defence's ability to undertake Through Life Capability Management*, June 2006, 35. http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf.

[17] Gray, *Review of Acquisition for the Secretary of State for Defence*, 198.
[18] www. http://www.mod.uk/NR/rdonlyres/78821960-14A0-429E-A90A-FA2A8C292C84/0/ReviewAcquisitionGrayreport.pdf

Smart Acquisition adheres to the following seven principles set forth by the MoD:

- A whole-life approach, typified by applying through-life costing techniques
- Integrated project teams (IPTs) with clearly identified customers
- A better, more open relationship with industry
- More investment during early project phases
- Effective trade-offs between system performance, through-life costs, and time
- New procurement approaches, including incremental acquisition
- A streamlined process for project approvals

The initiative sought to clarify the roles and responsibilities of "requirements setters" and "acquirers" and to empower integrated project teams to deliver on stable requirements.[19]

Major defence projects were experiencing significant cost overruns and delivery schedule slippageSlippage and changing requirements were judged to be the main causes of these cost overruns, so the SDR introduced a new "CADMID" procurement cycle in 1999 in order to better control the underlying cost overrun drivers. CADMID refers to a procurement life-cycle process (shown in Figure 5) that includes the following steps: Concept, Assessment, Demonstration, Manufacture, In-Service, Disposal. Under CADMID, the approvals mechanism was simplified to include fewer approval points and to introduce the concept of an empowered integrated project team, whose leader was able to make performance, time, cost, and risk trade-offs within prescribed boundaries.[20]

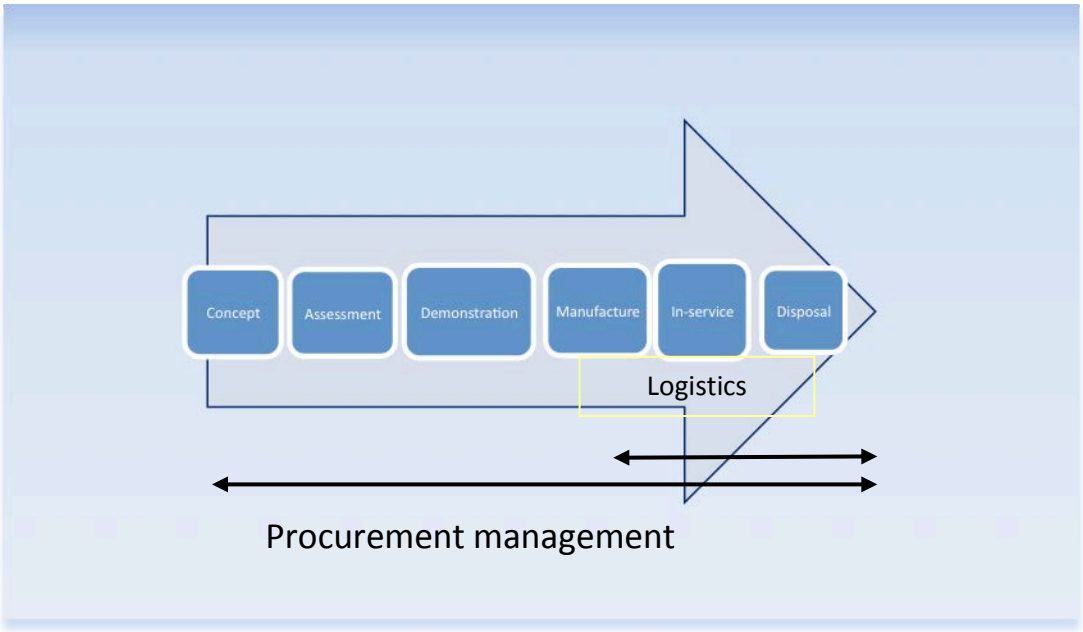
The CADMID cycle stages are defined as:

- Concept: a statement of the military customer's requirement
- Assessment: identification of an acceptable balance of time, cost, and performance (including commercial and technical factors); risk defined and quantified to a level consistent with delivering an acceptable level of system performance to tightly controlled time and cost parameters, and selection of the most appropriate procurement strategy

[19] http://www.mod.uk/NR/rdonlyres/78821960-14A0-429E-A90A-FA2A8C292C84/0/ReviewAcquisitionGrayreport.pdf
[20] Ibid., 7.

- Demonstration: progressive reduction of development risk; performance targets fixed for manufacture
- Manufacture: delivery and acceptance of the solution to meet the military requirement
- In-service: provision of effective support to the front line; delivery of any agreed upgrades
- Disposal: efficient, effective, and safe disposal of the equipment [21]

Figure 5. CADMID cycle



Source: Gray, *Review of Acquisition for the Secretary of State for Defence*, 13.

Initial estimates of the sums that could be saved through this initiative were on the order of £2 billion, and these efficiencies were assumed in the core defense program.[22]

Another significant change under Smart Procurement was that as a result of the application of resource accounting, project costs would be couched in terms of outturn

[21] *Enabling Acquisition Change: An examination of the Ministry of Defence's ability to undertake Through Life Capability Management*, June 2006, 13. http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf.
[22] McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?*, 7.

prices and not constant prices. All resource costs would be captured along with the capital costs of programs.[23]

Changing to resource accounting was a significant move. The driving force behind it was the need to properly account for the cost of owning a piece of equipment over its service life. This is a significant change from pure cash-based accounting—the old MoD accounting method, which was merely based on planning for in year of expenditure.

Under resource accounting and budgeting (RAB), costs are accrued (i.e., recognized as the resources are consumed, rather than when they are paid for), and capital purchases are depreciated over time to link their costs with their usage. Under a cash regime (as existed pre-RAB), once an item had been purchased, its capital cost no longer entered the reports.[24]

Thus, under the old cash-based system, a piece of equipment paid for one year could be written off the following year without recourse to whether Defence had yet obtained the value, in usage and capability terms, that public money had paid for. However, the introduction of resource-based accounting procedures has meant that, for example, a sudden withdrawal of a major piece of equipment from service, in order to avoid further operating costs, would now mean that the write-off cost would have to be paid for during the same accounting year by the account holder. This would mean that the cost of such a write-off would need to be appropriately resourced, in cash terms, in advance.[25]

Logistics and the defense estate were also targeted for significant savings. An infrastructure and support review identified the potential for an annual and accumulating efficiency gain of 3 percent. This was judged as achievable and duly "baked in" to the core program as a saving and scored against the defense budget.

Overall, the potential savings taken against force structure reductions, rationalizations, and efficiency savings were assumed, and a three-year spending plan from FY 1999 to FY 2001 was constructed for the first year, which represented 2.7 percent of GDP. In later years—and largely as a result of efficiencies in the areas outlined

[23] Ibid.
[24] http://www.dasa.mod.U.K./modintranet/U.K.DS/U.K.DS2011/c1/rab.php (accessed February 14, 2012).
[25] McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?,* 7–8.

above, including asset sales through rationalization—the budget was expected to settle at around 2.4 percent of GDP.[26]

Under Smart Acquisition, the MoD no longer replaces military equipment, services, or business information systems on a like-for-like basis, but instead takes into account how such a capability will integrate with other capabilities to achieve optimum effect for the armed services. Core to this approach is a through-life approach.

Overall, the aim of Smart Acquisition is "to acquire Defence capability faster, cheaper, better, and more effectively integrated."[27]

The objectives of Smart Acquisition are:

- To deliver and sustain defense capabilities within the performance, time, and cost parameters approved at the time the major investment decisions are taken.
- To integrate defense capabilities into their environment within Defence, with the flexibility to be adapted as the environment changes.
- To acquire defense capabilities progressively, at lower risk. Optimization of tradeoffs between military effectiveness, time, and whole-life cost are maximized.
- To cut the time for (key) new technologies to be introduced into the front line, where needed to secure military advantage and industrial competitiveness.

Smart acquisition was intended to address the fact that as a result of tight fiscal policy for defense spending, in the U.K. equipment lives are being extended, with the consequence that fewer contracts are let. This is particularly evident in military aircraft, where the cost of procuring new equipment, such as the Eurofighter, is very high. Furthermore, the technical complexity and management challenges caused by collaborative programs invariably mean that projects such as these are delivered late and over budget.[28]

After the procurement/logistics system was restructured, the DLO established a goal of reducing costs by 20 percent by 2006, which would be accomplished through the use of "availability contracts." The concept of contracting for availability (CFA) utilizes through-life principles supported by Smart Acquisition.

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[26] Ibid, 7-8.
[27] *Smart Acquisition Program*, http://photos.state.gov/libraries/unitedkingdom/39181/pdfs/Smart_Acquisition_1_.pdf.
[28] Ibid.

Traditionally, as the Gray Report explained, support contracts utilized a customer-supplier type of arrangement in which the MoD carried most of the risk and industry provided spares and maintenance services. However, the CFA concept provides a structure under which MoD is partnered with industry, so that the risk is shared by both; this provides incentives for industry to meet specified availability targets. CFAs require the contractor to take over all support services and repairs for a particular piece of equipment while MoD provides resources such as manpower and infrastructure, in order to meet availability targets through an integrated support process.[29]

Major Project Reports: Expenditures and Costs

On an annual basis, the *Major Project Report* (MPR) examines projects on which £10 million has already been spent based on a forecast of the next year's expenditure on 31 March of each year. The top (most expensive) 25 projects are targeted. Projects fall out of this category as they progress through the cycle, their forecast annual expenditure drops, and they fall outside the top 25. One significant finding of the team that compiles the reports is that once cost overruns accrue, they are not recovered. What this means is that the reports highlight the actual costs of the most expensive projects, and a series of reports can be used to give a reasonably accurate view of the total costs of the equipment procurement program.[30]

The MPR of 1999, which predated Smart Acquisition, showed that MoD's equipment procurement plan was recording cost increases well beyond inflation. This led to a number of projects being "de-scoped" (reduced in scope/capability), deferred, or cancelled. What the 1999 report found was not untypical of the system prior to the 1998 SDR. The 25 programs had increased in cost by some £2.7 billion, or 7.8 percent. This was not dissimilar to the figure of the previous year. At the same time, the 1999 report indicated that in terms of project delays, the average in-service date across 24 out of the 25 projects was expected to slip by 47 months, or nearly four years.[31]

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[29] Gray, *Review of Acquisition for the Secretary of State for Defence,* 146.
[30] McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?,* 8.
[31] Ibid., 8–9.

Slippage in project time gets expensive in a hurry. If a project was intended to replace a legacy system at a given point in time, and it does not do so, then costs escalate for two reasons. First, McG. Connell explains, the legacy system must remain in service far longer than expected, and as any system approaches the end of its life, the cost of obsolescence and support naturally increases. Second, as manufacture is delayed, costs rise at a rate higher than the inflation upon which program assumptions are based.

A third, and often-ignored issue, is that for many years the MoD assumed that as one system went out of service its costs would decline, offsetting the rising cost of the replacement. Taken across the plethora of programs, the effect was assumed to be largely neutral. This turned out to be optimistic, because when programs are delayed the cost of holding two concurrent sets of platform overheads for an extended period—such as project teams and, in the airspace sector, design and airworthiness offices—often causes a temporary increase in total costs.[32]

Against a background inflation figure that was close to 2 percent, containing the rising cost of an equipment program whose major programs were rising annually at around 7–8 percent presented a severe challenge. Expenditure on new equipment was also a significant part of the defense budget and hovered around £6 billion. Even one year after the SDR, the U.K.'s defense plans already started to look overly optimistic.[33]

With defense budgets expected to shrink as a percentage of GDP, such equipment cost inflation would quickly "overheat" the defense budget.[34]

Although not officially described as a defense review, the *Defence White Paper* released in December 2003 set out an analysis of the likely future security environment. In effect, it "reset" the baseline assumptions upon which the U.K.'s force structure should be derived. In July 2004, the government released a follow-on piece entitled *Future Capabilities.* It outlined force structure changes and specified some significant cuts both to the front line and future programs. Its release sparked a number of criticisms that the cuts were too draconian and would negatively impact force structure especially.

The major question mark over the plans revolved around the affordability across the period 2008–2012. During this time, a "bow wave," or rapid surge of expenditure,

[32] Ibid., 9.
[33] Ibid.
[34] Ibid., 10.

was predicted as spending on key projects ramped up. Programs cited included the A400M transport aircraft, the Beyond Visual Range Air-to-Air Missile, the Joint Strike Fighter, the Future Carrier (CVF), Future Integrated Soldier Technology (FIST), and the Future Strategic Tanker Aircraft (FSTA).[35]

It was clear to most analysts that, despite significant restructuring of the front line, including the rapid loss of 7,500 personnel from the Royal Air Force and a further 1,500 from the Royal Navy, that the future structure of defense now hinged on the delivery of the entire equipment program on budget and on time. Even then, it was unclear how to massage away the "bow wave" expected in 2008 and then absorb the cost of them, especially during the peak period from 2011, without a further round of "rebalancing" or severe cost reduction.

Running along in the background during the drafting of the December 2003 white paper, the expected benefits from the imposition of Smart Acquisition remained elusive. The 2004 MPR identified that on top of rises of £3.1 billion identified in the 2003 report, costs had risen by a further £1.7 billion. Total project delays were expected to worsen even further – by an additional 62 months – bringing the total cumulative delay for all major projects to more than 200 months beyond originally expected in-service-dates.

In the 10 years after the implementation of the Smart Acquisition system, there was some concern among MoD officials that some of the goals of through-life management were not being met, and many called for a review of the system since implementation. In response, the *Defence Industrial Strategy* white paper (DIS) was published in December 2005. The DIS reviewed the acquisition process and confirmed the effectiveness of Smart principles; however, the report also highlighted a need for greater adherence to through-life concepts.[36]

The Legacy of the 2004 Program

Over the next few years, the MoD concentrated its effort in each planning round on making the first year of each 10-year plan affordable and generally allowing costs in the second and subsequent years to remain above the forecast allocation of funding. This

[35] Ibid., 11.
[36] Gray, *Review of Acquisition for the Secretary of State for Defence*, 172.

approach might at first sight seem a reasonable approach, but it did nothing to tackle the "bow wave" that was expected.[37]

"The MPRs from 2006 and 2007 offer an interesting insight into what was happening inside the MoD," writes McG. Connell. "In 2006, while the cost of the top 20 projects remained stubbornly high at 11% over the expected cost at approval, this figure did not capture the £448m that was 'reclassified' and passed across to the non-equipment part of the budget to be absorbed. Thus, other activities, elsewhere in defence, were expected to find corresponding savings of around half a billion pounds to balance the books. One year later, another £609m received similar treatment. While the practice of throwing problems 'over the fence' for another budget to cope with could be justified, it was not something that the receiving budgets were anticipating." During 2005–2006, another 33 to 38 months of slippage occurred in the major projects. The volume of planned equipment purchases also was reduced for some platforms.[38]

In 2006, a report entitled *Enabling Acquisition Change,* which was based on a detailed review of the MoD's acquisition processes and equipment support, was published. The report was highly critical and stated that the MoD's acquisition system had "a history of suffering from a conspiracy of optimism" that led to a poor understanding and thus poor management of program costs and risks. It also highlighted poorly aligned targets and incentives, stove-piped behaviors, and the need for better unity of purpose.[39]

In response to the recommendations of the DIS white paper, a study was undertaken to assess whether the MoD's current business structures were adhering to through-life principles, and if not, what changes needed to be made. The study recommended that MoD's procurement and logistics functions be merged into a new organization and that whole-life costs be better managed. The new organization, known as Defence Equipment and Support (DE&S), was created in 2007 as a result of what became known as the Defence Acquisition Change Programme (DACP). It represented a merger of the former DPA and DLO groups.

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[37] McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?,* 13.
[38] Ibid., 13–14
[39] *Enabling Acquisition Change,* June 2006, Executive Summary.

The aim in creating DE&S was to fundamentally change defense procurement by altering the culture of the organization and institutionalizing a focus on through-life capability management. DE&S' charter, according to the agency's website, is as follows:

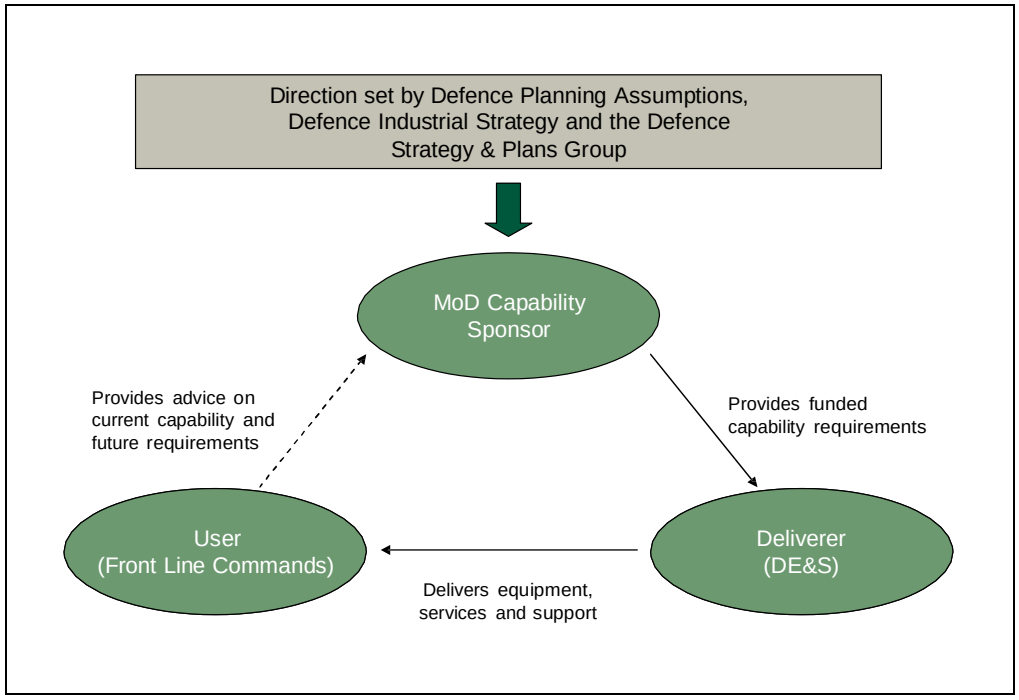
> DE&S is responsible for the through-life approach to equipment procurement and support, and the creation of an improved service to our front line customers. The core output of DE&S is the delivery of through-life project management and support to operations. DE&S focuses on being an intelligent 'decider' to an industry provider, rather than providing services ourselves.[40]

The reorganization also established the MoD Unified Customer framework in which DE&S works with the requirements community, the front line commands, the Science Innovation and Technology TLB (top-level budget), and MoD Centre to identify and support customer needs. And it created the Defence Commercial Directorate, which provides strategic guidance on commercial issues for the MoD across different defense sectors.[41] (See Figure 6.)

Importantly, the practice of planning for equipment procurement across a 10-year period and the logistics support program over the first four years would cease; both would be aligned across a decade.

[40] U.K. Ministry of Defence, http://www.mod.U.K./DefenceInternet/MicroSite/DES/WhatWeDo (accessed February 14, 2012).
[41] Gray, *Review of Acquisition for the Secretary of State for Defence*, 172.

Figure 6. Tripartite structure of equipment procurement planning in the MoD



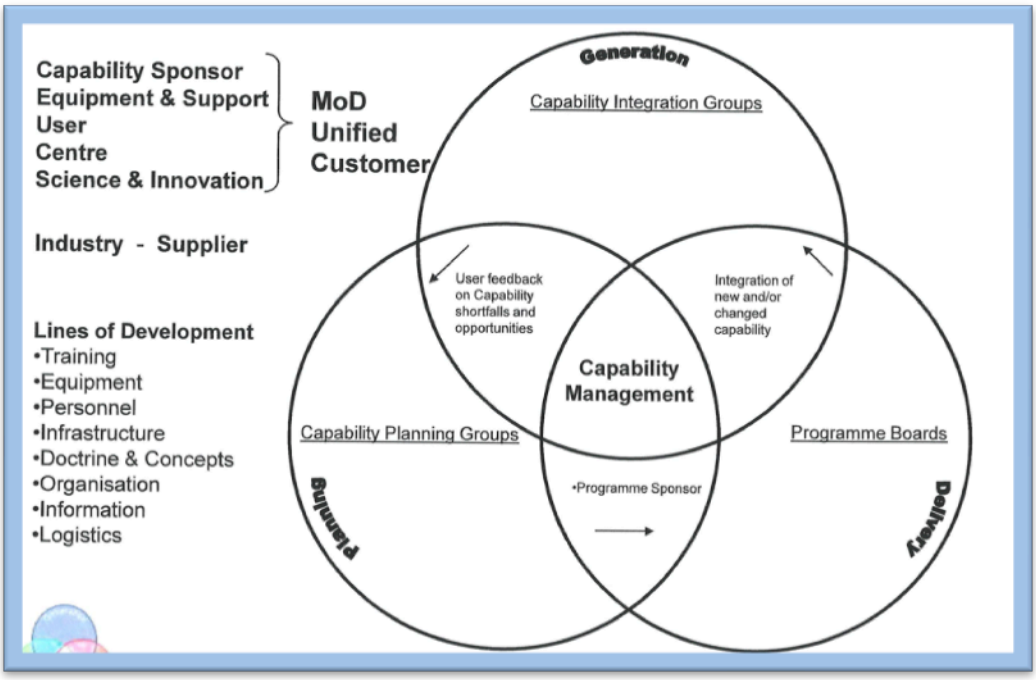
Source: Gray, Bernard, *Review of Acquisition for the Secretary of State for Defence*, 2009, 61.

DE&S works with the rest of Defence in two key ways: as part of the MoD Unified Customer (MUC), and as a formal top-level budget within the MoD. Additionally, Chief of Defence Materiel (CDM) is the logistics process owner (LPO) and national armaments director (NAD) for Defence.

As part of the MoD Unified Customer, DE&S forms part of the MUC, working with the Capability Sponsor, front-line commands, MoD Centre, and Science, Innovation and Technology (SIT) TLB to integrate outputs with the broader Defence Lines of Development (DLoD), in line with the principles of through-life capability management. The Equipment and Support Plan (agreed with the Capability Sponsor), Joint Business Agreements (agreed with the front-line commands), and Urgent Operational Requirements (UORs) specify the equipment, support, and logistics outputs that DE&S is required to deliver.[42] Figure 7 shows this working structure for DE&S.

[42] U.K. Ministry of Defence, *Operating Handbook: How DE&S Works*, 2009, 5.

Figure 7. MoD Unified Customer working structure



Source: UK Ministry of Defence.

The *DE&S Handbook* describes the roles, relationships and working characteristics and mechanisms of the agency.

> The increasing focus is on DE&S becoming the intelligent 'decider' with industry acting as the 'provider', but this still requires DE&S to initiate, manage and control often very complex projects and programmes (building the maturity and viability of each to the point that industry can be engaged to complete development and manufacture), and then integrate the outputs of individual projects and contracts into complete, coherent and safe solutions that meet the Front Line's requirements. DE&S also delivers a significant element of Defence logistics capability, operating and maintaining logistics infrastructure in the U.K. and sustaining military capability deployed on Operations.[43]
>
> The Programme & Performance Board (PPB) collectively reviews the performance in delivery terms and the associated financial position of the COO's area of responsibility; considers portfolio risks within COO's area of responsibilities and ensures that effective mitigation is in place where appropriate; agrees areas for collective or individual action to recognise success or remedy concerns to ensure delivery of DE&S outputs within available funding; agrees actions in support of wider DE&S strategic objectives to deliver robust, reliable and safe performance, both now and in the future; supports COO in his responsibilities for mitigating and managing DE&S Strategic Risks; identifies collective issues requiring involvement of other three areas for resolution; identifies corporate issues for COO to raise to the executive committee of the main board.[44]

[43] Ibid, 5

[44] Ibid, 13.

In March 2008, about a year after DPA and DLO were merged into DE&S, MoD officials developed the PACE program (Performance, Agility, Confidence, and Efficiency), which is a single framework designed to enable DE&S to more effectively implement changes in a way that is coherent and properly aligned with activities in other parts of the MoD. The objectives of PACE are as follows: [45]

- Equipment and Support plan that is more stable, affordable, and realistic allowing greater agility
- Significantly (50 percent) shorter acquisition cycle time—reducing time from decision to effect
- Reduced cost of doing business for both MoD and industry
- More effective delivery
- Industrial transformation

MoD officials expected PACE to deliver significant savings primarily due to reductions in staff.

In addition to staffing cuts and the reduction in overhead costs, PACE has another initiative aimed at improving the skills of the workforce. This part of the PACE initiative has been implemented on a continuous-improvement basis and is focused on improving staff skills and overall performance through training programs and creating a new system of outcome-based incentives.

Despite these changes, spending on major projects continued to rise significantly. The *National Audit Office: Major Projects Report 2009* stated:

> If the Defence budget remained constant in real terms, and using the Department's forecast for defence inflation of 2.7 per cent, the gap would now be £6 billion over the 10 years. If, as is possible given the general economic position, there was no increase in the defence budget in cash terms over the same 10-year period, the gap would rise to £36 billion. In recent planning rounds, the Department concentrated its efforts on ensuring that the Equipment Programme was affordable in the early years, and on creating room in the budget for improvements in capability that were relevant to current operations. Since any radical changes in planned Defence capability would fall to be made in a Strategic Defence Review, the Department chose to make savings by re-profiling expenditure on existing projects and reducing the numbers of equipment being acquired on others. These decisions were necessary to ensure that the programme was affordable in the next few years, but they increased the overall procurement costs and represent poor value for money on the specific projects affected.[46]

[45] *DE&S Blueprint: The Future Operating Model*, http://www.mod.uk/NR/rdonlyres/6089CCFC-4AA4-4D56-99E9-724B587597B9/0/DES_PACE_Blueprint_V1_02.pdf.
[46] *National Audit Office: Major Projects Report 2009*, HC: 85, 2009-10, 15 December 2009, 4 (cited in McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?*, 16.

> Thus, at the end of 2009, no major projects had been cancelled since the 1998 SDR and the Department had routinely embarked on slipping programmes to ease pressure in the first years of each annual plan. Significant decisions had been delayed on the basis that they would be tackled during the post-election Defence Review. It is also difficult to capture the capability reductions in individual projects that have accrued over the preceding years since details of these trade-offs are not often leaked into the public domain except in cases where numbers of platforms or equipments are reduced. However, the MOD is arguably beyond the point where giving projects individual haircuts would generate sufficient savings to balance the books.[47]

In his report, Gray noted that there are three main levers that can be used to change contracting outcomes:

- Adjust the time frame of the contract: slowing down or speeding up a program
- Vary the cost: putting more or less money into a project, or
- Change the performance of the equipment: asking for more or less capability from the system in question.

In the mainstream MoD equipment plan, according to Gray, the main variable that is exercised is time. "When budgetary pressures arise, as they often do, projects are slowed down, and delivered later. What happens to cost in these circumstances is that the short-term cash spend is lowered, while the long-term total cost of delivering the project is increased."[48]

This increase occurs because overhead costs associated with a project don't go away with a slowdown, but rather continue to accrue. "Project teams within the MoD and industry remain engaged even though the project has slowed, industry may have significant working capital tied up in production for longer, and older equipment may have to be kept in-service for longer to make good the gap left by the late arrival of new equipment."[49]

A project slowdown carries another negative impact. It reduces the resources available for creating new defense equipment by transferring funds into unproductive overhead.

[47] McG. Connell, *UK Department of Defence: Has the vision of the 1998 Strategic Defense Review died?,* 16.
[48] Gray, *Review of Acquisition for the Secretary of State for Defence,* 2009, 37–38.
[49] Ibid, 38.

Acquisition reform timeline: Summary of key changes

The timeline below summarizes the key changes in MoD acquisition policy and procedure since the introduction of Smart Acquisition in 1998.[50]

Late 1990s and early 2000s: Smart Acquisition, formation of DPA\DLO and DLO Change Programme

- Smart Acquisition (1998): On the basis of a fundamental review, the Department sought to improve performance based on implementing a range of major initiatives. Significant changes were made to the acquisition process, most visibly the implementation of Initial and Main Gates in the Departmental decision making process and the formation of Integrated Project Teams to deliver individual projects.
- Development of the Procurement Executive into the DPA and formation of the DLO (1999): In keeping with principles of Smart Acquisition and SDR recommendations, the PE was vested with agency status and the three single Service logistics organizations were consolidated to form the DLO.
- DLO Change Programme (2000): Focused on unifying the logistics organization and its systems, spreading best practice, maximizing the benefits of Smart Acquisition, and adopting a common approach to industry. The effort morphed into the Logistics Transformation Programme in 204.

More recent initiatives driven by the DIS and EAC report—2005–2009

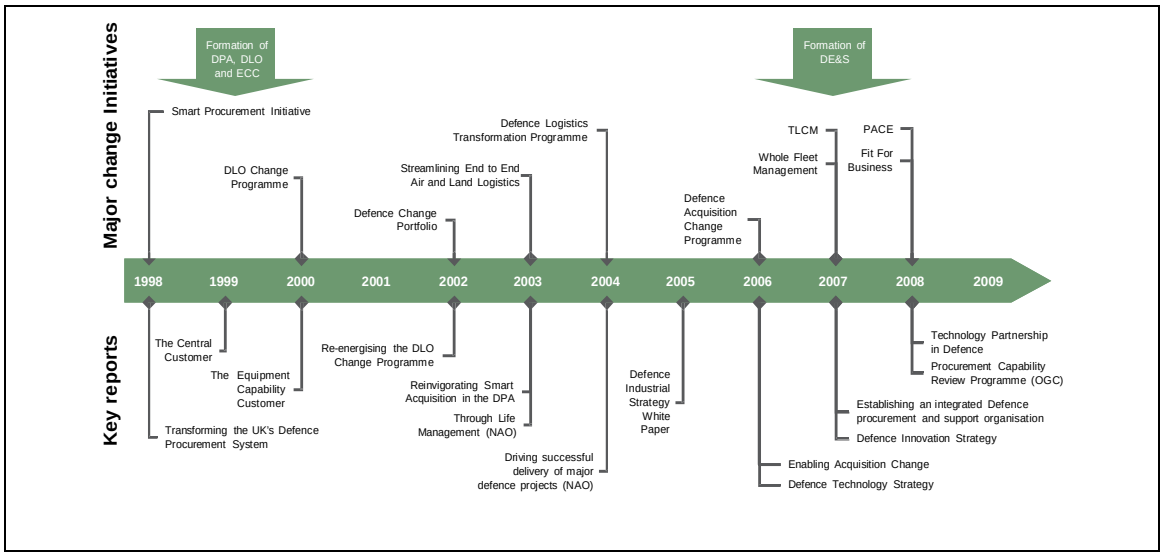
- Merger of DPA and DLO into DE&S. The development of the Transformation Staircase in support. A number of large contracts for availability have been let (e.g., Tornado ATTAC, Harrier PAC, Sea King) which appear to have delivered very significant savings over historical unit cost rates. Furthermore, a number of public finance initiative (PFI) contracts51 for capability have been let (e.g., support vehicle, air-to-air refueling tanker). This transformation process remains ongoing.
- Initial implementation of the Defence Industrial Strategy (2005): agreeing and deploying changes to acquisition strategies in industrial sectors regarded as strategic.
- Implementation of Through-life Capability Management ("TLCM") following on from the Enabling Acquisition Change report (2006). TLCM was designed to optimize and synchronize across the 8 Defence Lines of Development ("DLODs") thereby reducing cost and improving delivery of military capability.
- "Phase 4" of the implementation program (including reorganization of the "Equipment Capability Customer" into the "MoD Capability Sponsor" and establishment of Programme Boards) commenced during Spring 2009.

Figure 8 provides a graphic summary of these events.

[50] Ibid., 59–61.

[51] Public Finance Initiatives ("PFI"), in which the private sector provides the initial capital investment in return for future 'rental' payments from public sector. This model is also frequently implemented in situations where it is believed that the private sector can bring superior management and/or operational skills to public services, and ultimately benefit to taxpayers.

Figure 8. Key events in MoD acquisition system reform



Source: Gray, Bernard, *Review of Acquisition for the Secretary of State for Defence*, 2009, 58

A key element of TLCM was introduction of Programme Boards, beginning in 2008. Programme Boards are responsible for translating capability plans into specific outputs, which are delivered to the front-line commands. Each board is led by the relevant Head of Capability, and includes representatives from the front-line command, those responsible for delivering each of the eight DLODs, the finance function and, where it is felt to be appropriate, industry.

David Shouesmith discusses the Programme Boards in more detail:

> The U.K. embarked on TLS-TLCM not knowing all the answers, not knowing where it would take us. The feeling at the time was, "Whatever we do can't be worse than the situation we're currently in. We will learn and adjust as we go along. But we have to start."
>
> So we set up the mechanism of Programme Boards, which was an attempt to get everyone organized around defence lines of development (DLODs).[52] This meant that for any capabilities we want to field, there would be someone responsible for making sure the people are in place, and the infrastructure, technology, manufacturing capability, information and so on are also in place.
>
> So we set up the Programme Board mechanism, which was an attempt to get everyone's input in an organized fashion around the DLODs. Each Programme Board is chaired by the requirements owner in MoD. The theory of Programme Boards—and it works in industry—is that empowered

[52] Note: Currently, there are eight DLoDs in the MoD. They include: Training, Equipment, Personnel, Information, Doctrine and Concepts, Organisation, Infrastructure, Logistics.

representatives come to the Programme Boards able to make the decisions on tradeoffs. These could be design tradeoffs at an early stage, or a capability trade off in midlife, or decide to put in place a contract support solution because it's cheaper over the life of the equipment. The key is the ability to make tradeoffs through the life of the programme and to have the people empowered to make those decisions represented on the Programme Boards.

Programme Boards lie at the heart of the TLCM.

But while Programme Boards are good in theory, in practice, it is difficult to achieve that goal of getting everyone empowered/acting at the same level. In theory you get all these things teed up, press the button and everyone is empowered. In practice, that didn't happen.[53]

[53] Interviews with David Shouesmith, July–August 2011.

III. The New Decider-Provider Paradigm

TLS-TLCM represents a fundamental change in the relationships between, as well as in the roles of, the decider (MoD) and the provider (the supplier). The MoD's new role involves deciding what capability or output it wants and then contracting for it—usually over an extended contract term of several decades. Suppliers, in this paradigm, become the capability provider, guaranteeing the MoD the capability for flying a given number of hours, for example. Or, as one observer put it, guaranteeing the MoD the ability to blow up a bunker.

This new acquisition approach represents a move up the business relationship evolutionary ladder—from a purchasing/transactional attitude with a short-term focus, to a partnership relationship with a long-term commitment. This shift is characterized by what the MoD calls the Defence Logistics Acquisition Staircase, which we discuss in greater detail later in this chapter.

In this context, the nature of the supplier role is changing, as the Secretary of State for Defence explained in a 2005 white paper:

> We are seeing a shift away from platform orientated programmes towards a capability-based approach, with corresponding implications for the demand required of the traditional defence industrial base. Although we are in the middle of a substantial transformation, involving a series of major new platforms, we expect these platforms to have very long service lives. This means the future business for the defence industry in many sectors will be in supporting and upgrading these platforms, rapidly inserting new technology to meet emerging threats, fulfill new requirements and respond to innovative opportunities, not immediately moving to design the next generation.[54]
>
> In the past, equipment has been procured with two separate contracts, one for delivery and one for repair. This does not clearly incentivise the delivery of reliable equipment. We are moving to a single contract system, by which suppliers are paid for **use** of equipment. Companies are generally keen to move towards this model. While it offers us greater equipment availability, it also provides our industrial partners greater returns over a longer period."[55]

This paradigm shift toward managing the support and upgrade of equipment through-life, together with shrinking defense budgets for new platforms, is significantly changing the defense aerospace market, as the Secretary of State for Defence white paper points out.

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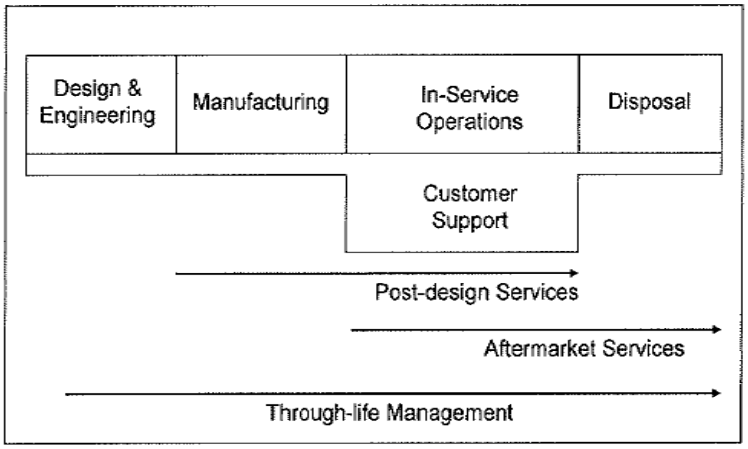
[54] The Secretary of State for Defence, *Defence Industrial Strategy Defence White Paper,* (paper Presented to Parliament), December 2005, 15.
[55] Ibid, 66.

> Budgets are focused increasingly on fewer but more capable and flexible multi-role platforms, such as Joint Strike Fighter (JSF) and Typhoon. The trend towards fewer, smaller fleets of ever-more sophisticated, capable and expensive platforms has driven recent changes in the European and US aerospace defense industry. The main consideration for the major suppliers is that there will be a potentially significant reduction in new military aircraft design and development work.[56]

Figure 9 illustrates, in a simplified way, the scope of through-life management.

Figure 9. The scope of through-life management



Source: Ward, Yvonne, and Andrew Graves, *Through-Life Management: The Provision of Integrated Customer Solutions By Aerospace Manufacturers*, University of Bath School of Management Working Paper Series 2005.14, 6.

The Supplier Picture

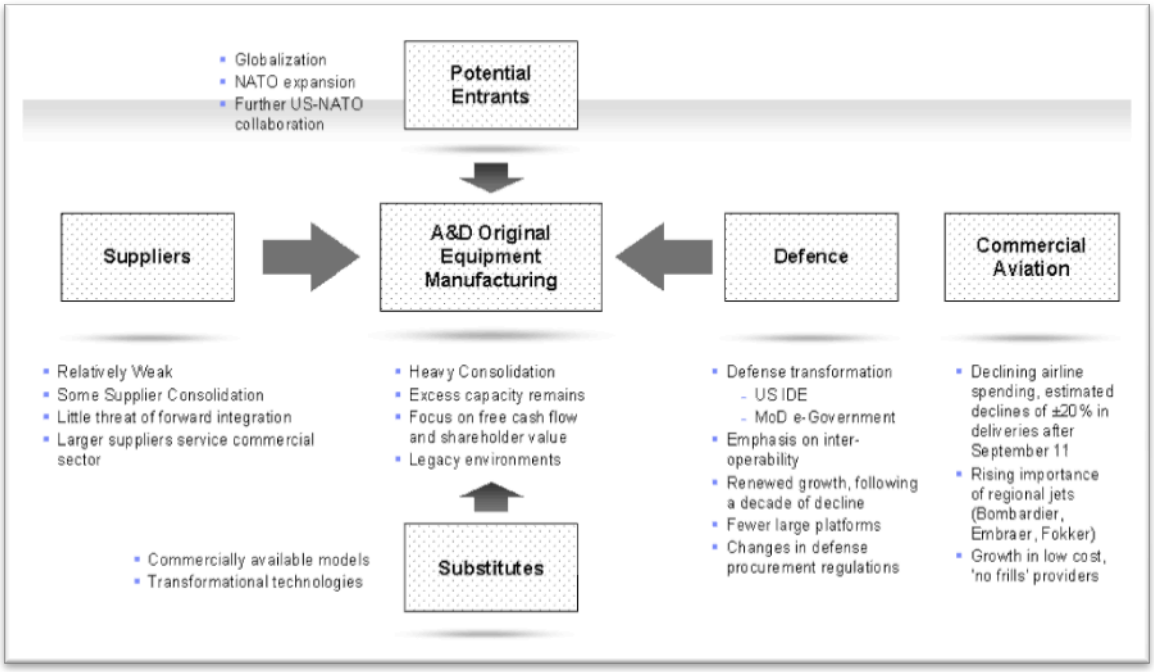
The SDR highlighted savings targets—notably the need to deliver £2 billion worth of savings—and discussed how those might be achieved. In addressing these challenges, while at the same time seeking to ensure the survival of U.K. industry, the traditional arms-length, transactional supplier relationship began to change. Closer working relationships with industry through strategic partnering started to emerge. In particular, emphasis was placed on the need for a changing business ethos within acquisition to ensure that industry is incentivized to support the reduction in whole-life costs in a manner that is realistic and in their long-term interests.[57]

[56] Ibid, 89.
[57] Bywater, J.J., "Department of Defence Management and Security Analysis" (Master of Defence Administration dissertation, Cranfield University, 2004), 13.

This approach represented a major cultural shift in the nature of MoD-industry relationships, toward one focused on long-term value for money (VFM). These relationships historically had been close but adversarial, with a focus on initial purchase or transaction price rather than total lifetime cost.

The key economic forces from exerting pressure on the industry are represented by the model in Figure 10.

Figure 10. Forces exerting pressure on the aerospace and defense industries



Source: Bywater, J.J., "Department of Defence Management and Security Analysis" (Master of Defence Administration dissertation, Cranfield University, 2004), 28. Original source: IBM Business Consulting Services (USA).

Within this competitive context, a number of key trends are driving the evolution of aerospace and defense industries worldwide.[58]

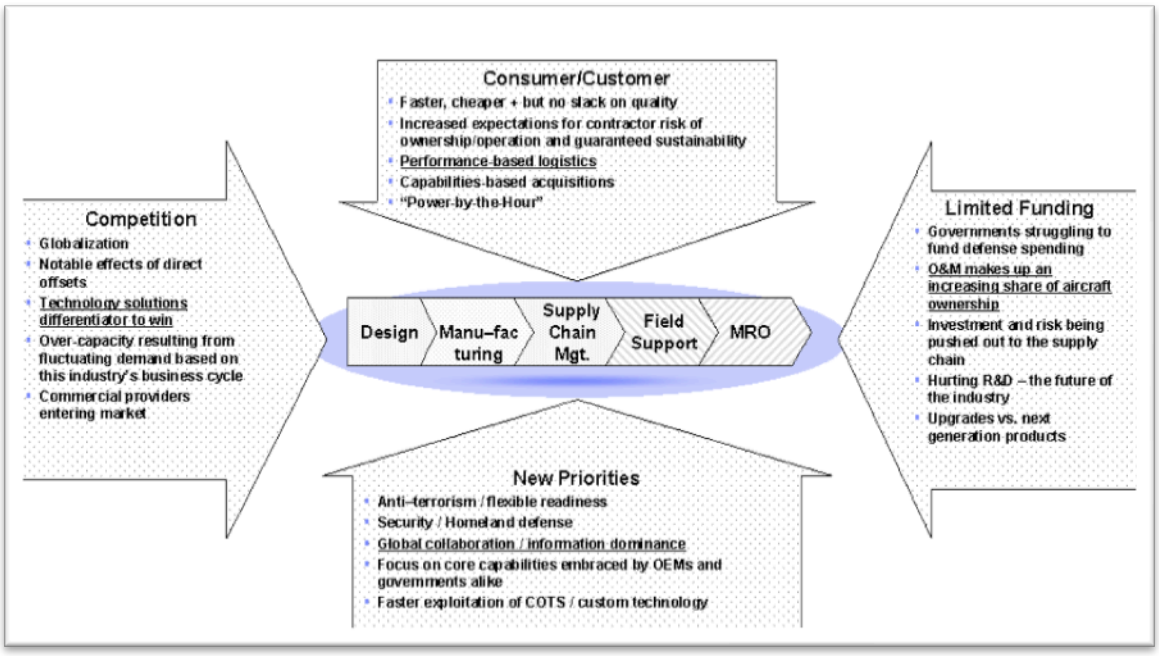
- Better, faster, cheaper. The MoD customer has embraced a general demand for "better, faster, cheaper" in defense procurement. These seemingly conflicting demands must be achieved with no degradation in quality.

[58] Ibid., 29.

- Shrinking budgets. Industry must contend with increasingly stretched defense budgets. Cost-cutting pressures are enormous.
- Whole-life management. For most major weapons systems, the largest costs of ownership revolve around operating and maintaining them. This forces a whole-life approach to acquisition.
- Risk assumption. The U.K. MoD expects the supplier to carry the risk of current and future availability of equipment systems as an incentive to invest in the reliability of the equipment, rather than focus on making the bulk of profits from supplying spares. The supply chains that deliver fit equipment to the front line will be increasingly performance-based, and more equipment will be leased from the supplier.
- Global competition. Whereas in the past competition was largely domestic U.K., today it is truly global.
- Upgradeability. In order to be positioned to offer affordable equipment, companies will need to design systems with built-in flexibility for multi-role use. This requires increasing levels of common interfacing to other systems or "add-on" capabilities. It will force open-architecture designs with, where possible, use of available commercial off-the-shelf (COTS) technology. Upgradeability is a necessary component of platform designs because shrinking budgets are compelling defense agencies to demand longer life from their weapons systems.

The elements described above are represented by the simple model below, shown in Figure 11. This diagram shows that in order to align the business to best exploit the changing environment it must support, suppliers must have a greater share in the whole-life support business. This includes management of the supply chain, moving the boundary forward for supporting the equipment, and taking increasing responsibility for the depth work of maintenance, repair, and overhaul (MRO).

Figure 11. Trends driving the evolution of aerospace and defence industries

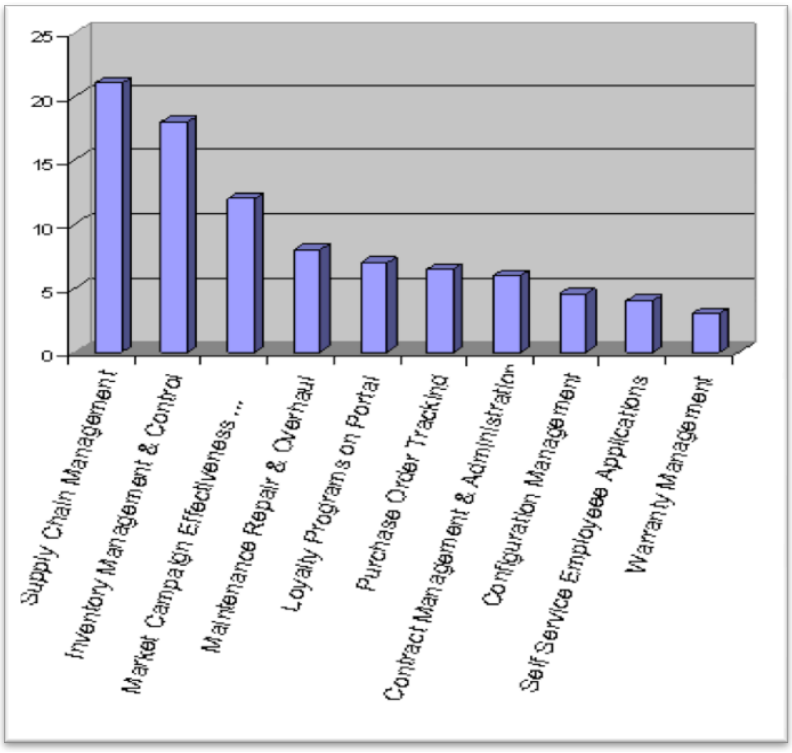


Source: Bywater, J.J., "Department of Defence Management and Security Analysis" (Master of Defence Administration dissertation, Cranfield University, 2004), 30. Original source: IBM Business Consulting Services (USA).

Observes J.J. Bywater in his 2004 dissertation for Cranfield University, "It is clear that A&D companies must seek to take an increasing role in whole-life equipment support. To achieve business growth in this area, defense industries must discover where they can best add value to processes, as a route to adding value to shareholders. They will then be able to focus on value creating solutions. The bar chart at Figure 2.5 [Figure 12 in this document] shows the main business areas where, through process improvement, shareholder value can be increased. This illustrates the need to focus on supply chain management as the main area for potential added value." [59]

[59] Bywater, "Department of Defence Management and Security Analysis," 31.

Figure 12. Most effective method(s) for increasing shareholder value (by %)



Source: Bywater, J.J., "Department of Defence Management and Security Analysis" (Master of Defence Administration dissertation, Cranfield University, 2004), 32. Original source: The *Aviation Week* Creation Study, 2002.

In order to fully exploit the potential for the benefits of a through-life approach to support or capability management, contracts placed with industry will need to incentivize them to improve availability and reliability of equipment and drive down whole-life costs. Thus it must be in their commercial interests to provide the most efficient and high-quality service, rather than to seek profits through more traditional approaches, such as constant design changes, through modification, and achieving high sales volumes for spares parts.[60] The private sector also must be able to collaborate with Ministry of Defence "organic" maintenance and repair depots to deliver the needed outcomes.

Bywater observes:

> To be able to move to such a significantly changed commercial environment between the U.K. MoD and Industry will require a degree of trust and a willingness to work together towards these common goals. To get there will require a good underlying knowledge of the drivers on each side

[60] Ibid, 35.

> which sustain current commercial relationships and the potential benefits for both of moving into a radically changed commercial environment.[61]

Through-life management requires providing customers with a total solution, comprising a mix of products and services. Suppliers' move toward this model is driven by several major factors, including customer demand and the need for increased revenues and better margins.

Customer Demand. Military support contracts are being linked to equipment availability targets in a drive to transfer risk to the manufacturer or support provider and reduce total costs of ownership. The focus, as we've noted earlier in this paper, has changed from inputs to outputs. As a result, customer requirements are driving improvements in equipment reliability and, therefore, reducing the number of spares and the amount of maintenance, repair, and overhaul (MRO) required over the product life-cycle.[62]

At the same time, however, this shift in customer requirements opens up significant opportunities for manufacturers to develop new value-added services. Manufacturers see these opportunities as a way to deliver revenue and profit improvements, by assuming more of the risk together with providing greater breadth of support and service.

Increased Revenues. In addition to customer pressure to move toward through-life management, aerospace manufacturers themselves are eager to develop models for through-life operations. Traditionally, aerospace manufacturers concentrated heavily on the design and manufacture of aerospace equipment, with aftermarket activities being viewed as the "necessary evil."[63]

Over the past 10 to 15 years, however, aerospace manufacturers began to recognize the financial opportunities provided by support and aftermarket activities. The long aftermarket life-cycle phase, relative to that of design and manufacture, provides significant revenue and profit opportunities with respect to in-service support and maintenance, especially with regard to the provision of spare parts. Despite this increased

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[61] Ibid.
[62] Ward, Yvonne, and Andrew Graves, University of Bath School of Management, *Through-life Management: A Catalyst for Process Excellence in Customer Support and Maintenance, Repair, and Overhaul (MRO)*, U.K. Lean Aerospace Initiative Report, May 2006, 6.
[63] Ibid., 12.

attention by aerospace manufacturers on aftermarket activities and services, manufacturing and in-service support were effectively considered separate businesses, with no real integration between the two.

The Transformation Staircase

The traditional manner in which the MoD has procured equipment has been to drive the price down through competition, thereby securing the maximum short-term value for the taxpayer (cheapest price). This approach gives little or no consideration to the downstream costs of supporting the equipment, which is where the greatest costs traditionally lie. It also creates a destructive and eventually expensive procurement cost spiral, which Bywater outlines in his dissertation.

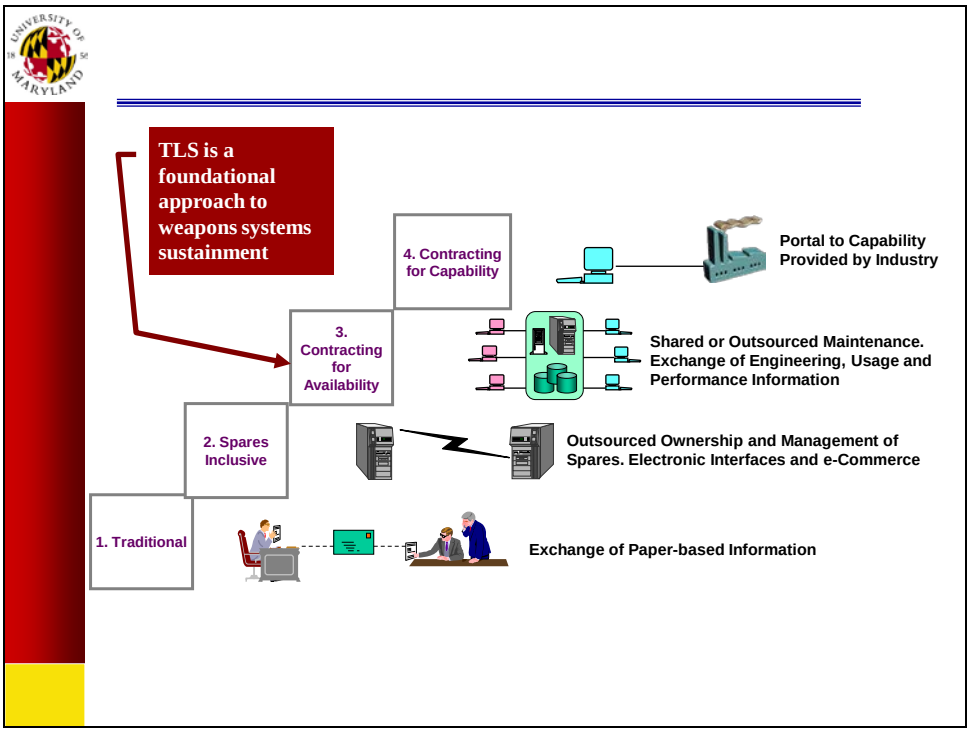
> From an Industry perspective, the need to win the initial competition ensures that profit margins on the original sale are driven down to the lowest possible level. In some cases this may even mean that the equipment is delivered at a loss, in order to preserve industrial capability. This means that there will be little incentive for Industry to invest heavily in ensuring that the initial design incorporates high standards of reliability, since to do so would not only squeeze margins further still, but would also diminish the prospects for future profits through the sale of spares and embodiment of modifications. The effect is therefore that, under traditional procurement, Industry is incentivized to maximise profits over the whole life of the equipment, at the expense of tight initial margins for delivery.[64]

Understanding how counterproductive this old model of procurement was, the MoD, in its shift to a more through-life approach, adopted a model for guiding integrated project teams (IPTs) to deliver whole-life cost savings, through incentivized contracting. This process, known as the Defence Logistic Transformation Staircase, now forms a central tenet of the Defence Logistic Transformation Programme (DLTP). The Transformation Staircase is depicted in Figure 13.

The goal of the Transformation Staircase is to move IPTs from traditional contracting through a series of steps to the ultimate goal of transferring all of the risk to industry by paying suppliers to deliver a capability. By incentivizing contractors (via long-term contracts) to achieve a high level of performance and availability, the MoD hopes to encourage the contractor to improve the reliability of the equipment through modification over time as well as through improved maintenance solutions, and thereby reduce the overall cost to operate.

[64] Bywater, "Department of Defence Management and Security Analysis," 41–42.

Figure 13. The Defence Logistic Transformation Staircase



Source: Center for Public Policy and Private Enterprise, 2011.

IV: TLS-TLCM and PBL

TLS -TLCM bears a striking resemblance to the U.S. Department of Defense's performance-based logistics (PBL) approach to contracting for weapons system sustainment. There are, however, some significant differences.

Essentially, the TLS -TLCM contracting model is farther along the evolutionary scale as compared with performance-based logistics. They incorporate greater contracting freedom or leeway, improvement derived from more than a decade of lessons learned, and other contracting advancements that potentially or actually generate greater savings, better performance and availability, and overall increased value for money.

This section of the paper, therefore, compares and contrasts TLS with U.S. DoD PBL-type contracting. It discusses the impact of the differences, in particular.

PBL: Definition and Background

In 2001, the U.S. DoD identified performance-based logistics (PBL) as its preferred support strategy for weapons systems.

The *Defense Acquisition Guidebook* defines performance-based logistics as:

> …the purchase of support as an integrated, affordable, performance package designed to optimize system readiness and meet performance goals for a weapon system through long-term support arrangements with clear lines of authority and responsibility. Application of Performance-based logistics may be at the system, subsystem, or major assembly level depending on program unique circumstances and appropriate business case analysis. [65]

PBL arrangements focus on the purchase of measurable performance outcomes (such as the availability of functioning weapon systems) through long-term support arrangements rather than the purchase of individual elements of support—such as parts, repairs, and engineering support. These performance measures ultimately tie into stated performance requirements for the warfighter. PBL is intended to increase weapon system

[65] Gansler, J. S. (2000, September-October). Gansler [The Undersecretary of Defense for Acquisiton, Logistics, and Technology] testifies before Congress on transformation of DoD logistics. *Statement before the House Armed Services Committee Readiness Subcommittee Logistics Transformation Hearing held June 27, 2000,* 68-69.

readiness through cost-effective, integrated, logistics chains and public/private partnerships.[66]

There are approximately 200 PBL applications in DoD. Spending on PBL projects has more than tripled since their inception—from $1.4 billion in 2001 to $5.0 billion in 2009, a 17.2 percent compound annual growth rate (CAGR). Deloitte Consulting estimates that DoD spending on PBL contracts projects could continue to grow at a 10.3 percent CAGR to reach $7.4 billion by 2013. (See Figure 14.) At the same time, the average PBL contract size has grown from an estimated $26.4 million in the 2000–2002 timeframe, to $59.5 million in the 2007–09 timeframe, for a 12.3 percent CAGR.[67]

The savings from the increases in PBLs are just the tip of the iceberg, according to the Heritage Foundation. Fully deployed PBL contracting "can increase the efficiency and lower the cost of the military's logistical system through well-designed partnerships between government-run depots and private contractors, offering savings estimated at up to $32 billion a year.[68]

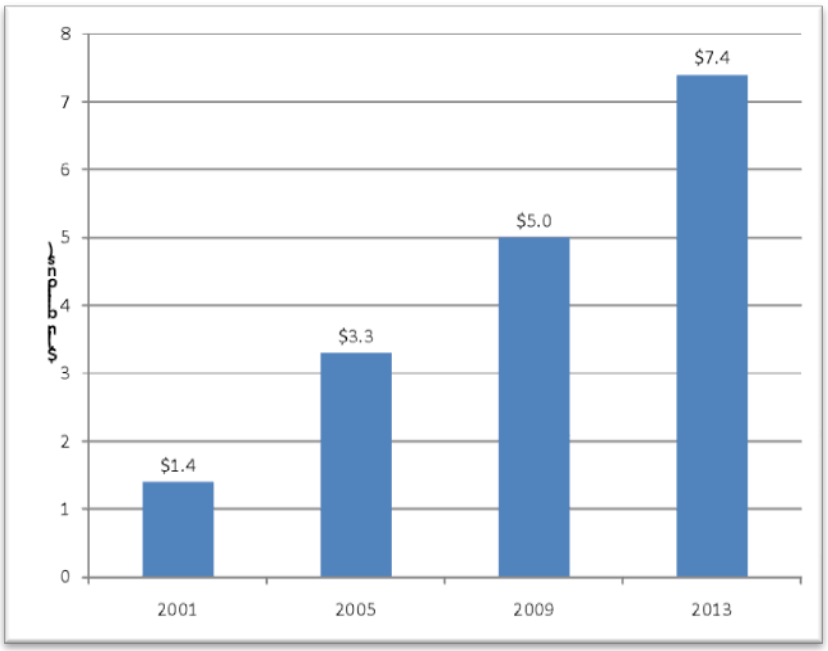
As shown in Figure 15, Deloitte estimates average PBL contract size could continue growing at a rate of 7.6 percent CAGR to reach $85.8 million by 2013.

[66] Landreth, et al., *Performance-based logistics for the FA-18/S-3/P-3/C-2 Auxiliary Power Unit at Honeywell: An Applied Analysis.*

[67] Gansler et. al, *The Current State of Performance Based Logistics and Public-Private Partnerships for Depot-Level Maintenance: Operating Models, Outcomes, and Issues*, Center for Public Policy and Private Enterprise, University of Maryland, October 2010, 6.

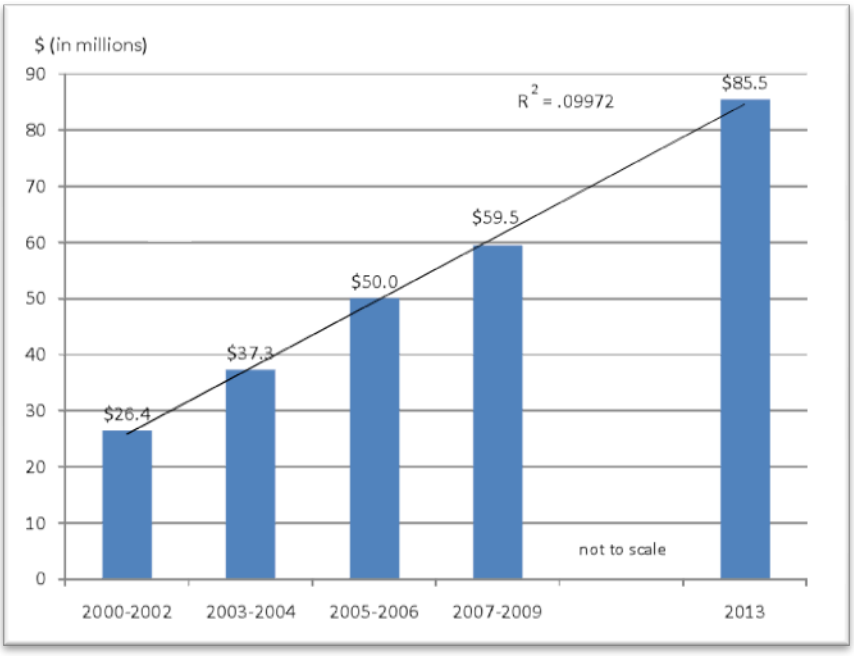
[68] Carafano, James Jay, *How the Pentagon Can Be Best Buy,* The Heritage Foundation, April 2, 2012.

Figure 14. Annual DoD spending on PBL contracts



Source: Captain et al., *Performance-Based Logistics* (Deloitte), 2010.

Figure 15. Growth in size of PBL contracts



Source: Captain et al., *Performance-Based Logistics* (Deloitte), 2010.

PBL differs from DoD's traditional approach to weapon system sustainment in that these arrangements establish a single point of direct accountability for a weapon system's life-cycle product support. This designated support integrator can be the original equipment manufacturer (OEM), a systems integration contractor, or a DoD engineering or logistics activity.

PBL was and is transformative. It is designed to aid DoD in addressing what former Undersecretary of Defense for Acquisition, Technology, and Logistics, Jacques Gansler (one of the authors) called the "death spiral" of decreasing readiness and increasing costs:

> Our equipment is aging. We cannot replace much of that equipment in the near future. Consequently, our operations and maintenance (O&M) costs will continue to escalate. This results in reduced readiness—yet at increasing costs. And, unless we reverse the trend quickly and deliberately, we face what I have described as a "death spiral"—a situation where reduced readiness requires us to keep removing more and more dollars from equipment modernization and putting it into daily O&M, thus further delaying modernization, causing the aging equipment to be over-used, further reducing readiness, and increasing O&M—a vicious circle.[69]

By shifting resources to PBL contracts, the DoD's intent is to gain significantly improved readiness at significantly reduced costs. Because contractors are compensated based on performance and may be penalized for performance shortfalls, they have a great incentive to maintain and modernize existing platforms and systems, conduct continuous product improvements, and develop low-cost solutions for addressing aging systems. After all, the fewer repairs and less downtime, the more profitable the contract is for the commercial PBL provider.

Figure 16 outlines the total cost benefits achieved in four PBL programs.

[69] Gansler, Testimony before Congress, *Op. Cit.*, 68-69.

Figure 16. Examples of PBL cost benefits

Program	System Description	PBL Owner	Total Cost Benefit (in millions)[70]
C-17	Transport aircraft	Air Force	$477
F/A-18	Fighter/attack aircraft	Navy	$688
AH-64	Attack helicopter	Army	$100
TOW-ITAS	Integrated mobile missile and targeting system	Army	$350
Sentinel AN/MPQ-64	Mobile Air Defense	Army	$302

Source: Fowler, Randy T., Misunderstood Heroes: Batman and Performance-Based Logistics," *Defense AT&L*, January–February 2009.

Figure 17 summarizes some of the performance benefits in availability improvement and cycle-time reduction accrued by five PBL program applications. Performance benefits tend to be characterized in two primary dimensions—readiness or availability improvements, and cycle-time reductions measured by logistics response time and repair turnaround times.[71]

Figure 17. Examples of PBL performance benefits

Program	System Description	PBL Owner	Availability Improvement (1)	Cycle Time Reduction (2)
F/A-18	Fighter/attack aircraft	Navy	23%	-74%
Tires	Aircraft tires	Navy	17%	-92%
F-22	Fighter	Air Force	15%	-20%
UH-60 Avionics	Utility helicopter	Army	14%	-85%
F404 Engine	Jet engine for the F/A-18 aircraft	Navy	46%	-25%

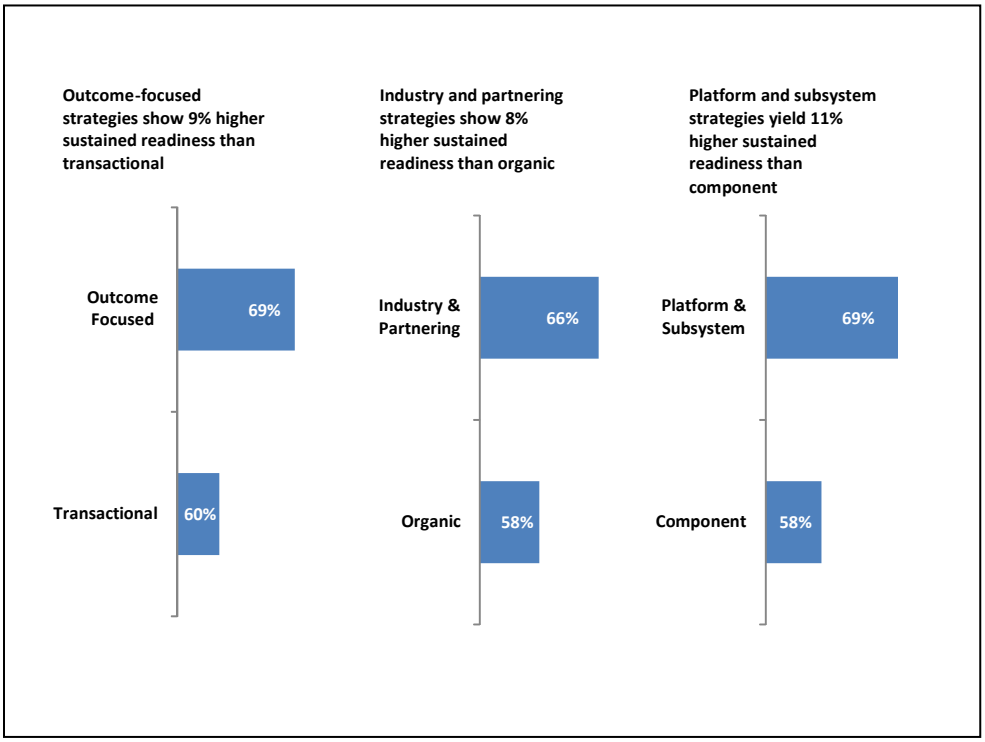
(1.) Ready for tasking, operational readiness, mission capable, etc.
(2.) Logistics response time or repair turnaround time

Source: Fowler, Randy T., "Misunderstood Heroes: Batman and Performance-Based Logistics," *Defense AT&L*, January–February 2009.

[70] The report did not identify the time period for the cost-benefit calculations.
[71] Fowler, *Misunderstood Heroes: Batman and Performance-Based Logistics*.

Figures 18 and 19 illustrate findings about the nature of DoD contracts and their impact on performance. Performance improves significantly in outcome vs. transactional relationships, and a partnership approach between industry and the DoD customer is adopted.

Figure 18. Subsystem and platform-level industry partnerships designed to achieve target outcomes yield higher sustained readiness improvement

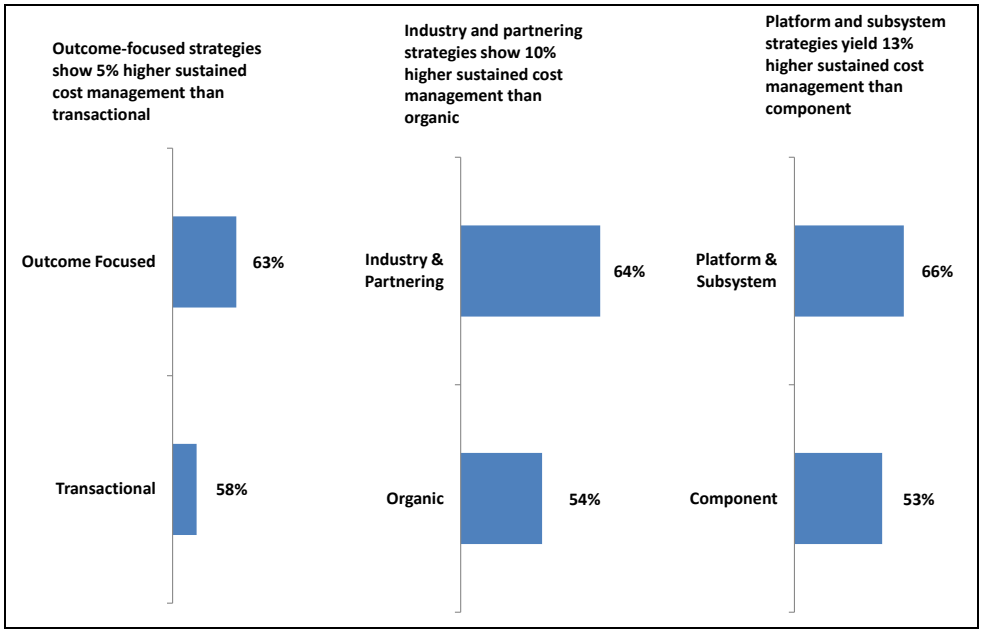


Notes:

1. Sustained Readiness Improvement is the number of years over the span of 1999 through 2007 where a weapon system saw no decline in availability or saw a decline of lesser magnitude than the domain average.
2. F-22, FMTV, MTVR, and Stryker data does not span from 1999 through 2007 due to their newness.
3. USAF C-130 APU contract awarded to Honeywell in August 2007—not enough time had occurred yet to include it as a partnership for this evaluation.

Source: U.S. Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, November 2009, 88.

Figure 19. Subsystem and platform-level industry partnerships designed to achieve target outcomes and manage cost best



Note: Sustained Cost Management is the number of years over the span of 1999 through 2007 where a weapon system saw no increase in cost per unit usage or saw an increase of lesser magnitude than the domain average.

Source: Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, November 2009, 88.

Comparison of PBL and TLS-TLCM

TLS-TLCM are very similar in almost all aspects, as we describe below. There is one key difference, however, and that is the length of the contract.

Key similarities:

- Contractor is not paid for inputs, e.g., level of activity performed (hours spent on maintenance) or number of parts procured.
- Contractor is paid based on the level of system availability.
- Contractor is contractually incentivized to improve productivity and reduce costs, thereby improving contractor margin while upgrading platform performance.
- Both adopt partnership approach between Decider (MoD or DoD) and Provider (contractor).

- Both save money, improve system performance, improve platform availability, improve capability, achieve better value for money.

Key difference: Length of contracts

From a regulatory perspective, the U.K. MoD has far greater flexibility to adopt longer term contracts than does the U.S. DoD (regulatory constraints). This fact is one of the key enablers of success for TLS-TLCM contracts.

Key examples of MoD long-term availability contracts include the following:[72]

- The Ministry of Defence has a 10-year contract with AgustaWestland to support the Sea King helicopter until it is projected to be removed from service. The Ministry of Defence has priced the contract for the first five years, and thereafter it establishes the price in five-year increments.
- The Ministry of Defence has a 23-year contract with VT Group to support two survey ships owned by the ministry. The contract has price renegotiation points at the 7-, 15-, and 20-year points.
- The Ministry of Defence has a 19-year contract with BAE to support the fleet of Tornado aircraft. The ministry awarded the contract in December 2006 and priced it for the first 10 years.
- The Ministry of Defence has a 25-year contract with AgustaWestland to support the Merlin helicopter until it is projected to be removed from service. The price for the initial five-year period of the contract is fixed, and the ministry is currently negotiating prices for the next five-year period of performance that begins in 2011.

Long-term contracts provide benefits to both the MoD and industry. They provide the business framework in which MoD can transfer risk (meaning investment in support infrastructure, investment in platform updates/upgrades, inventory carrying costs and responsibility, etc.) in return for a guarantee of a long-term commitment from the MoD.

This long-term nature of TLS-TLCM contracts is critical to the success of the acquisition model; indeed, it would not achieve the desired results without it.

[72] U.S. General Accounting Office, *Defense Logistics: Improved Analysis and Cost Data Needed to Evaluate the Cost-effectiveness of Performance Based Logistics*, 2009, 50.

Observed one U.S. defense industry executive about the U.K. approach:

> If you want to motivate private industry, a long-term contract is the best path. If you have a 25-year contract that is legally binding, with five-year pricing periods, gain sharing, and continuous improvement built in, industry will invest for the long term. MoD can terminate for convenience, but would be liable for our costs if they terminate. With the 25-year period, even though there are five-year pricing periods, we will invest for the next pricing. MoD can come in and audit us to validate the costs incurred and what we put forward into our pricing.
>
> Industry needs to be able to count on a long-enough contract term so that we can achieve a return on investment. Unfortunately, I don't think we'll ever see a 25-year contract in the U.S.

U.S. Federal Acquisition Regulations (FAR) do not permit contracts of 25 years in length, as the executive indicated. Appendix B discusses the U.S. FAR and its five-year extension rules. The discussion provides a more detailed picture of FAR contracting restrictions and provisions as to term.

Part V: TLS Case Studies

This section of the report presents two case studies (on three aircraft) on applied examples of TLS with regard to two major weapon systems platforms: the Tornado and Harrier fast jets and the Merlin helicopter. The cases describe the programs and summarize the results and benefits.

Case #1: Tornado and Harrier Fast Jets

The Harrier and Tornado fast jets were among the first major platforms to migrate to a TLS approach to weapons system sustainment. This case study looks at how TLS has been applied to Tornado and Harrier fast jets and assesses the results. It describes the positive performance results of TLS, which have reduced the cost of support and decreased manpower and maintenance times while maintaining operational availability. The success of TLS has hinged on the redefined relationship between the Ministry of Defence and industry, with both sides taking responsibility for and having a stake in maintaining the aircraft.

Under the Tornado and Harrier programs, industry is paid for a given level of availability. The arrangement includes incentives to reduce support chain costs and make the weapon system more reliable and support-maintenance processes more efficient. The cost-reduction goal was a key driver in the transformation of the maintenance, repair, and overhaul activity for the two jet aircraft.

According to a U.S. General Accounting Office (GAO) report that reviewed the Tornado TLS solution, “A member of the Tornado Integrated Project Team stated that a number of factors drove the support strategy change for the Tornado aircraft, but the

primary factor was the need to reduce costs to match budget reductions; the team identified availability contracting as an effective way to reduce costs and maintain performance. Officials also stated that the support strategies for all of the ministry's helicopters were changed because of increased budget pressures."[73]

Traditionally, the U.K. Ministry of Defence and industry carried out four levels of repair and overhaul on fast jets:

1. Minor repairs performed by Operational Squadrons on base
2. Major repairs performed by Operational Squadrons on base
3. Major repair performed by the Defence Aviation Repair Agency (now the Defence Support Group)
4. Major repair (as per no. 3, but for crashed/damaged aircraft) and upgrades performed by industry.[74]

Repair and overhaul took place at multiple RAF locations dispersed throughout the U.K. While, industry was involved only during the fourth line of repair when an aircraft was typically upgraded.[75] Such upgrades occurred at the original equipment manufacturer's site.

The Ministry of Defence operated a multiple-base system, which originally was designed to ensure that dependable capability endured in the event of an attack on one or more of the bases. Once the Cold War ended, the Ministry no longer felt the threat of an imminent attack and therefore no longer required dispersed locations for repair. The Department was also facing a decrease in financial resources, and it began to consider streamlining its available repair facilities for fast jets. The End-to-End Review of logistics recommended, in July 2003, that repair equipment and facilities for each aircraft fleet should be centered at one location, "as far as is practicable."[76]

[73] U.S. General Accounting Office, *Defense Logistics: Improved Analysis and Cost Data Needed to Evaluate the Cost-effectiveness of Performance Based Logistics,* 2009, 48, http://www.gao.gov/new.items/d0941.pdf.
[74] National Audit Office, *Transforming logistics support for fast jets,* (London: House of Commons, July 2007), 54.
[75] Ibid.4
[76] Ibid., 12.

The Solution

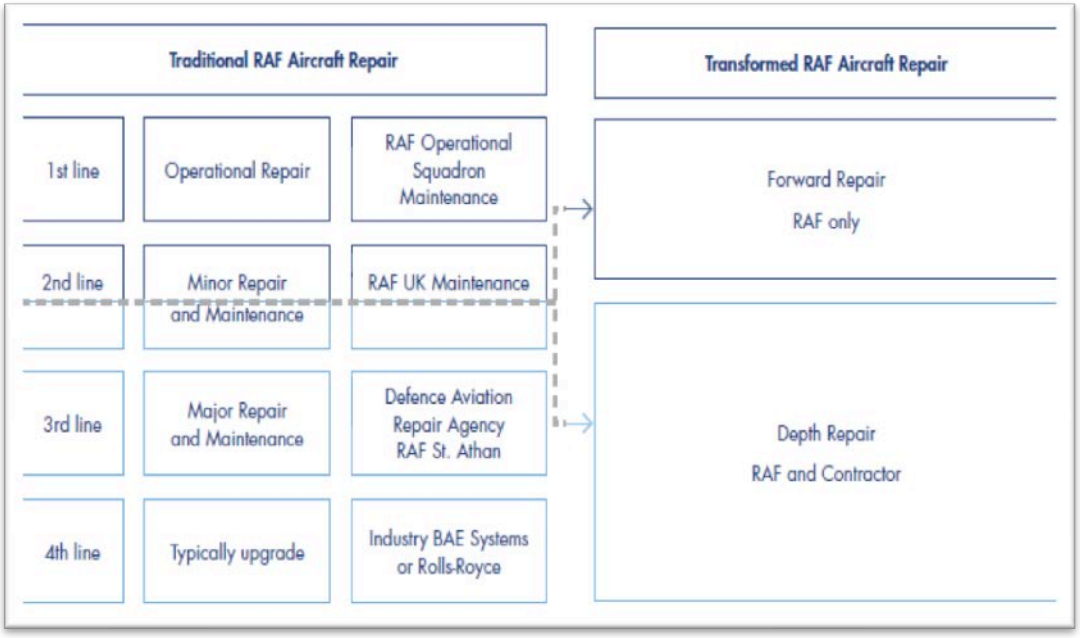
The Department and industry updated its repair into two organizational structures: forward repair and depth repair.

Forward repair pertains to "logistical elements" that deliver immediate support to the operating environment.[77] Forward repair consists of primary maintenance. From the old system, forward repair replaces minor and half of major repairs performed by Operational Squadrons on base. Forward repair takes place on base and is managed solely by RAF Strike Command. The forward elements are deployable on operations.[78]

Depth repair pertains to "platform support elements." Depth repair consists of most maintenance and overhaul procedures, including on-aircraft minor, major, and modification work.[79] Depth elements are mainly non-deployable to operations but there are "deployable-depth" units if necessary.[80] From the old system, depth repair replaces half of minor repairs performed by Operational Squadrons on base as well as major repairs that used to be solely performed by the MoD (for crashed/damaged aircraft) and upgrades traditionally performed by industry. Depth repair was managed by the Defence Logistics Organisation (now DE&S) along with its industry partners, but "manpower and infrastructure are provided by RAF Strike Command."[81] Industry partners bring "improved access to design authority as well as their experience of supply chain and asset management to bear on the process."[82]

[77] Ibid., 54.
[78] Ibid.
[79] Ibid., 12.
[80] Ibid., 54.
[81] Ibid., 54.
[82] Ibid., 12.

Figure 20. Comparison of traditional and transformed RAF aircraft repair processes



Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 5.

Figure 20 depicts the transformation from the traditional repair system to the transformed Aircraft Repair System. RAF is solely responsible for forward repair or primary maintenance while RAF and its industry partners are both responsible for depth repair or minor, major, and modification work. Note: the diagram reflects agency names at the time of the transformation. Some names have since changed.

Forward repair would take place at each operational squadron, and depth repair was reduced to "a single depth hub at which aircraft are maintained, repaired, and overhauled."[83] The new depth hubs were located at RAF Marham for Tornado aircraft and RAF Cottesmore for Harrier aircraft.[84] The MoD-Industry partnership capitalizes on the combined expertise, facilities and equipment, processes, and innovation of both parties working together.

[83] Ibid., 4.
[84] Ibid., 4.

From March 2004 the Department collocated all deep repair and upgrade maintenance for Harrier at the main operating base of RAF Cottesmore. Subsequently, from September 2004, RAF Marham became the main location for the deep repair.[85]

To streamline and coordinate the process for managing its aircraft fleets across the squadrons and depth repair hubs, the MoD established new Integrated Logistics Operations Centres in 2005–06. Defence Logistics Organisation (now DE&S) and RAF Strike Command personnel staff these jointly. They jointly manage the prioritization of spares and the order in which aircraft enter the depth hub based on flying hours, and they undertake an analysis to plan the work to be performed and the spares required.[86]

In 2006, the MoD awarded BAE Systems the ATTAC program—Availability Transformation Tornado Aircraft Contract. The initial contract was valued at £940 million for 10 years of flight availability on a fleet of 220 aircraft. As of 2009, the BAE-led team had delivered £510 million in savings and cut by half the cost per hour of flight. Additional options on the contract extend the value to 2025.

Under the ATTAC service, BAE Systems works in partnership with the MoD's Defence Logistics Organisation (now DE&S) and the RAF to provide availability as set out in the U.K. Defence Industrial Strategy.

BAE Systems is responsible for "depth" support at RAF Marham and combines this with the Capability Development and Sustainment Service (CDSS). CDSS is an approach to adding new features to the aircraft to maintain the aircraft's military effectiveness throughout its service life.[87]

The ATTAC contract brings 300 suppliers under one contract, replacing 300 direct relationships with MoD. The integrated team shares financial and risk information and, through a unique incentive program, encourages risk reduction to assure focus on opportunity management instead. All personnel work within this risk-incentive system.

All program functions coexist with the military customer at the fast jet facility at Marham. Adding to the complexity is the fact that about 600 government workers are supervised by the BAE Systems team. Described as "customer supplied dependency," the

[85] Ibid., 12.
[86] Ibid., 13.
[87] The Engineer, "ATTAC Contract for BAE Systems," December 22, 2006, http://www.theengineer.co.U.K./news/attac-contract-for-bae-systems/297588.article (accessed April 23, 2012).

military also provides facilities and support infrastructure along with more than 150 other services.[88]

The metrics for contract performance include a bank of flying hours available, LRU and spares availability, the level of non-availability impact on sortie performance and responsiveness to technical queries. The military also is measured on its ability to deliver on "customer supplied dependencies."

Fast jets must undergo regularly scheduled maintenance after accruing a certain number of flying hours. Maintenance is divided into three levels: primary, minor, and major. While "primary" maintenance is covered under forward repair strictly by RAF when needed, minor and major repairs are carried out for Tornado and Harrier every 825 hours and 720 hours, respectively, at the depth repair hubs.[89]

Under the old system, the MoD paid industry on a per-cost basis for repairs and technical support. Under the new availability contracts system, the department pays industry for aircraft and machinery to be readily available to the military.[90] Because industry is paid for availability rather than for parts and costs, industry is incentivized to "reduce support chain costs and make the aircraft more reliable"[91] while improving efficiency. The more reliable the aircraft, the less it consumes in terms of maintenance/repair costs; that is, labor and parts/supplies. Industry, as a result, realized a better profit margin.

Introduction of Pulse Lines

The Ministry introduced "pulse" lines as a new way of operating depth repair hubs. "Pulse lines" transformed the way aircraft were repaired because the aircraft were "pulsed" from one area within the hanger to another instead of having mobile maintenance workers move from one aircraft station to another.[92]

[88] Carole Rickard Hedden, *Overhaul & Maintenance,* August 1, 2009, 39.
[89] U.K. National Audit Office, *Transforming logistics support for fast jets*, 13.
[90] Ibid., 13.
[91] Ibid., 13.
[92] Ibid., 6.

To further reduce costs and improve efficiency, the Ministry incorporated lean techniques into the design of pulse lines.[93] Lean techniques were originally implemented in the early 1990s by Toyota Motor Manufacturer's production system. Since then, lean techniques have become commonplace across private and public sector manufacturing and maintenance operations.

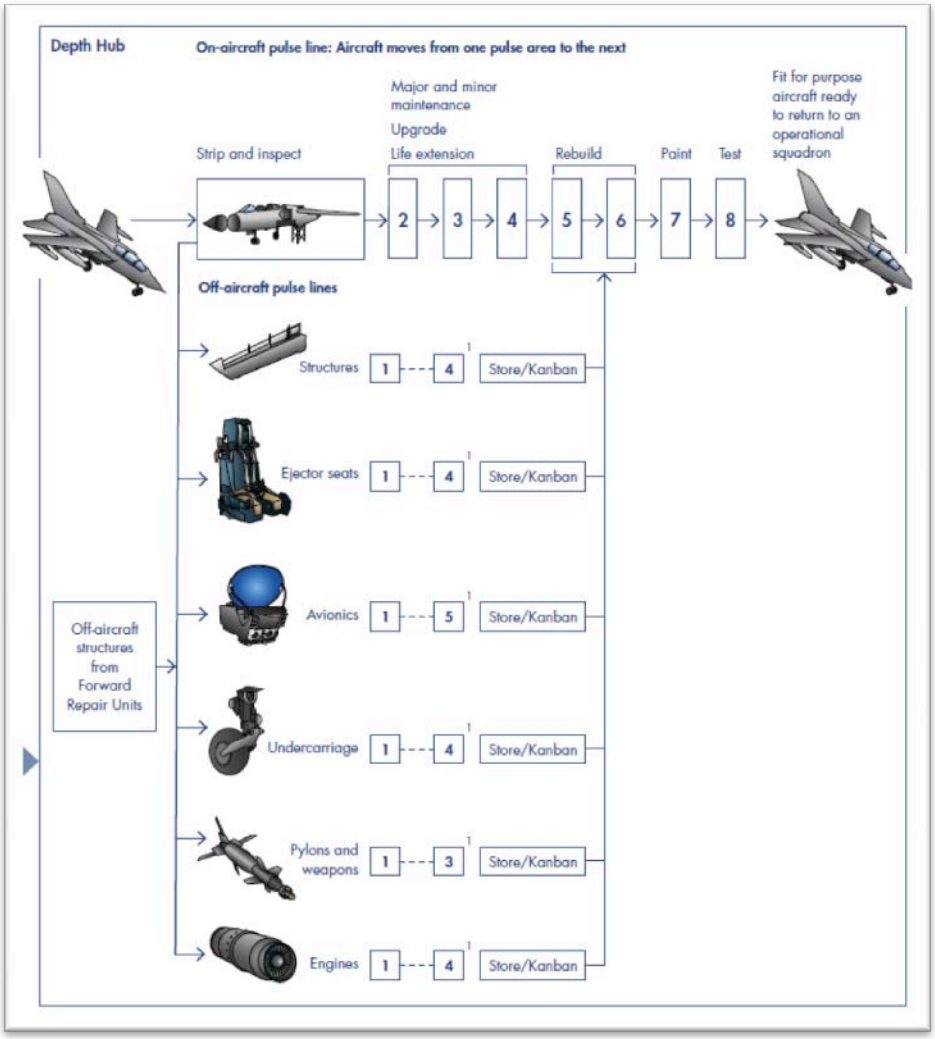
"Techniques such as Value Stream Analysis and Rapid Improvement Events are used to identify and eliminate any activity or process that does not add value to the end user or customer, enabling the remaining activity to flow in the most efficient sequence possible."[94] Value Stream Analysis is an analytic technique used by the RAF to describe the process as it existed and identify parts of the process that did not add value in order to design an improved system.[95] Rapid Improvements Events helped verify the improved system and tested it out before the eventual incorporation of lean techniques into the pulse line production system.[96]

At the depth repair hubs, aircraft progress along "pulse" lines similar to assembly lines in an automotive manufacturing plant. Traditionally, aircraft were stationary and workers brought parts to the aircraft to perform maintenance. This method meant that workers spent a lot of their time traveling in the facility in order to bring parts to the stationary aircraft, negatively affecting their overall labor productivity and slowing down the aircraft maintenance process.

Under the pulse system, repair is divided into "sequential packages of equal duration (the length of which depends on both the aircraft and maintenance type)."[97] The jet moves between the different repair stations or "pulses." Each station is assigned a standardized specific task or set of tasks, which it performs on each aircraft moving through the pulse line. At the same time, the pulse stations become expert in their particular process and thus perform the process with greater consistency of quality and higher labor productivity. Figure 21 depicts how aircraft progress along pulse lines upon entering the depth repair organization.

[93] Ibid., 6.
[94] Ibid.
[95] Ibid., 43.
[96] Ibid.
[97] Ibid., 13.

Figure 21. Pulse lines at a depth hub



Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 9.

The productivity of the repair process is improved due to the pulses because the pulses "are designed to remove inefficiencies; for example by reducing tradesmen's waiting times by improving the scheduling of individual repair activities, and locating spares where they are needed rather than distributing them around the maintenance facility."[98] The pulse line and the use of a visual management system increase the consistency of the maintenance process. This system enables efficient management and

[98] Ibid., 14.

forecasting of personnel, equipment, and spares requirements within each pulse, leading to reduced maintenance times and greater visibility of remaining spares inventories."[99]

Results of the Program

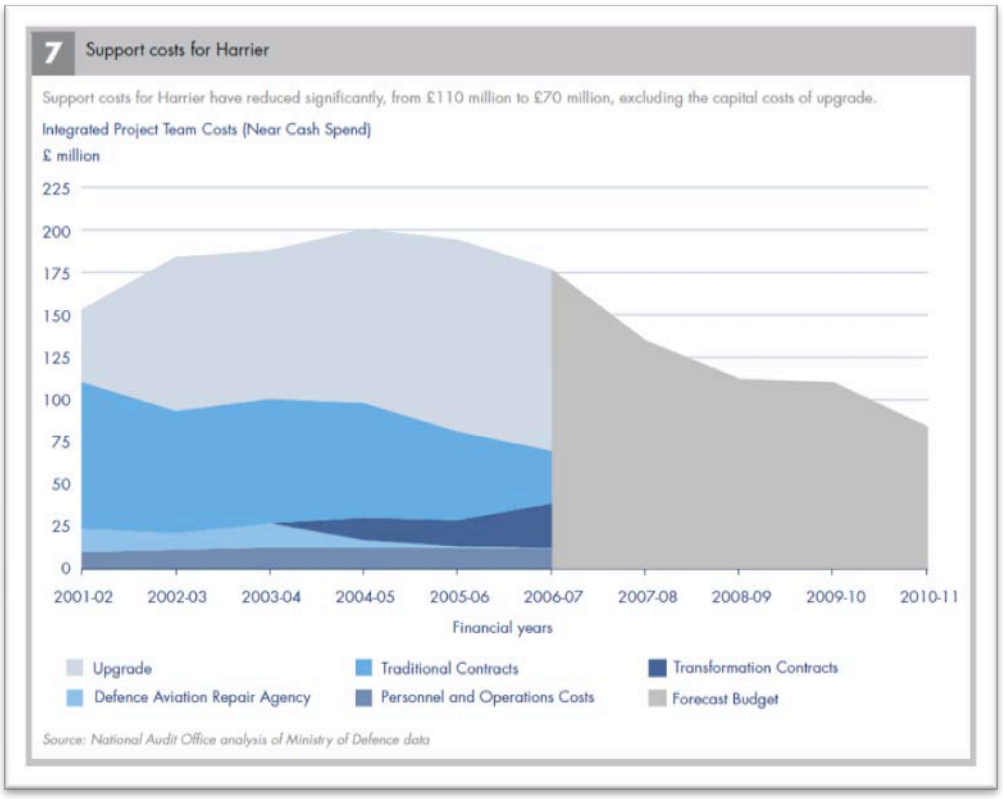
The Tornado and Harrier TLS programs have been in place for more than a decade at this writing, and have evolved through several phases of development and implementation. The TLS program has generated notable improvements in cost reduction, service availability, aircraft performance. Overall, the incorporation of lean techniques has allowed the Department to significantly extend the number of flying hours for Tornado and Harrier aircraft between scheduled maintenance while at the same time reducing costs and improving in-service aircraft performance.[100]

Support Cost Savings

The Integrated Project Teams' costs have decreased significantly. As shown in Figure 22, the Harrier Integrated Project Team's costs have reduced from £110 million in 2001–02 to £70 million in 2006–07, excluding the capital cost of the upgrade program. The cumulative savings over the period amount to £109 million.

[99] Ibid., 6.
[100] Ibid., 6.

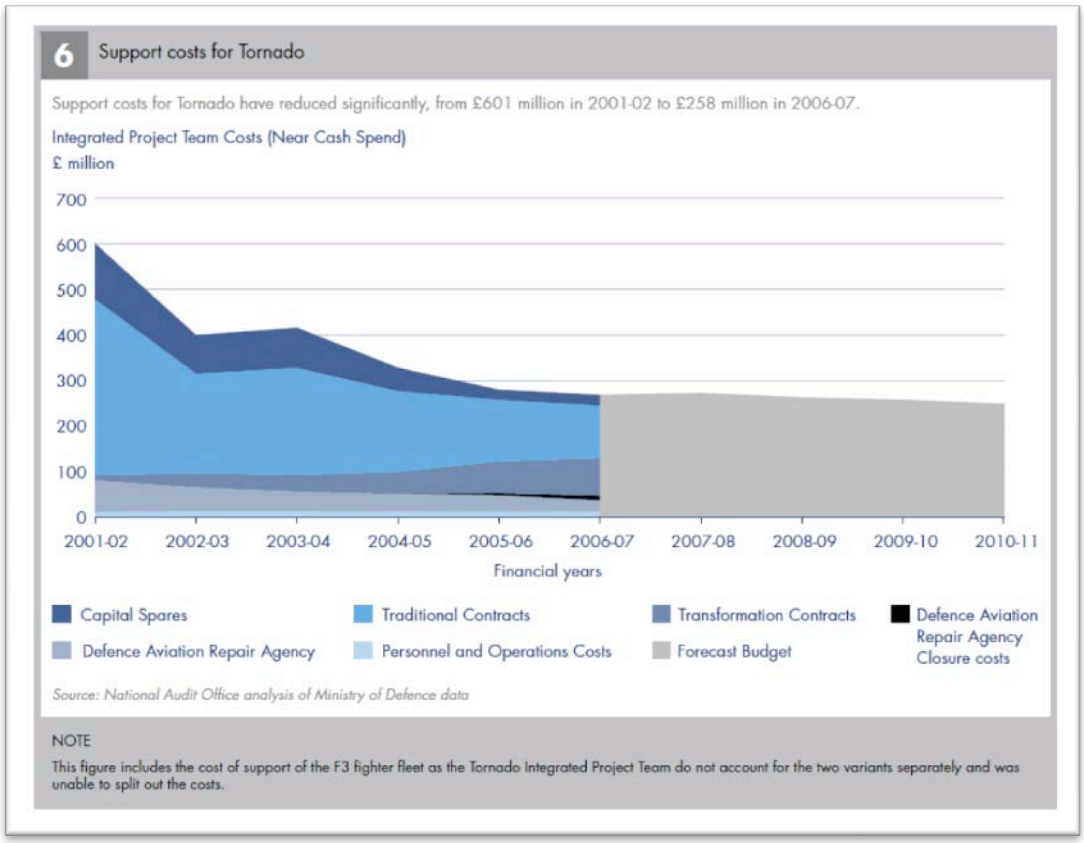
Figure 22. Support costs for Harrier



Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 17.

The Tornado Integrated Project Team's costs have reduced from £601 million in 2001–02 to £258 million in 2006–07. The cumulative savings over the period amount to £1.3 billion. The Department of Defence projects that the annual cost will fall further, to £250 million by 2010–11. Figure 23 details the reduction in support costs for the Tornado Integrated Project Team.

Figure 23. Support costs for Tornado



Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 16.

"The majority of the cost reductions have been achieved through working with industry to reform traditional contracts, as the Department prepared for and introduced the Harrier Joint Upgrade and Maintenance Programme in November 2004, and the Tornado Combined Maintenance and Upgrade pulse line for the Tornado GR4 in December 2005. Over the same period, the Department has maintained a broadly similar level of flying hours and the cost per flying hour has reduced for both aircraft fleets."[101]

Associated Costs

Switching to through-life support has resulted in monetary savings, although the transition did not come without associated costs. The MoD incurred the cost of

[101] Ibid., 15.

rationalizing its base network (through base closures) and certain other transition-related costs.

Additionally, the switch to one main base for each aircraft has meant the closure of other support locations. The closure of the Defence Aviation Repair Agency site in St. Athan cost the Department an estimated £140 million.[102] The MoD also incurred expenses when creating the new depth repair hubs, which amounted to approximately £18 million.

Although there were additional costs, the cumulative budget savings as a result of the transformation to logistics support in fast jets—£1.4 billion over the period 2001–02 to 2006–07—more than offset these expenses.[103]

Reduced Manpower

Since March 2001, the Harrier Integrated Project Team reduced manpower by 21 percent. Since August 2005, the Tornado Integrated Project Team reduced manpower by 8 percent. As a result, the MoD was able to cut its maintenance and upgrade manpower requirements at each base.[104]

The number of service personnel employed in Harrier repair was reduced from 1,078 to 984 (8.7 percent) between 2004–05 and 2006–07, and the number employed in Tornado repair was reduced from 5,282 to 5,012 (5.1 per cent), with further reductions planned. These reductions would equate to an additional saving of £12 million.[105]

With every major change program, there is a risk that the output of the process undergoing change will initially drop as the change occurs. The RAF, however, did not have the luxury of allowing the maintenance of its aircraft to fall below certain performance targets. Through the implementation of the transformation, the RAF broadly maintained the operational availability of both Harrier and Tornado, while at the same time reducing maintenance times.

The Chief of Defence Logistics and Commander in Chief RAF Strike Command decide the number of available aircraft by type and quantity of flying hours required to

[102] Ibid., 16.
[103] Ibid.
[104] Ibid.
[105] Ibid.

meet the training and operational task as set out in Defence Planning Assumptions.[106] Throughout the transformation to depth repair, performance has been relatively maintained, with only a few exceptions.

Harrier aircraft operational availability had been below target since before the transformation in 2001.[107] With the start of the Harrier upgrade program at BAE Systems' site at Wharton, there was a further decrease in the operational availability of Harrier jets.[108] However, as the upgrades were transferred to the new depth repair hub at RAF Cottesmore in 2003, the availability increased.[109] The decrease in availability of Harrier aircraft can be attributed to the increase in repair for operations in Afghanistan, between September 2005 and April 2006. During 2006, the number of aircraft in depth repair and upgrade has been decreasing, meaning that more aircraft have been released for service.[110] The target was revised, and in the latter half of 2006 aircraft availability approached 100 percent, mainly due to the reduced number of aircraft in depth repair.[111]

Tornado GR4 aircraft also experienced a decline in operational availability during the transition to TLS. However, this decline predated the implementation of pulse lines that took place at RAF Marham in December 2005.[112] Once pulse lines were introduced, Tornado aircraft met the set availability target 93 percent of the time between December 2005 and December 2006. Tornado GR4 aircraft have shown a steady improvement in operational availability since September 2006, with the required operational availability being met from the end of December 2006. [113]

Flying Hours

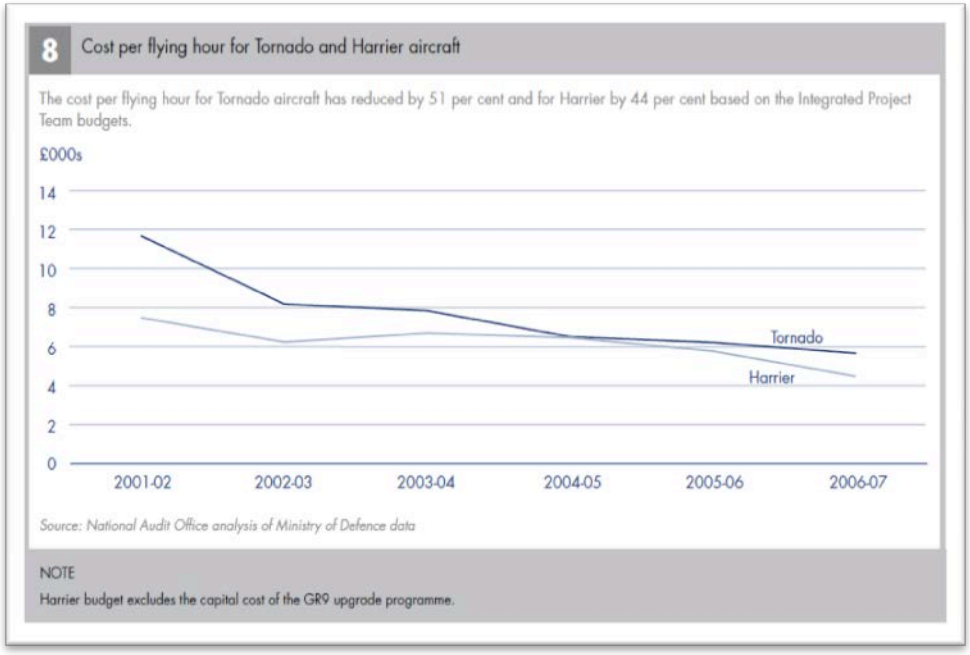
The MoD achieved 90 percent of flying hours for the Harrier fleet before the pulse line began at RAF Cottesmore in October 2002 and 91 percent afterwards.[114] Tornado GR4 aircraft achieved 93 percent of flying hours before the pulse line began at

[106] Ibid., 16.
[107] Ibid., 6.
[108] Ibid., 18.
[109] Ibid., 18.
[110] Ibid., 18
[111] Ibid., 6
[112] Ibid., 20
[113] Ibid., 20
[114] Ibid., 19

RAF Marham and 108 percent for the period December 2005 to March 2006, with achievement above the target due to operational requirements.

In contracting for availability, the Department set banded targets whereby output needs to fall within a range of flying hours.[115] During this period, the MoD has maintained a broadly similar level of flying hours and the cost per flying hour has been reduced for both aircraft fleets. (See Figure 24.)

Figure 24. Cost per flying hour for Harrier and Tornado



Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 17.

Repair Time

Because of the improved aircraft availability delivered by the pulse line, for the first time a buffer stock of two Harrier aircraft were held by the depth repair hub, which could be made fit for the front line squadrons within 72 hours. Prior to implementation of TLS, there were no Harriers available for this purpose.[116]

[115] Ibid., 20
[116] Ibid., 19

Additionally, a Harrier aircraft could be repaired in 91 days, as opposed to the 136 days it previously took the Defence Aviation Repair Agency.[117]

The single pulse line at RAF Cottesmore, which started in November 2004, showed a 43 percent decrease in the time required to upgrade the Harrier GR7 aircraft to GR9 standard over the time achieved at BAE Systems' Warton site. The upgrade program overachieved by two its initial aim of delivering 24 upgraded aircraft by the target in-service date of September 2006.[118] The Department of Defence has also met a significant surge requirement for repair associated with operations in Afghanistan.[119]

The usage of pulse and lean techniques has also enabled the MoD to reduce the time it takes to overhaul Harrier Pegasus engines from 227 days to 114 days, a reduction of 59 percent.[120]

From 2000 to 2003, operational availability of the Tornado GR46 averaged 100 percent of target. The start of the decline in performance pre-dates the establishment of the pulse line in December 2005 at RAF Marham, when availability averaged 93 percent. Since September 2006, the availability trend has been rising, and the target was met from the end of December.[121]

Tornado ATTAC Program Summary

Program summary

- BAE Systems was awarded a £1.3 billion contract by the U.K. MoD in December 2006, providing on- and off-aircraft depth maintenance and capability insertion to meet future requirements of the Tornado GR4 fleet.
- The contract, known as ATTAC (Availability Transformation: Tornado Aircraft Contract), includes on-aircraft maintenance of the GR4 fleet, spares support, technical support, and training.
- The approach builds on availability improvements and cost reductions achieved through earlier pilot programs.
- The first pilot, signed in 2001 and worth £45 million, extended support of GR4 Avionics items.
- A £76 million, 10-year support service for the Secondary Power System (SPS) was signed in 2004.
- The Combined Maintenance and Upgrade (CMU) contract signed in 2005 is worth £130 million.
- In December 2006, BAE Systems was awarded the ATTAC contract, worth £942 million.
- The ATTAC contract helped deliver savings of £1.3 billion to the U.K. taxpayer 2001–02 to 2006–07 (Source: National Audit Office report 2007).
- A contract amendment known as ATTAC Phase 2 was signed in December 2007. It incorporated additional avionics, general systems, and engineering support services into the previous contract, bringing the total value of the ATTAC program to £1.3 billion.

[117] Ibid., 19
[118] Ibid., 19
[119] Ibid., 6
[120] Ibid., 19
[121] Ibid., 7

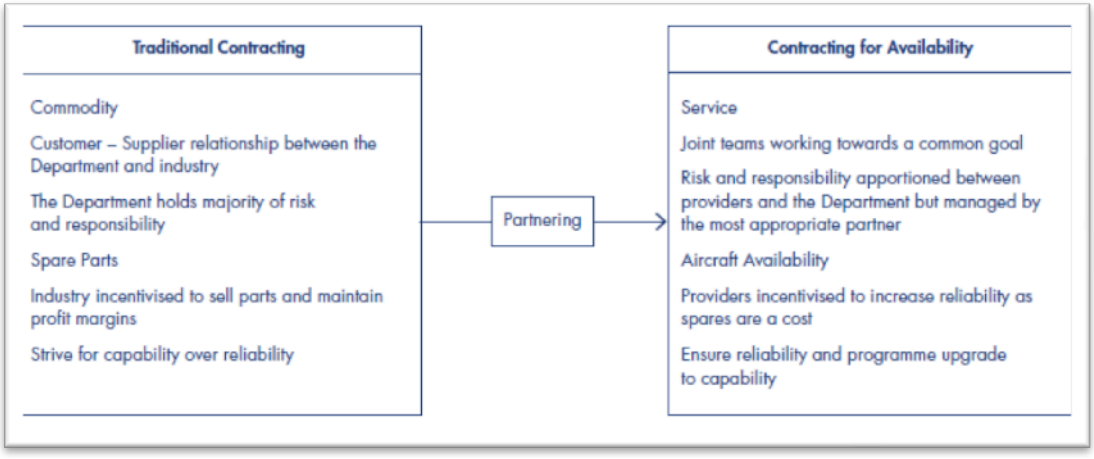
The Tornado GR4 pulse line is less mature.[122] "Since December 2005, when the Combined Maintenance and Upgrade Programme established a pulse line at RAF Marham, the elapsed time for Tornado GR4 aircraft undergoing scheduled minor maintenance has decreased by 37 per cent from that achieved previously at the Defence Aviation Repair Agency."[123]

Results Summary for both Tornado and Harrier

Logistics transformation and the implementation of the new repair process for the Tornado and Harrier aircraft produced positive results in terms of cost and performance. Cumulative savings for the first six years of the contract were £1.4 billion. The cost of support decreased significantly, and manpower and maintenance times were reduced while operational availability was maintained. The savings were achieved as a result of all of the modifications discussed above.

Recent contracts set by the Ministry with BAE Systems and Rolls-Royce have incentivized both parties to deliver improved performance, while reducing costs.

Figure 25. Comparison of key features of traditional contracting with contracting for availability



[122] Ibid., 7
[123] Ibid., 21

Source: U.K. National Audit Office, *Transforming logistics support for fast jets*, July 2007, 27.

As summarized in Figure 25, partnering with industry has transformed the way Harrier and Tornado aircraft are maintained. Implementation of the new repair process has produced positive results in terms of cost and performance:

- Reduced Tornado Integrated Project Team's costs from £601 million in 2001–02 to £258 million in 2006-07—a 57 percent reduction.
- The cumulative savings over the period amount to £1.3 billion.
- The Department anticipated additional annual cost reductions to £250 million by 2010–11.
- The Harrier Integrated Project Team's costs dropped from £110 million in 2001–02 to £70 million in 2006–07—a 36 percent reduction.
- Cumulative savings over the period of £109 million.
- Cost per flying hour has been reduced for both aircraft fleets: by 51 percent for Tornado and 44 percent for Harrier. The MoD introduced a pulse line for the Harrier aircraft in October 2002, and over the next two years the number of days required to achieve successful minor maintenance was, on average, down from 115 to 93 days (a 19 percent decrease).
- When a pulse line was established for Tornado GR4 aircraft in December 2005, the elapsed time for scheduled minor maintenance decreased by 37 percent.
- Through the implementation of the transformation, the RAF broadly maintained the operational availability of both Harrier and Tornado, while at the same time reducing maintenance times.
- Availability contracts have also allowed the MoD to reduce the manpower required to support depth repair.
- Manpower reductions of 8 percent for Tornado have been achieved since August 2005, and reductions of 21 percent have been reached for Harrier since March 2001.
- The number of service personnel employed in Harrier repair was reduced from 1,078 to 984 (down 8.7 percent) between 2004–05 and 2006–07, and the number

employed in Tornado repair was reduced from 5,282 to 5,012 (down 5.1 percent) with further reductions planned.

- These reductions would equate to an additional savings of £12 million.

HARRIER Retirement

In 2010 Britain announced that it would retire the Joint Force Harrier Jet from service. The Harrier, which served the Royal Air Force and Royal Navy, will be replaced by the Joint Strike Fighter by the decade's end. Decommissioning the Harrier is estimated to save £450m over the next four years and £900m in total. In 2011, the MoD sold 72 of the retired Harrier jets to the United State for approximately $180 million. The U.S. is set to use the Harriet jets as a source of spare parts for the U.S. Harrier fleet.[124]

Case #2: Rotary Wing TLS—Merlin Helicopter

Traditionally, rotary-wing (RW) integrated project teams (IPTs) managed a number of contracts with suppliers to provide various elements of support for helicopters. These arrangements followed the traditional methodology of contracting for parts and services (inputs).

As Figure 26 shows, helicopter serviceability targets were not being reliably achieved, with the majority falling below base service requirements. A report by the National Audit Office in 2002 outlined the performance problem:

> The Customer Supplier Agreements detail the number of flying hours to be achieved during the year. For most of the helicopters operated by the Joint Helicopter Command, these targets have not been met. The flying hours targets for Strike Command Sea Kings have also not been met; in 2000 86 per cent of planned flying hours were achieved, falling to 79 per cent in 2001. Commodore Naval Aviation achieved 76 per cent of planned flying hours in 2000-01 and 89 per cent to January 2002 in 2001-02. The low level of flying hours in 2000-01 was partly the result of a deliberate reduction during the year in the number of hours flown as part of a cost savings exercise.[125]

Thus, there was a recognized need to improve these performance levels significantly.

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[124] "UK sells 72 retired Harrier jump jets for $180m to US," November 24, 2011, http://www.bbc.co.uk/news/uk-15876745.

[125] U.K. National Audit Office, *Report by the Comptroller and Auditor General, HC 840 Session 2001–2002: 23 May 2002,* 15.

Figure 26. Actual flying hours achieved 2000–2002

	2000-01		2001-02 First Quarter	
Targets met	Puma		Gazelle	
	Sea King			
Targets not met		**% of target achieved**		**% of target achieved**
	Wessex	93	Sea King	98
	Gazelle	84	Puma	96
	Chinook	78	Lynx	85
	Lynx	76	Wessex	82
			Chinook	73

Note: Figures for 2001–2002 are the actual number of flying hours achieved in April to June 2001.

Source: U.K. National Audit Office, *Report by the Comptroller and Auditor General, HC 840 Session 2001–2002*, May 23, 2002, 15.

The Solution

In 2000, Westland Helicopters Ltd. (WHL; now AgustaWestland) approached the MoD with a set of proposals for the provision of depth support from industry. WHL proposed the Sea King as a suitable demonstrator for this new business concept, which they named the Sea King Integrated Operational Support solution (SKIOS). The move into a SKIOS solution was seen as a useful way to assist the company to transform itself into a total capability provider under the through-life support concept.[126]

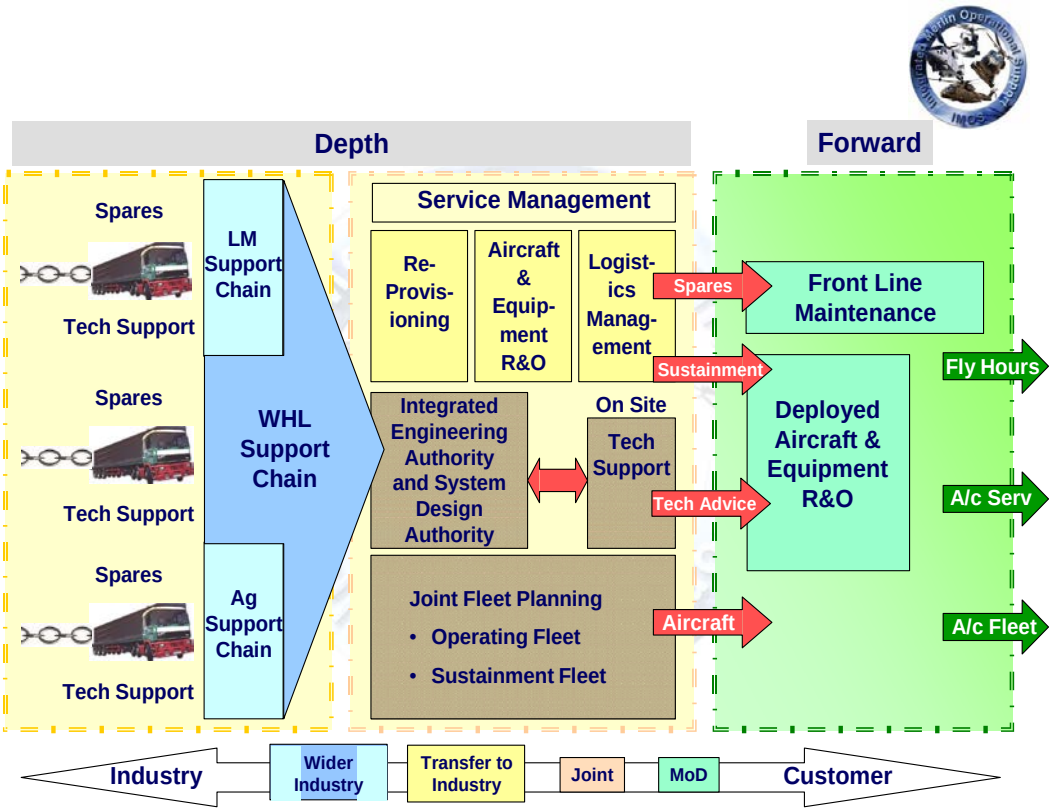
The IOS (for Sea King and other RWs) proposals were generally well received by senior management within the Defence Logistics Organisation, as they provided useful impetus for RW IPTs to begin developing output-based contracts able to be delivered by prime contractors. It was hoped that by using Sea King as the concept demonstrator, as proposed by WHL, other programs would be able to follow. These would include the Merlin, Chinook, and Apache helicopter fleets, together with all future programs.[127]

The IOS package was an attempt by WHL and the MoD to jointly move up the transformation staircase toward eventually letting a contract that delivers "capability." The general concept of contracting for availability, within the forward/depth construct

[126] Bywater, "Department of Defence Management and Security Analysis," 73
[127] Ibid.

defined by the Defence Logistic Transformation program, is shown in Figure 27. The graphic depicts the division of tasks and responsibilities between industry and the MoD.

Figure 27. Contracting for availability—the IOS concept



Source: U.K. National Audit Office, date unknown.

The first TLS contract for the Sea King was let on April 5, 2005, at a firm price of £300 million for the first five years. This new contract replaced approximately 60 individual contracts with over 30 different suppliers, and was assigned to a prime contractor. The contract was intended to provide support for the Sea King fleet until it goes out of service in 2018, contingent on a successful review after five years.[128]

Under the initial contract, the first five years were to be implemented in two phases. For implementation Phase 1, WHL would assume responsibility for the provision of aircraft, transmission, mechanical, and avionics support. This covers spares, repairs, publications, and technical advice. Under Phase 2, which was scheduled to take effect in

[128] Ibid., 77–78

2007 and was subject to a separate approval by the MoD Initial Approvals Board (IAB), industry was to assume responsibility for aircraft maintenance undertaken by the MoD.[129]

The second helicopter project to adopt a strategic partnering approach with industry was the Merlin helicopter fleet, through the Integrated Merlin Operational Support concept (IMOS). In February 2006 the MoD's Defence Logistics Organisation and AgustaWestland signed a contract, valued at £450 million for the first five years of a 25-year contract, to provide support for the EH101 Merlin Mk.1 and Mk.3 helicopter fleets, operated by the Royal Navy and the Royal Air Force, respectively.

The IMOS contract broke new ground in through-life support agreements by introducing payments for achieved flying hours and incentivizing industry to deliver agreed levels of aircraft serviceability, operational fleet aircraft numbers, and Merlin HM Mk.1 training system availability.

The Merlin fleet is much younger than Sea King and therefore, it was believed, offered greater opportunities for developing new concepts for supporting the aircraft. By applying the lessons learned from Sea King to a younger program, the MoD hoped to build on the SKIOS experience to move the IMOS program further up the MoD's "transformation staircase."[130]

As noted, the IMOS contract is a single, 25-year agreement, with five-year price breakpoints, to provide through-life support for the MoD EH101 Merlin fleet to its planned out-of-service dates of 2029 (Royal Navy Mk1) and 2030 (RAF Mk3). Under the contract, AgustaWestland provides an extensive aircraft availability service with a Main

[129] Ibid.
[130] Ibid., 78

Support Base at RNAS Culdrose. Responsibilities include repair and overhaul, and the management of the complete Merlin supply chain. Responsibility for on- and off-aircraft depth maintenance was transferred from the U.K. Ministry of Defence to prime contractor AgustaWestland. The Merlin Depth Maintenance Facility is located at Royal Naval Air Station Culdrose in southwest England and is responsible for performing all Royal Navy and Royal Air Force EH101 Merlin depth maintenance.[131]

When the initial 2006 contract announcement was made, Minister for the Armed Forces Adam Ingram said:

> Until now MoD has operated separate support systems for the two different types of Merlin aircraft. This was the best approach when introducing both helicopters into service, but not the optimum way to manage support in the long-term. This new contract will incentivise industry to increase the availability of Merlin helicopters to the Front Line Commands, while saving the MoD and U.K. taxpayers around GBP 1 billion in support costs over the next 25 years. These arrangements will also sustain up to 1,200 jobs, many of which are at AgustaWestland in Yeovil. This through-life approach to supporting operations is a good example of MoD's recently announced Defence Industrial Strategy in action.[132]

In January 2011, AgustaWestland signed a contract with the U.K. Ministry of Defence covering the second IMOS five-year period within the 25-year contract. The 2011-2016 segment is valued at approximately £570 million.

The IMOS contract sustains more than 1,000 jobs, many of which are located at AgustaWestland's facility in Yeovil, and at RNAS Culdrose in Cornwall, where the Merlin Depth Maintenance Facility and the Royal Navy's Merlin Training System are located.[133]

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[131] "AgustaWestland's Through-Life Support for U.K. Merlin Helis," *Defence Industry Daily,* Jan 17, 2011
[132] Ibid.
[133] Ibid.

To execute the TLS contract, AgustaWestland, the prime contractor, formed an industrial alliance with numerous partners in order to deliver the program. Alliance members included Lockheed Martin U.K. as the sub-prime for the Merlin Mk1 Mission System, Merlin Avionics Test System, and Training Facilities located at RNAS Culdrose in southwest England. Total Support Services (TSS), the "avionics alliance," comprising SELEX Sensors and Airborne Systems (S&AS) U.K., Smiths Aerospace, and Thales U.K., is contracted to manage a significant part of the Merlin Mk.1 and Mk.3 air-vehicle avionics, while Serco provides local management and manpower for the Merlin Depth Maintenance Facility located at RNAS Culdrose.

Highlighting the truly integrated IMOS team, the Merlin Depth Maintenance Facility is manned by Royal Navy, Royal Air Force, and Serco technicians under AgustaWestland management. Service Management and Supply, Engineering, and Design Authority also are co-located and operate from an office at AgustaWestland's Yeovil facility, embedded within the on-site support teams. Co-locating authorized design and engineering specialists next to the squadrons on the main operating and support bases and integrating the geographical and functional elements of the support chain has brought significant improvements over the traditional, separate location arrangements. The removal of bureaucratic and time-consuming survey, quote, and negotiation processes for post-design services has cut the time taken to undertake fault investigations and other technical queries to one-eighth of the pre-contract time.[134]

The IMOS Team's goal is to improve EH101 Merlin operational serviceability by 20 percentage points and the throughput of aircraft through the Culdrose-based depth maintenance facility by 30 percent.[135] The IMOS program mission was to create a single contract to provide through-life support for the U.K. Merlin fleet (both versions), to transfer risk—in a controlled fashion—from the MoD to industry, to significantly improve service support levels, and to progressively reduce Merlin support costs over the life of the platform.

To accomplish its mission, the IMOS project faced a number of challenges. It had to**:**

[134] "IMOS Goes Live," Helis.com Helicopter History Site, October 6, 2006, http://www.helis.com/database/news/eh101imos/
[135] Ibid.

- Reduce output costs without compromising delivery of support to the front-line customer
- Align the MoD/industry/front-line customer business model
- Optimize support by platform (Merlin) vs. commodity (parts)
- Develop an incentivized service arrangement with gainsharing provisions
- Map operational output requirements to contracted service
- Provide improved business opportunities for industry to support risk transfer and increase their revenue streams

The procurement strategy concluded that a sole-source arrangement with AgustaWestland as prime, with a cadre of sub-primes, offered maximum opportunities to meet program goals. This so-called "thin prime" arrangement was designed to minimize overhead and improves flow-down of risk and reward to the supplier base. The arrangement capitalizes on AgustaWestland's 25-year experience with EH101/Merlin.

IMOS contract key features include: [136]

- Execution of an overarching 25-year through-life support contract to the platform.
- Only the initial five-year period was firm priced. At the three-year point, the MoD was to conduct a performance review that, if positive, would result in award of a three-year contract extension and reestablish the five-year contract horizon.
- Thereafter, the contract would enter into rolling five-year renewals, based on performance and formulaic pricing.
- Pricing was linked to banded flying hours with fixed and variable elements clearly identified and understood. Key performance indicators (KPIs) were defined, agreed upon, and accepted. Under the IMOS contract, approximately 50 percent of the cost varies with flying hours. Under legacy contracts, by contrast, about 20 percent of cost varies with flying hours. This shift to a more variable pricing model based on performance is a key difference between IMOS and traditional contracts.

[136] http://www.defenseindustrydaily.com/augustawestland-lands-gbp-450m-throughlife-support-contract-for-uk-eh101s-01999/#british-aw101, January 17, 2011.

- A gainsharing mechanism was established and profit would be based on output performance achieved.

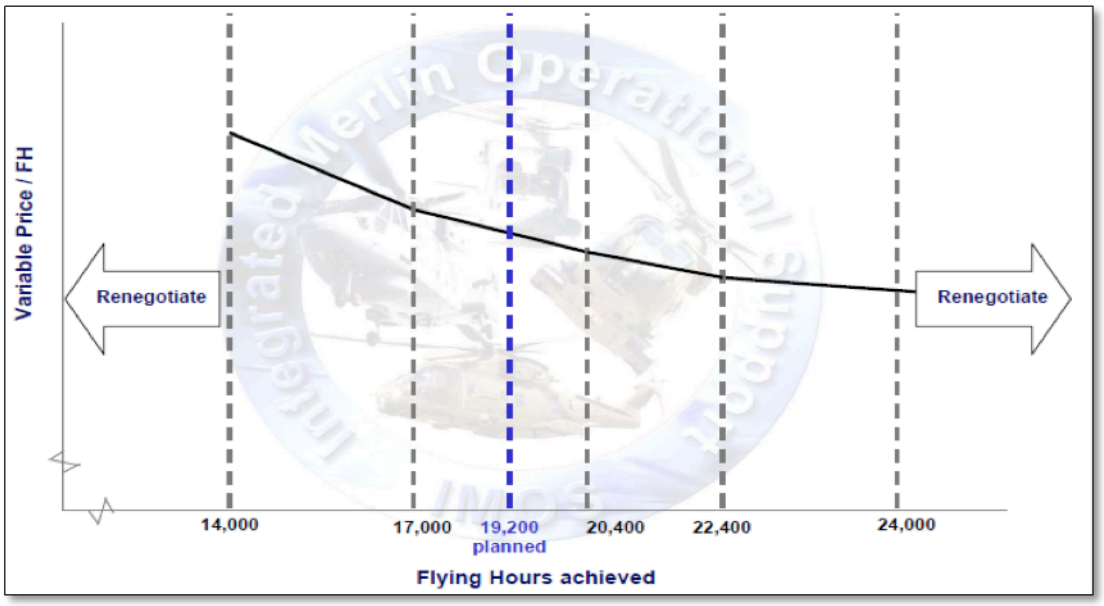
Results

The IMOS program produced tangible benefits in both cost management and performance improvement.

The banded flying hours provision enables operational flexibility. With a number of flying hours bands possible, each band has its own price. This variable pricing model is depicted in Figure 28.

By utilizing a variable pricing model based on banded flying hours, the MoD can increase or decrease flying hours without renegotiating the contract. The price charged per flying hour at the lower bands is higher because the contractor must be able to cover fixed costs with fewer flight hours to charge. Despite this fact, the cost per flying hour is still far less than it would have been under a more flexible, traditional arrangement.[137]

Figure 28. Shift to variable pricing model based on performance



Source: U.K. National Audit Office

[137] Ibid., 54.

In terms of key performance indicators (KPIs) and any penalties for performance failures, the contract gave industry two years before the KPIs contractually impacted industry. Industry would be penalized for failure on key KPIs, with its profit reduced for performance failure.

The contract includes a gainsharing mechanism designed to incentivize the contractor to identify opportunities for cost-of-ownership reduction across the life of the aircraft, which cannot be achieved within the contract pricing. The risk and profit share will be assessed on a case-by-case basis and be determined by the level of risk and investment made by each party.[138]

The IMOS contract provided greater financial flexibility and control for the MoD than traditional contracting. Payment mechanisms aim to encourage contractor performance and reward cost control/reduction. The rolling renewal increments were designed to eliminate predatory pricing for later increments of the program. Pre-negotiated pricing for a wide variation in Merlin flying rate provides certainty for budgeting. And IMOS allows greater flexibility to respond to MoD/customer-directed changes (e.g., surge for operations, budgetary restrictions, etc.).[139]

The IMOS contract performed so well that the MoD approved a continuation of the program in 2011. Peter Luff, Parliamentary Under Secretary of State–Defence Equipment, Support, and Technology commented:

> I am pleased to announce the continuation of the 25-year Integrated Merlin Operational Support (IMOS) contract with the agreement of the second pricing period with AgustaWestland valued at approximately £570 million. The IMOS contract was awarded to AgustaWestland in 2006 to secure the future availability of the Merlin helicopter fleet to the front line **while saving the Ministry of Defence and U.K. taxpayers around £12 million per year compared to previous contractual arrangements**.

Lessons Learned with IMOS

An early priority for IMOS was to ensure that industry was able to work to a well-defined requirement. MoD IPT staff were therefore involved much earlier in the process than had been the case for SKIOS.

[138] Ibid.
[139] U.K. National Audit Office presentation. No date.

However, defining contracts in output-based terms was a new undertaking for the IPT staff, so the team had to learn on the job, so to speak. According to IBM Consulting Services Ltd., which reviewed the arrangement, the industry was hampered in its ability to innovate in the crucial early stages of the arrangement by an overly prescriptive definition of the MoD requirement.

"Rather than provide industry with a generic output-based requirement, the contract required industry to take responsibility for existing processes in place at the MoD. This had the effect of restricting the ability of Industry to seek efficiencies through innovation during the early stages of negotiation," IBM noted.[140]

The Bywater paper additionally observes:

> The lack of scope for industry to drive down costs through innovation meant that they had had to look elsewhere for cost reduction, in order to make the IMOS concept affordable. This meant that industry had to reduce the proportion of risk that it was prepared to underwrite. Agreeing on the apportionment of risk between the two parties was a significant area of difficulty.[141]

IMOS has not experienced the same difficulties of relationship management as SKIOS, although geographical separation has been an occasional factor in allowing misunderstandings to develop, albeit to a significantly lesser extent than for SKIOS. To address this, the Merlin IPT deployed specialist teams on site at the Westland Helicopters Limited site at Yeovil, in order to develop elements of the program on a joint basis. This has worked well and aided understanding between the two sides.[142]

Under IMOS, MoD staff played a leading role in defining and refining the output and performance requirements to which industry had to respond. This meant that MoD IMOS staff felt more in control of the situation than their Sea King counterparts. "They have therefore been less skeptical of the partnering initiative and not seen IMOS as a significant threat to their livelihoods," Bywater writes.[143]

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[140] Bywater, "Department of Defence Management and Security Analysis," 78–79.
[141] Ibid., 79.
[142] Ibid.
[143] Ibid., 79.

VI. Results, Implementation Challenges, and Lessons Learned

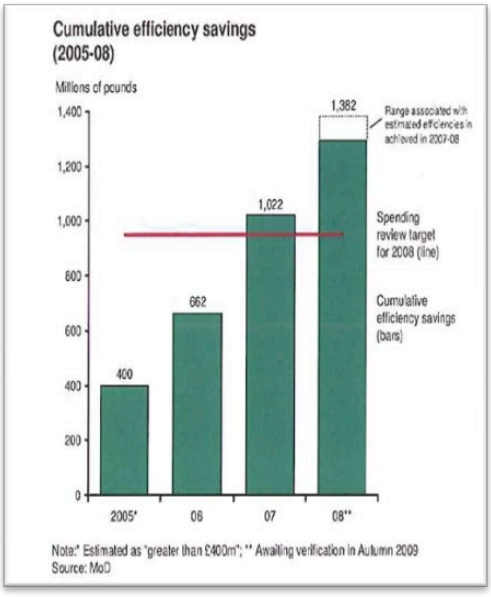
In its 10-plus years of experience with TLS-TLCM approach to weapon systems acquisition and sustainment, the U.K. MoD has faced numerous challenges and learned many valuable lessons. Both have helped the agency fine-tune its approach to and implementation of TLS-TLCM so as to achieve improved outcomes.

TLS-TLCM works. It saves money. It improves performance, availability, and capability. It delivers better value for the money.

The MoD believes TLS-TLCM is an effective way to manage defense acquisition for the long term. It has generated billions (£) in savings for the U.K. MoD. The Tornado and Merlin case studies clearly demonstrate this point. Thus far, these two programs have produced nearly £2 billion in savings while dramatically improving equipment availability.

Figure 29 illustrates cumulative efficiency savings of nearly £1.4 billion derived from this transformational approach to acquisition between 2005 and 2008—savings that exceeded MoD estimates starting in 2007.

Figure 29. Cumulative efficiency savings of defense logistics transformation



Source: U.K. Ministry of Defence, *Annual Report and Accounts 2007–2008*, July 2008.

Above all, TLS-TLCM is a long-term enterprise—a partnership between government and industry to deliver greater value for money over extended equipment life-cycles that typically average 25 to 30 years. Savings are not immediate. Instead, they ramp up over time, based on continuous improvement efforts and long-term investments made by industry in servicing the contracts.

Key Characteristics of a High-Performing Acquisition System

Before discussing the challenges and lessons learned in TLS-TLCM execution, let us first summarize what a high performing acquisition system looks like. In a 2006 document, the MoD listed the following ideal key attributes: [144]

Key characteristics

- Unity of purpose with corporate goals and objectives, clearly understood and shared by everyone.
- Clear individual roles, responsibilities, and accountabilities.
- A unified planning process that takes into account the external commercial environment and technological developments.
- Investment of sufficient time and resources during the early stages of a project, with a view to rapid execution thereafter.
- Robust data, mature estimating processes, and comprehensive assessment of technical and financial risks before commencement of a project's execution phase.
- Plans that are prudent and contain adequate contingency.
- A strong focus on in-service operating costs.
- Close engagement of the user in new investment decisions and project development.
- An agile research and development program that understands associated technical risks.
- Early identification of acceptable performance trade-offs to deliver projects to time and cost.
- Willingness and ability to cancel failing projects.
- A financial system that is fit for purpose and understood by all that use it.

[144] Source: *Enabling Acquisition Change: An examination of the Ministry of Defence's ability to undertake Through Life Capability Management*, June 2006, 73. http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf.

- A governance and performance management system with targets that are quantifiable and include in-service operating costs.
- A management information system that is capable of providing accurate and timely information, particularly in regard to financial, project, time, and risk-related issues.
- An efficient approvals process that incorporates detailed, accurate, and non-advocate advice and due diligence appropriate to the scale of the proposed investment.
- Appropriately experienced and qualified people who are rewarded and incentivized to meet corporate objectives.
- A strong relationship with industry partners to deliver long-term value for money based on trust, openness, and a clear alignment of incentives

Implementation Challenges

Although the benefits from TLS-TLCM have been demonstrated, the MoD not surprisingly has encountered a number of challenges in structuring and implementing this radical new approach to acquisition. These challenges fall into several categories:

- Organizational change
- Information systems
- Contracting procedure changes
- Supplier relationship changes

The following paragraphs highlight some of the specific issues within each of these four categories of challenges.

Organizational

Challenge: *Entrenched organizational culture, structure, processes and skill sets must be changed in order for TLS-TLCM to succeed.*

TLS-TLCM represents a major change in culture, behaviors, skills, and training for the MoD. There is a continuing need for leadership and the correct governance

structures to drive change. Additionally, there is an ongoing need for effective change management processes, skills up-training, and management.

Structuring the MoD acquisition organization to support and execute through-life programs has been one of the greatest challenges the agency has faced.

TLCM requires a major shift in focus for program acquisition and management staff. It requires the mentality to switch from a focus on transactions to a focus on output/outcome. This means a radical shift from buying on price to optimizing the total life-cycle cost of a platform in order to deliver greater value for the money spent.

Within this business paradigm, then, there are a number of organizational and cultural challenges. First, there is the challenge of creating and maintaining high-performing customer teams to deliver the required business outcomes.

High-performing teams require certain basic building blocks on which to operate, as discussed in a 2010 RUSI Defence Systems paper. The paper outlined these requisites:[145]

- The need for a clear and engaging sense of direction and a shared understanding across the team as to why they exist
- Clearly defined roles, with every member understanding their personal contribution to the achievement of the team outcome
- Sufficient authority in place for sub-teams and members to make meaningful decisions about how their work is done, and processes established for regular goal setting
- An appropriate range of skills and competencies, including both the technical abilities required for task performance and interpersonal skills needed to work collaboratively with industry.

In a speech delivered at the Heritage Foundation in Washington, D.C., in February 2011, the U.K.'s Permanent Under Secretary Ursula Brennan elaborated on people-related aspects of the new acquisition model.

> We need acquisition experts who deeply understand how the forces will use and maintain the equipment we buy. But expertise in the management of huge, costly, and complex procurement

[145] McGlynn, John, "AFV Acquisition Processes," *RUSI Defence Systems*, October 2010, http://www.rusi.org/publications/defencesystems/ref:A4D0F40AC75BF0/.

> projects requires skills which are built up over years of practical project management. This sits uncomfortably with the military career pattern of moving on every two years. [146]

The RUSI paper went on to make observations about the nature of teams under this new acquisition approach:

> Creating and maintaining a high-performing team is a constant challenge in the MoD, where there is a cultural belief, in both military and civilian management, that 'broad is good'; so people are encouraged to move around different roles every few years. While this can have positive benefits in terms of widening an individual's experience, it has the effect of undermining high-performing teams as they are constantly being changed with people leaving and joining, often with little previous experience in the project area.[147]

As the MoD goes forward with through-life acquisition and the new partnership approach with industry, the U.K. Ministry of Defence will need to effect further clarification of roles and purposes for itself and for industry, as the RUSI report suggests:

> The MoD, as the 'decider', needs to define what core skills it wishes to retain in-house and concentrate its investments on being efficient and effective at delivering them. The private sector, as 'provider', delivers those skills that are not core for the MoD. In acquisition terms, the 'provider' needs to be completely independent from the supply chain and have sufficient size and scale to be able to meet the demands of a complex range of acquisition and support programmes.
>
> In looking to answer this question, for the 'decider' role, it is all about the MoD retaining those skills and activities that are fundamental to its purpose and no equivalent market for those skills exists in the private sector. So for example, the identification of military requirements must remain with the MoD, as they are fundamental to the MoD and the unique expertise in identifying them only resides therein.
>
> For the 'provider' role, it is about the MoD identifying those activities where there is a competitive market for best practitioner expertise and then competing those activities. Having a competitive market drives innovation and costs in the private sector, which the MoD can then benefit from. The other criteria that should be applied in deciding what should remain with the 'decider' and what should be sourced from a 'provider' are as shown in [Figure 30]. These criteria can be applied at any level, from delivery team to cluster-level and beyond.

[146] Brennan, Ursula, "Transforming Defence: A British Perspective on Defence in a Time of Financial Challenge," speech at the Heritage Foundation, Washington, D.C., February 2, 2011.
[149] McGlynn, "AFV Acquisition Processes."

Figure 30**: Customer-side "decider" and "Provider" decision criteria**

Decider role (retain internally by MoD)	Provider role (source from independent private sector provider)
Activities fundamental to MoD purposes	Competitive market for best practitioner expertise, driving innovation and cost advantage
Unique existance only exisiting in the MoD	Outsourcing risk/reward profile is acceptable
Security and/or scarcity of supply	Switching costs relatively low so MoD can change if supplier underperforms
Little competitive market for best practitioner expertise	Specialist supplier better placed to maintain critical mass of skills across awider market base

Source: McGlynn, John, "AFV Acquisition Processes," *RUSI Defence Systems*, October 2010, http://www.rusi.org/publications/defencesystems/ref:A4D0F40AC75BF0/.

In essence, getting clarity on the 'decider'/'provider' roles on the customer side and then resourcing acquisition delivery teams accordingly will reduce overall acquisition costs and improve delivery times, along with strengthening the customer/industry relationship.[148]

To execute on this new role as decider, with a through-life focus, the MoD restructured to create Capability Boards, which are charged with directing programs. Each of the Defence Lines of Development is represented on the Capability Boards, and each DLOD has an opinion as to what should be done in the provision of new equipment. "Rapid staff rotation, however, creates issues in skills and knowledge transfer and consistency, education up-skilling, differences of opinion from one member to the replacement member, and so on," the Gray Report noted.[149] In addition, Gray pointed out another shortcoming: "The Capability Board structure does not have a single executive empowered to drive decisions and accountable for those choices. Without that, it is hard to see these bodies coming to swift decisions and being happy to be held to account for their actions."[150]

[148] McGlynn, "AFV Acquisition Processes."
[149] Gray, *Review of Acquisition for the Secretary of State for Defence*, 41.
[150] Ibid., 41.

Capability Boards, known as Programme Boards today, cut across the Department's existing budgetary and organizational structures. As the Department gains experience in operating Programme Boards, the ongoing question is whether these boards have sufficient authority to allocate program resources across the existing budgetary structures, and to direct activities to improve the efficiency and effectiveness with which they deliver capability.

Securing full support from all parts of the Department and its industry partners is an ongoing challenge. The Department recognized that engagement of front-line commands would need to improve if TLCM was to succeed. Thus, the MoD has undertaken a major effort to assist front-line commands in integrating the TLCM approach into their established ways of working and improve their management of DLODs, for example, by providing new project management training courses.

"Getting all the budget holders to understand TLCM is a critical preliminary step in a through-life approach."

"Getting all the budget holders to understand TLCM is a critical preliminary step in a through-life approach," says Shouesmith. "The mechanism for integrating TLCM program requirements was the Programme Boards, which were chaired by the requirement owner in MoD. Each program owner ran a committee, which consisted of representatives for all the defense lines of development owners. Depending on where the program was in its cycle—concept or development—these committees would have different people with different degrees of influence. There were 42 such committees to start; this number has been reduced to 16 to 17 in the last three years.

"The theory behind Programme Boards—it works in industry—is that empowered representatives come to the board able to make the decisions on trade-offs, like design trade-offs at the early stage, or capability trade-offs for midlife, or put in place a contract support solution because it's cheaper over the life of the platform. The key is the ability to make trade-off decisions through the life of the program and place the people empowered to make those decisions on the program boards. These boards lie at the heart of TLCM. So the key to success for Programme Boards is having empowered

representatives from the various aspects of a program agree that they will contribute more or relinquish some capability."

In reality, Shouesmith observes, it is very difficult to achieve that goal of getting everyone empowered/acting at the same level. "In theory," he explains, "you get all these things teed up, press the button, and everyone is empowered. In practice, that did not happen. What happened was the start of an adventure. We realized we had to start somewhere. Our thinking was, 'Whatever we do can't be worse than the way things currently are. We will just adjust over time.

"So that's where we got until about one year ago. There was a recognition that the introduction of program boards had been inconsistent across the range of capabilities. Performance of the board was very dependent on the appetite of the program board chairman. It also became clear that this was a hugely complex business—getting the right people with the right delegation of authorities to contribute to the whole."

Programme Boards remain at the heart of TLCM, but the MoD, learning from experience, has shifted to a model of putting the front-line commands—Army, Navy, Air Force—in charge of program design and management.

"If it's a ship, give it to the Navy to deliver because the Navy owns the people, infrastructure, concepts, doctrine, support, and so on," says Shouesmith. "It's more logical to give it to the Navy to manage, provided they are held responsible to deliver. So MoD still manages through-life, but has simplified machinery by placing it in the front-line command."

For capabilities that cut across service lines and are clearly joint in nature—logistics, for instance, does not sit naturally in any service—the MoD created a Joint Forces Command. This agency is responsible for fielding and operating truly joint capabilities, Shouesmith notes.

In other organizational developments, DE&S—the support delivery agency—is being restructured to match neatly against the four commands: maritime, land, air, and "enabler" areas.

As for the mega projects like the Joint Strike Fighter, program control will remain in the MoD rather than with the individual commands' program boards. "There is huge political impact if one of these big programs is late or over budget," Shouesmith

observes. “So the size of the program is such that politicians may need to take some money out of it.”

Above all, it is critical that MoD acquisition adopts a platform approach, says Shouesmith. “A major weapons systems is designed as a long-term platform, with service life measured in 30 to 50 years,” he notes. “This requires platform design to include through-life upgradeability, longevity, maintainability, and sustainability. It requires an open systems architecture, COTS, modular components, standardized parts/sub-systems, and so on.”

This long-term view should also be overlaid on program savings expectations. These programs may not produce much in the way of short-term savings. Over the life of the equipment, however, the savings can be and are significant.

Information Systems

***Challenge**: Address information gaps and the ongoing need for robust information systems to track programs and provide visibility, proper accounting, accurate and timely reporting, process management, program oversight, and effective decision-making.*

In order to manage TLS-TLCM programs effectively, the MoD must have robust financial and program management information systems that track overall costs of programs across all DLODs. Comprehensive, accurate cost information enables the ministry to explore trade-off decisions and better manage program costs as a whole, over the long term. The Department faced challenges in this area because it lacked such systems. As a result, TLS-TLCM programs and their performance were initially hampered by this IT shortcoming.

This situation was particularly true for the Programme Boards, whose job it is to coordinate the strands of work involved in each TLCM program. Bernard Gray pointed out these shortcomings in his 2009 report, saying, “If this system is to have any significant impact, then it needs be populated with such data, and the financial management skills required to analyze the information, as a matter of urgency. Without

that information, the risk is that the Capability Boards, and TLCM, are reduced to being a limited talking shop."[151]

In 2010, the MoD implemented reporting tools designed to address this issue—to generate a consistent set of non-financial information, for example, on program level risks and dependencies, and on progress against DLOD plans. The upgrade included a new through-life finance tool set that rolled out in March 2010 to improve financial information needed for decision making. The year before, in 2009, the MoD rolled out Programme Intranet Sites to meet the need for central management of, and broader access to, key program documents and information.[152]

The MoD also has concentrated on developing management information modules covering critical information requirements. These include a tool that enables key milestones to be described, target dates recorded, and progress mapped accordingly, and tools looking at dependencies and assumptions, risks and issues, and spend versus budget.[153]

Contract Terms

Challenge: *Change contracting terms from short-term to long-term, focusing on outcomes not outputs.*

"Longer contracts drive the cost down," says one U.K. defense contractor. "If you treat life as a 25-year program, then you are trying to reduce the cost of operating and maintaining that equipment well into its life, through two or three upgrade programs."

In the U.S., federal acquisition regulations place restrictions on contract lengths, with the most flexible rules allowing a five-year contract with five-year extensions (see Appendix B for a full discussion of Federal Acquisition Regulations with regard to contract term length.)

Effective TLS-TLCM contracting also should build in sufficient flexibility such that, if utilization changes, or some other key variable that would affect equipment sustainment changes, there is a mechanism in the contract to adjust for that variability.

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[151] Gray, *Review of Acquisition for the Secretary of State for Defence*, 41.
[152] House of Commons Defence Committee, *Defence Equipment 2010: Government response to the Committee's Sixth Report of Session 2009–10*, Fourth Special Report of Session 2009–10, March 30, 2010, 20, http://www.publications.parliament.uk/pa/cm200910/cmselect/cmdfence/516/516.pdf.
[153] Ibid., 20.

This flexibility is critical for both sides to realize the best from these contracts, and in ensuring that industry does not have to absorb unexpected costs that would make such contracts unattractive and financially untenable.

Finally, officials explained that in many of the Ministry of Defence's availability contracts, the concept of "open-book" accounting is employed. Open-book accounting is not a defined term but is more of a general expression describing a level of access to accounting data that would not normally be available under a conventional contract. In availability contracts, open-book accounting allows government program officials to review the accounting records of the contractor.

This access is not without limits. Officials said that the level of access must be agreed to in advance on a case-by-case basis and reflects the circumstances of the arrangement and the need for access to certain data to monitor performance or benefits arising from the arrangement. For example, one contract may only provide for man-hour data because that is all that needs to be shared given the circumstances. However, another contract may allow access to direct cost, direct labor hours, and other rates and factors that are relevant for the work involved. According to officials, the Ministry of Defence has an open-book accounting agreement with AgustaWestland for the Merlin contract, and the government has full visibility of the accounts pertaining to Merlin, including overhead costs. The contract must explicitly address the data-access arrangements and not rely on vague and undefined phrases that could be open to misinterpretation.[154]

The one potential downside that must be addressed in long-term availability contracts is the concern that they may limit flexibility to respond to changes in resources. In the past, as the GAO report explains, Integrated Project Team leaders in the Ministry of Defence had some ability to move funding between resource lines to overcome short-term funding issues. However, this flexibility is diminishing because of the transition to availability contracts, as larger portions of the budget are pre-allocated to fund these contracts.[155]

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[154] U.S. General Accounting Office, *Defense Logistics: Improved Analysis and Cost Data Needed to Evaluate the Cost-effectiveness of Performance Based Logistics,* 51.
[155] Ibid.

Supplier/Industry Relationships

Challenge: *Craft the decider-provider relationships with industry such that there is clear identification of roles, responsibilities, expectations, and constraints; continued training on the change issues required to migrate to a partnership model; sufficient margin incentives to encourage innovation and performance improvement; clear metrics; and early supplier involvement in new platform development.*

The 2009 report from the U.S. General Accounting Office corroborates the need for this new supplier relationship:

> Defence Equipment and Support officials said that they have found the long-term nature of availability contracts a key factor in reducing costs and that annual contracts cannot achieve the same benefits as the longer-term contracts do. According to officials, the long-term contracts for Tornado aircraft and helicopter fleets reduced costs because the contractors were able to stabilize their supply chain and obtain better prices from the supplier base. The Ministry of Defence also found that industry preferred long-term contracts. In a discussion of contracting for availability, the [2005 Defence Industrial Strategy] stated that companies are generally interested in using availability contracts because it provides the commercial firms with greater returns over a longer period.[156]

The GAO report went on to point out that MoD officials reported that other factors, such as inventory ownership, contract incentives, and cost visibility, were also important when contracting for availability. "Officials told us that they preferred to transfer not only management of inventory but also inventory ownership under such arrangements," the GAO wrote. "They noted that under some of their current availability contracts this had not been possible for a variety of reasons. Nonetheless, in the future they intend to pursue transfer of inventory ownership as much as possible."

"In addition, according to ministry officials, several of the availability contracts—including those supporting the Sea King and Merlin helicopters and Tornado fast jets—had incentives referred to as 'gain share' or 'pain share.' In these types of arrangements, the contractor and government share cost savings or cost overruns in pre-negotiated proportions. According to officials, they found that these types of metrics are useful to influence contractor cost control measures and provide an incentive for industry to develop changes and modifications that reduce support costs. Officials familiar with the

[156] Ibid., 49–50.

Tornado fast jet availability contract explained that their arrangement included gain sharing and pain sharing on both the variable and fixed-price portions of the contract." [157]

Gainsharing provisions structure continuous improvement into the fabric of the contract. Continuous improvement is a contractual necessity and must be well spelled out for both parties over the term of the contract.

Applying lessons learned to PBL in the U.S. DoD

As noted in Part IV, TLCM and PBL share many similarities. Both challenge the status quo contracting methodology (moving from transactional contracts to performance based contracts), with little regard to total life-cycle sustainment costs. Both espouse a new approach to weapons systems acquisitions that is focused on outputs, performance, and outcomes rather than inputs, parts, or discrete transactions.

There are a number of lessons learned with TLCM that are transferrable to PBL. The first and most important is the fact that TLCM works because the contracts are long-term—up to 25 years. This length of term incentivizes industry to make investments in the platform for the long term, knowing that it can realize a return on these investments over the life of the contract precisely because it is long-term.

This long-term approach produces results—in the case of the Ministry of Defence, that has included billions of pounds in savings. PBL offers the same potential, if adopted on a more widespread basis.

Second, TLCM requires considerable organizational change in order to realize the greatest benefit. The U.K. MoD learned what works as it went along, adapting and changing organizational structure, training, industry relationships, and so on in order to fine-tune programs and generate better results. The key takeaway from the U.K.'s experience is this willingness to adapt over time. DoD has learned similar lessons, although perhaps on a more limited scale.

Finally, the U.K. is some years ahead of the U.S. in terms of experiencing the kind of radical budget constraints and reduction measures that force transformative action. The U.S. DoD is in the early stages of precisely such a contraction. The U.K.'s

[157] Ibid., 51.

experience with TLS-TLCM is highly relevant in the U.S. as pressures to cut defense spending mount.

DoD spends more than $210 billion on logistics and sustainment every year. In the March–April 2012 issue of *Defense AT&L,* John Boyce, a former Navy aerospace maintenance duty officer, and Allan Banghart, a senior advisor with Deloitte Consulting and former director of enterprise transformation at the Defense Logistics Agency, argue that full adoption of performance-based logistics—the U.S. equivalent to TLS-TLCM—could save 10–20 percent every year.[158]

The lessons learned from the U.K. experience with TLCM can and should be applied in the U.S.

[158] Boyce, John, and Allan Banghart, "Performance Based Logistics and Project Proof Point: A Study of PBL Effectiveness," *Defense AT&L*, March–April 2012, 26–30.

VII. Conclusion

Partnering with industry has transformed the way in which the MoD contracts for repair and overhaul. Effective TLS works and generates a number of tangible benefits:

- It improves platform/system capability, reliability and availability
- It saves money and reduces total weapons system sustainment costs
- It supports readiness
- It shifts risk from MoD to suppliers, and rewards suppliers for successfully managing this risk
- It encourages continuous improvement, best practices, and innovation
- It is a win-win for MoD and industry, and lastly
- It delivers greater value for money.

Summing up his observations about TLCM and its impact on U.K. MoD acquisition programs, Shouesmith offers the following observation:

> The lessons learned from the U.K. experience with TLCM can and should be applied in the U.S.

"This is an evolutionary process. We've been through a lot of changes [in TLCM] over the years, and every change takes us to a slightly different place. Are we in a better place overall, as a result? Absolutely. TLCM people understand true costs sit in the back end, not the front, so they need to plan support and mid-life upgrades from day one. You can't just buy something and hope that someone else will pick up the support costs in year 10 or 11. While MoD's mechanisms to ensure that still aren't as mature as they could be, the level of understanding as to the necessity of this approach is much greater. That's real progress."

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About the Authors

Jacques S. Gansler

The Honorable Jacques S. Gansler, former Under Secretary of Defense for Acquisition, Technology, and Logistics, is a Professor and holds the Roger C. Lipitz Chair in Public Policy and Private Enterprise in the School of Public Policy, University of Maryland; he is also the Director of both the Center for Public Policy and Private Enterprise and the Sloan Biotechnology Industry Center. As the third-ranking civilian at the Pentagon from 1997 to 2001, Professor Gansler was responsible for all research and development, acquisition reform, logistics, advance technology, environmental security, defense industry, and numerous other security programs.

Before joining the Clinton Administration, Dr. Gansler held a variety of positions in government and the private sector, including Deputy Assistant Secretary of Defense (Material Acquisition), assistant director of defense research and engineering (electronics), senior vice president at TASC, vice president of ITT, and engineering and management positions with Singer and Raytheon Corporations.

Throughout his career, Dr. Gansler has written, published, and taught on subjects related to his work. Gansler recently served as the Chair of the Secretary of the Army's "Commission on Contracting and Program Management for Army Expeditionary Forces." He is also a member of the National Academy of Engineering and a Fellow of the National Academy of Public Administration. Additionally, he is the Glenn L. Martin Institute Fellow of Engineering at the A. James Clarke School of Engineering, an Affiliate Faculty member at the Robert H. Smith School of Business, and a Senior Fellow at the James MacGregor Burns Academy of Leadership (all at the University of Maryland). From 2003–2004, he served as Interim Dean of the School of Public Policy. From 2004–2006, Dr. Gansler served as the Vice President for Research at the University of Maryland.

William Lucyshyn

William Lucyshyn is the Director of Research and a Senior Research Scholar at the Center for Public Policy and Private Enterprise in the School of Public Policy, University of Maryland. In this position, he directs research on critical policy issues related to the increasingly complex problems associated with improving public-sector management and operations and with how government works with private enterprise. Current projects include modernizing government supply-chain management, identifying government sourcing and acquisition best practices, and analyzing Department of Defense business modernization and transformation. Previously, Mr. Lucyshyn served as a program manager and the principal technical advisor to the Director of the Defense Advanced Research Projects Agency (DARPA) on the identification, selection, research, development, and prototype production of advanced technology projects.

Prior to joining DARPA, Mr. Lucyshyn completed a 25-year career in the U.S. Air Force. Mr. Lucyshyn received his Bachelor degree in Engineering Science from the City University of New York and earned his Master's degree in Nuclear Engineering from the Air Force Institute of Technology. He has authored numerous reports, book chapters, and journal articles.

Lisa H. Harrington

Lisa H. Harrington holds a research appointment to the Center for Public Policy and Private Enterprise at the University of Maryland's School of Public Policy, where her research focus is on defense supply chain management. She also is an adjunct professor of supply chain management and senior research fellow at the Supply Chain Management Center, Robert H. Smith School of Business University of Maryland. Ms. Harrington served as lead author on the recently published book, X-SCM: The New Science of X-treme Supply Chain Management (2010), and co-authored two other books, In Real Time: Managing the New Supply Chain (2004), and Logistics and the Extended Enterprise: Benchmarks and Best Practices for Manufacturing Professionals (1999).

Ms. Harrington has consulted in the field of supply chain management for more than 20 years, serving clients in both the public and private sectors. She is a former board member of the Council of Supply Chain Management Professionals and the Warehousing Education & Research Council. She earned her Bachelor of Arts degree in communications from Brown University, and holds an Executive Education Certificate in Logistics Management from Michigan State University.

Appendix A: Acquisition System Key Characteristics Gap Analysis

This chart, created by the U.K. Ministry of Defence (MoD) in 2006, describes some of the key performance gaps between the then-current acquisition system and "best practice" acquisition procedures also identified by the MoD.

The key gaps relating to through-life capability management (TLCM) as of 2006, summarized in the bulleted list, have been the focus of subsequent improvement efforts, with at least some degree of success.

- Lack of a unifying culture for defense acquisition
- Lack of unified planning process aligned to the requirements of TLCM
- Insufficient understanding of risk and over optimism as to true project costs
- Lack of agility in the defense program
- Failure of Equipment Capability Customer to plan on a TLCM basis to a sufficient degree
- Risk of failing to appreciate fully through-life costs
- Absence of TLCM targets
- Inconsistency in relations with industry
- Shortage of sufficient acquisition skills

Key Characteristics	Assessment of Current Performance	Gap
Unity of purpose with corporate goals and objectives understood and shared by everyone.	Well defined and understood identities and cultures exist within each element of the acquisition system. However, Defence Values for Acquisition intended to shape the behavior of everyone in the acquisition community (including industry) are not yet fully embedded.	A unifying culture for Defence Acquisition has yet to be fully achieved.
Clear individual roles, responsibilities, and accountabilities.	Individual roles, responsibilities and accountabilities are not clearly understood internally and externally; e.g., multiple customer voices, scrutinizers commenting outside areas of expertise, etc.	Clarification and reinforcement of roles, responsibilities and accountabilities required.

A unified planning process which takes into account the external commercial environment and technological developments.	Separate planning functions in resource and equipment planning, using different time horizons; e.g., EP/STP. Incremental approach to acquisition is not fully embedded.	Lack of unified planning process. Needs to bind more closely together the EP and STP process so that changes in one are reflected in the other. Lack of fully embedded incremental approach.
Investment of sufficient time and resources during the early stages of a project, with a view to rapid execution thereafter.	Performance is improving and the IAB require evidence of early investment, but there is still insufficient Concept and Assessment phase spend; e.g., average spend for Concept and Assessment Phase for Cat A projects is about 5%.	Insufficient investment of resources in early stages of a project.
Robust data, mature estimating processes, and comprehensive assessment of technical and financial risks before commencement of a project's execution phase.	Performance has improved. However, continued experience of time and cost overruns on major projects and risk that many estimates are optimistic in terms of time and cost and technical challenges are not fully appreciated. Cost estimates not systematically subject to independent scrutiny.	Data upon which we base our decisions is not gathered, analyzed, and stored consistently. Risks are not fully appreciated at Main Gate.
Plans which are prudent and contain adequate contingency.	Situation improving, but planning rounds still characterized by efforts to deal with effects of cost growth at the expense of uncommitted programs.	Lack of uncommitted funds restricts agility in the equipment program.
A strong focus on in-service operating costs.	Customer 1 is not adequately incentivized to take full account of through-life costs. Support costs are only 'noted' rather than subject to approval at Main Gate.	Customer 1 does not plan on TLCM basis across all DLOD to a sufficient degree. The Department risks failing to fully appreciate through-life costs.
Close engagement of the user in new investment decisions and project development.	Customer 2 is too far removed from investment decision making and development of new capability; e.g., inconsistent approach to Capability Working Groups.	Customer 2 insufficiently engaged in decision making and project development.

An agile R&D program that rapidly understands associated technical risk.	Much of MoD's R&D is considered world class. However, there is some possible duplication of research and concerns about pull-through of technology to meet the customer's requirements and a tendency to specify high risk solutions before the technology is properly understand.	Process for directing research is not optimized for TLCM. Limited funds inhibit ability to rapidly develop technology. Insufficient focus on the maxim that the best is the enemy of the good.
Early identification of acceptable performance trade-offs to deliver projects to time and cost.	Customer 1 regularly makes performance and time trade-offs. But Customers are not incentivized to adopt incremental approach and without a full appreciation of the key cost drivers, scope for tradeoffs is not identified sufficiently early to have a major impact on overall costs.	A combination of over optimism, incentives which discourage an incremental approach, and insufficient information to support key performance, cost, and time trade-offs early in the life of projects has a major impact on projects.
Willingness and ability to cancel failing projects.	Projects are cancelled at different stages of the acquisition cycle; e.g., 4.5 KW Generator, Armored Vehicle Training System, MRAV.	Lack of wide visibility of project cancellations.
A financial system that is fit for purpose and understood by all that use it.	Current financial planning processes are not well understood by the acquisition community as a whole, and inhibit good TLCM.	Absence of a TLCM view, especially for equipment support costs. Also need to rectify disincentives to good value for money of current Resource DEL/Capital DEL split.
A governance and performance management system with targets which are quantifiable and include in-service operating costs.	The Department's overall governance arrangements treat acquisition of new equipment as separate from the delivery of current capability. Different elements of the Acquisition System have separate targets which can drive behaviors contrary to good TLCM.	The different elements of the acquisition community operate in stovepipes and there are no TLCM targets. Separate and potentially conflicting behaviors have emerged.
Management information system which is capable of providing accurate and timely information, particularly financial-, project-, time-, and risk-related issues.	The DPA and DLO do not use a common Management Information System and use different IT systems; e.g., DPA use DAWN and the DLO/ECC use DII.	A common MIS and IT system is needed.

An efficient approvals process that incorporates detailed, accurate, and non-advocate advice and due diligence appropriate to the scale of the proposed investment.	The current approvals system is time consuming, and does not apply levels of scrutiny appropriate to the level of investment. The lines between scrutiny and assurance are blurred. Non-Executive Directors are not used.	Approvals process which does not adequately differentiate between higher- and lower-risk projects and harnesses inadequate expertise to assess technical and commercial aspects of major projects.
Appropriately experienced and qualified people who are managed, rewarded and incentivized to meet corporate objectives.	The MoD possesses skilled and highly motivated staff. There are, however, differences between Military and Civilian approaches to management of the human resource. Training is fragmented and there is a low level of interchange with industry. Reward mechanisms are insufficient.	The Department lacks sufficient commercial expertise, and has low levels of professionally qualified staff. Staff are not managed to maximize the performance of acquisition community. Reward mechanisms are not fully utilized. Lack of means to encourage specialists to develop areas of expertise.
A strong relationship with industry partners to deliver long-term value for money based on trust, openness, and a clear alignment of incentives.	Quality of relationships with Industry varies. Transparency of forward equipment plans and partnering arrangements are comparatively immature.	Inconsistency in relations with Industry.

Source: U.K. Ministry of Defence—Enabling Acquisition Change Team Leader, *Enabling Acquisition Change: An examination of the Ministry of Defence's ability to undertake Through Life Capability Management*, June 2006, 48–49, http://www.mod.uk/NR/rdonlyres/10D1F054-A940-4EC6-AA21-D295FFEB6E8A/0/mod_brochure_hr.pdf.

Appendix B: The Five-Year Limit on Government Contracts: Reality or Myth?[159]

By Vernon J. Edwards

Note: Vernon J. Edwards is a researcher, writer and teacher of Federal contracting. This article was first published in May 2003. The discussion of the topic, therefore, is based on federal acquisition regulations at that time. While some requirements may have changed, the "five-year rule" is still a factor in federal acquisition procedure and regulations.

The question comes up again and again, usually in connection with service contracts and often with respect to the use of award-term incentives[i]: *Doesn't the Federal Acquisition Regulation limit the duration of government contracts to five years?* The purpose of this article is to describe and explain the various five-year limits on government contracts, especially as they might pertain to the use of award-term incentives.

A search of the Westlaw® Federal Acquisition Regulation (FAR) database[ii] for occurrences of the terms: "5-year," "5 year," "five-year," and "five year," produced 98 documents containing hundreds of occurrences of the terms.[iii] Many of those occurrences were in the Federal Property Management Regulation[iv] and pertained to property leases. This article will address only the limitations in the FAR. A review of the FAR documents identified four five-year limitations, as follows:

- FAR § 16.505(c)(1), a limitation on task order contracts for advisory and assistance services;
- FAR § 17.104(a), a limitation on multi-year contracts;
- FAR § 17.204(e), a limitation on contracts with options; and,
- FAR § 22.1002-1, a limitation on contracts covered by the Service Contract Act of 1965, as amended, 41 U.S.C. § 353(d).

I will discuss each of these limitations in turn.

I. The Five-Year Limit on Task Order Contracts for Advisory and Assistance Services

FAR § 16.505(c) provides as follows:

> (c) *Limitation on ordering period for task-order contracts for advisory and assistance services.*
>
> (1) Except as provided for in paragraphs (c)(2) and (c)(3), the ordering period of a task-order contract for advisory and assistance

[159] http://www.wifcon.com/anal/analfiveyear.htm, published May 2003. Vernon J. Edwards is a researcher, writer and teacher of Federal contracting.

> services, including all options or modifications, normally may not exceed 5 years.
>
> (2) The 5-year limitation does not apply when-
>
> (i) A longer ordering period is specifically authorized by a statute; or
>
> (ii) The contract is for an acquisition of supplies or services that includes the acquisition of advisory and assistance services and the contracting officer, or other official designated by the head of the agency, determines that the advisory and assistance services are incidental and not a significant component of the contract.
>
> (3) The contracting officer may extend the contract on a sole-source basis only once for a period not to exceed 6 months if the contracting officer, or other official designated by the head of the agency, determines that-
>
> (i) The award of a follow-on contract is delayed by circumstances that were not reasonably foreseeable at the time the initial contract was entered into; and
>
> (ii) The extension is necessary to ensure continuity of services, pending the award of the follow-on contract.

FAR § 2.101 defines *advisory and assistance services* and FAR Subpart 37.2 prescribes rules and guidance about their acquisition.

Note that FAR § 16.505(c) limits the duration of the "ordering period" of task order contracts for advisory and assistance services, not the duration of contractor's performance under the contract. If the total ordering period of a task order contract is five years long, including the basic and option periods, a task order may be issued on the last day of the final ordering period that could require the contractor to perform during a sixth year. However, such an order must be consistent with the *bona fide* needs rule of federal appropriations law[v] and the rules in FAR § 32.703-3 about contracts that cross fiscal years.

II. The Five-Year Limit on *Multi-Year* Contracts

This is the most confusing of all the five-year limits. The confusion stems from questions about: (1) the contracts to which the rule applies, i.e., what is a *multi-year*[vi] contract? and (2) the nature of the limitation itself.

A. What is a *multi-year* contract?

FAR § 17.103 defines the term *multi-year contract* as follows:

> "Multi-year contract" means a contract for the purchase of supplies or services for more than 1, but not more than 5, program years. A multi-year contract may provide that performance under the contract during the second and subsequent years of the contract is contingent upon the appropriation of funds, and (if it does so provide) may provide for a cancellation payment to be made to the contractor if appropriations are not made. The key distinguishing difference between multi-year contracts and multiple year contracts is that multi-year contracts, defined in the statutes cited at 17.101, buy more than 1 year's

> requirement (of a product or service) without establishing and having to exercise an option for each program year after the first.

The Air Force Materiel Command's *Contracting Officer's Guide on Fundamentals of Financial Management (January 1999)* provides a clear explanation of multi-year contracting ("multiyear procurement") on p. 111:

> Multiyear Procurement Multiyear procurement is a procurement method which commits the Air Force to buy more than one year of a program's requirements in a single contract award. In multiyear procurement, Congress acknowledges the total planned procurement for the specified period (up to five years) and commits future Congresses to appropriate funds for the future buys. However, the Congress is not bound to appropriate the funds for the out years. If adequate funds are not appropriated, the contract must be canceled and the Air Force must pay the contractor a cancellation charge. This protects the contractor against losing the nonrecurring costs invested in the program since they cannot be recovered through future Air Force payments for items which will now not be delivered. This procurement approach avoids annual nonrecurring start up costs and enhances the program's stability.

The key to understanding the difference between a *multi-year contract* and a *multiple year contract* is to understand that a *multi-year contract* commits an agency to buy supplies or services required in more than one fiscal year.[vii] The term *multi-year contract* does not include contracts for the requirements of one fiscal year that will take more than one year to complete, or contracts with options which must be exercised before the government becomes obligated.[viii]

A contract that includes an award-term incentive is not a multi-year contract *if* the contract provides as follows: (1) that an award term does not obligate the government in advance of appropriations, (2) that no award term will go into effect until the government notifies the contractor in writing that there is a continuing need, that funds are available, and that the government therefore affirms the award term, and (3) that the contractor is not entitled to payment of a cancellation charge or termination costs if the government cancels an award term before it begins. An award-term incentive clause should: (a) make all award terms contingent upon a continuing need for the service and the availability of funds, (b) make the commencement of performance under award terms further contingent upon the government's written notice of affirmation[ix], and (c) allow the government to cancel award terms at no cost to the government if there is no requirement for continued performance or if Congress does not appropriate funds for continued performance.

B. What is the nature of the five-year limit on multi-year contracts?

If a contract is a multi-year contract, as that term is used in FAR Subpart 17.2, then FAR § 17.104(a) provides as follows:

> (a) Multi-year contracting is a special contracting method to acquire known requirements in quantities and total cost not over planned requirements for up to 5 years unless otherwise authorized by statute, even though the total funds ultimately to be obligated may not be available at the time of contract award. This method may be used in sealed bidding or contracting by negotiation.

Note that this language does not explicitly limit the duration of a multi-year contract. The FAR does not say that a multi-year contract "shall not," "may not" or "must not" exceed five years in duration. It says only that multi-year contracting is the acquisition of no more than five program years' worth of requirements. However, three sections of the federal statutes address multi-year contracts: 10 U.S.C. §§ 2306b and 2306c, which apply to the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and the Coast Guard, and 41 U.S.C. § 254c, which applies to other agencies.

1. Multi-year Contracts Under Title 10 of the United States Code.

a. Multi-year Contracts for Supplies. 10 U.S.C. 2306b, is entitled, "Multiyear contracts; acquisition of property." It defines "multiyear contract" as follows in paragraph (k):

> (k) Multiyear Contract Defined. - For the purposes of this section, a multiyear contract is a contract for the purchase of property for more than one, buy not more than five, program years. Such a contract may provide that performance under the contract during the second and subsequent years of the contract is contingent upon the appropriation of funds and (if it does so provide) may provide for a cancellation payment to be made to the contractor if such appropriations are not made.

The statute makes no other mention of a five-year limitation.

The limitation in 10 U.S.C. 2306b(k) is not a limitation on the duration of the contract, but only on the number of years' worth of requirements that the contract can buy. However, an agency can buy supplies with the funds of one year and specify delivery in a subsequent year. See the General Accounting Office's *Principles of Federal Appropriations Law*, 2d ed., Vol. I, Chapter 5, Availability of Appropriations, p. 5-20:

> There are perfectly legitimate situations in which an obligation may be incurred in one year with delivery to occur in a subsequent year. Thus, where materials cannot be obtained in the same fiscal year in which they are needed and contracted for, provisions for delivery in the subsequent fiscal year do not violate the bona fide needs rule as long as the time intervening between contracting and delivery is not excessive and the procurement is not for standard commercial items readily available from other sources. 38 Comp. Gen. 628, 630 (1959).
>
> Similarly, an agency may contract in one fiscal year for delivery in a subsequent year if the material contracted for will not be obtainable on the open market at the time needed for use, provided the intervening period is necessary for production and fabrication of the material. 37 Comp. Gen. 155, 159 (1957).

So a multi-year contract for supplies with a long production lead time might be awarded on January 1, 2003, and provide for final delivery on June 15, 2008, a period of performance which exceeds five years. Thus, the total duration of a multi-year contract for products might legitimately exceed five years in duration.

b. Multi-year Contracts for Services. The next statute, 10 U.S.C. § 2306c, entitled, "Multiyear contracts; acquisition of services," provides as follows:

> (a) Authority. - Subject to subsections (d) and (e), the head of an agency may enter into contracts for periods of not more than five years for services described in subsection (b), and for items of supply related to such services, for which funds would otherwise be available for obligation only within the fiscal year for which appropriated… .

10 U.S.C. § 2306c(f) defines "multiyear contract" as follows:

> (f) Multiyear Contract Defined - For the purposes of this section, a multiyear contract is a contract for the purchase of services for more than one, but not more than five, program years. Such a contract may provide that performance under the contract during the second and subsequent years of the contract is contingent upon the appropriation of funds and (if it does so provide) may provide for a cancellation payment to be made to the contractor if such appropriations are not made.

The limitation in 10 U.S.C. § 2306c(a) appears to be a clear limitation on the "period," i.e., duration of a multiyear service contract for the "covered services"; such a multi-year contract may not exceed five years in duration. However, see the discussion in subsection 3, below, about options and award terms.

2. Multi-year Contracts Under Title 41 of the United States Code

For agencies other than DOD, NASA and the Coast Guard, statutory coverage of multi-year contracts for supplies and services is combined in a single section of Title 41 of the United States Code — § 254c. The only mention of a five-year limit in that section is in the definition of multi-year contract in paragraph (d), which reads as follows:

> (d) Multiyear contract defined. For the purposes of this section, a multiyear contract is a contract for the purchase of property or services for more than one, but not more than five, program years. Such a contract may provide that performance under the contract during the second and subsequent years of the contract is contingent upon the appropriation of funds and (if it does so provide) may provide for a cancellation payment to be made to the contractor if such appropriations are not made.

41 U.S.C. § 254c does not include the language about "periods of not more than five years for services" that is in 10 U.S.C. § 2306c(a). However, it is likely that this reflects careless statute writing, rather than any intent to establish a different rule.

3. Does the five-year limitation on multi-year contracts apply to options and award terms?

Can a multi-year contract include options or an award-term incentive that could extend coverage to more than five years worth of requirements for property, or extend the term of a service contract to more than five years? For instance, could the contract cover five years of services under multi-year provisions and then tack on another five one-year options, for a total of ten years? In *Freightliner Corporation*, a decision of the Armed Services Board of Contract Appeals (ASBCA), 94-1 BCA ¶ 26,538, 1993 WL 502202, ASBCA No. 42,982 (November 26, 1993), the Board addressed itself to the question of whether an option that covered a sixth program year worth of supplies violated the five-year limitation on multi-year contracts. The board held that "the provisions of the

multiyear statute and regulations… apply to quantities subject to a cancellation payment rather than to option quantities."[x] In explaining its conclusion the board said:

> The question is not, however, whether such a sixth program year basic quantity would have been illegal, but whether a fifth program year option quantity was illegal when, because of the award date of the contract (31 October 1984), it was susceptible of being exercised in fiscal year 1989, to fill an existing need.
>
> In considering this question, we look first to the language of the statute authorizing multiyear contracts for the acquisition of property, 10 U.S.C.A. sec. 2306(h)(l)-(ll). "[T]he starting point for interpreting a statute to the language of the statute itself. Absent a clearly expressed legislative intention to the contrary, that language must ordinarily be regarded as conclusive." *Consumer Product Safety Commission v. GTE Sylvania, Inc.*, 447 U.S. 102, 108 (1980). Appellant relies upon the following language of the statute (10 U.S.C.A. sec. 2306(h)(8)):
>
> > For the purposes of this subsection, a multiyear contract is a contract for the purchase of property or services for more than one, but not more than five, program years. Such a contract may provide that performance under the contract during the second and subsequent years of the contract to contingent upon the appropriation of funds and (if it does so provide) may provide for a cancellation payment to be made to the contractor if such appropriations are not made.
>
> This language defines a multiyear contract. It states that such a contract "may provide that performance . . . to contingent upon the appropriation of funds and (if it does so provide) may provide for a cancellation payment to be made . . . ." It does not refer to options, at least explicitly.
>
> We look next to the language of the DAR [Defense Acquisition Regulation] as in effect at the time the solicitation was initiated (DAC 76-20). (Although comment two refers to the FAR, appellant chiefly relies upon the DAR in its motion. There is no material difference for present purposes.) The DAR contained two key provisions: 1- 322.1(d) and (g). Appellant highlights DAR 1-322.1(d). It provided that "multiyear contracts for property and services shall not be used . . . (2) To obtain requirements which are in excess of the Five-Year Defense Program." Appellant argues that "[t]here is every reason to believe that when Congress adopted the 'five program years' language [in 5 2306(h)(8)]v it simply meant to 'codify' the above quoted DAR 1-322 limitation" (App. Supp. Br. at 26). Like the statute, however, DAR 1-322.1(d) did not refer to options.

The Board went on to acknowledge that the Defense Acquisition Regulation had elsewhere limited the total of basic and option quantities to five years. However, agencies can now waive that five-year limitation in accordance with their own procedures. (See the discussion of that limitation in section III, below.) Thus, since FAR § 17.107 permits the use of options in multi-year contracts and does not say that the five-year limit applies to such options, it appears, based on the ASBCA's interpretation in *Freightliner Corporation*, that the five year limitation on multi-year contracts applies to only the

multi-year portion of those contracts, and that a contract with multi-year provisions could exceed the five year limitation through the use of options or award terms.[xi]

III. The Five-Year Limit on Contracts with Options

FAR § 17.204(e) provides as follows:

> (e) Unless otherwise approved in accordance with agency procedures, the total of the basic and option periods shall not exceed 5 years in the case of services, and the total of the basic and option quantities shall not exceed the requirement for 5 years in the case of supplies. These limitations do not apply to information technology contracts. However, statutes applicable to various classes of contracts, for example, the Service Contract Act (see 22.1002-1), may place additional restrictions on the length of contracts.

This limitation, which is not based on a statute, is clear and unambiguous. It limits the total of the "periods" purchased under government service contracts with options, unless a longer duration is approved "in accordance with agency procedures." For supply contracts, the limit is not on the duration of the contract, but on the number of years' worth of supply requirements. (See the discussion, above, about the five-year limit on multi-year contracts for products.) Several agencies have established procedures for approving contracts of longer duration. See, e.g., the Department of Agriculture's FAR supplement at § 417.204; the Department of State's FAR supplement at § 617.204; and the Environmental Protection Agency's FAR supplement at § 1517.204. A review of agency solicitations available at FedBizOpps[xii] revealed that some agencies do approve service contracts in which the total of the basic and option periods exceed five years.

In order to better understand this five-year limitation, it is helpful to understand its origin. During the 1960s and 1970s, the procurement regulations that governed the use of options were somewhat more restrictive than they are today. In 1965, for example, the Armed Services Procurement Regulation (ASPR) § 1.1503(b) strictly prohibited the use of options when the supplies or services were readily available in the open market.[xiii] That restriction has since been removed and today options may be used in contracts for commercial items. Moreover, the rule at the time was to <u>not</u> evaluate options for the purposes of contract award.[xiv] The exceptions to that rule were when (1) the government planned to exercise the option at the time of award or (2) someone at a level above the contracting officer determined either (a) that the basic quantity was merely a learning or testing quantity to verify contractor or equipment performance capability, or (b) that although funds were not available to exercise the option at the time of award there was a "reasonable certainty" that funds would become available.[xv] The evaluation of options was not then a prerequisite to the exercise of an option, as it is today.[xvi] These policies appear to have been based on that belief that the evaluation of options would lead to unbalanced bidding practices and higher prices for basic quantities when there was uncertainty about whether or not the options would be exercised.

In 1969, the ASPR was revised to add the following paragraph to ASPR Subpart O—Options, § 1.1503, Applicability:

> (c) When options are to be evaluated pursuant to § 1.1504(d), the total of the basic and option periods shall not exceed 5 years in the case of services, and the total of the basic and option quantities shall not exceed the requirements for 5 years in the case of supplies.[xvii]

Note that this language limited the duration of contracts with options only when the agency was going to evaluate the options for purposes of contract award. There was no limitation if the agency was not going to evaluate the options. The limitation was undoubtedly based on the fact that the Department of Defense planned in five-year increments (as reflected in its Five Year Defense Plan), and thus there was too much uncertainty about options for requirements more than five years in the future to permit their evaluation. However, by 1980 this language had been changed to read as follows, in Defense Acquisition Regulation (DAR, as the ASPR had been renamed) § 1-1502(d):

> (d) The total of the basic and option periods shall not exceed five years in the case of services, and the total of the basic and option quantities shall not exceed the requirement for five years in the case of supplies. This five year limitation shall not apply to Automatic Data Processing Equipment acquisitions; however, the basic and option periods shall not exceed the approved systems life as defined in the Federal Property Management Regulations.

Note that the phrase "when options are to be evaluated" had been dropped.[xviii] In the years since 1969, policies restricting the use of options have been relaxed, the evaluation of options has been made a prerequisite to the exercise of options, and agencies are now permitted to waive the five-year limit. To the extent that award terms are not options, the limit in FAR § 17.204(e) does not apply.[xix] To the extent that contracts with award terms include a basic year, option years and award terms, the strict wording of the limit suggests that it applies only to the total of the basic year and the option years, but does not include the award terms. In any event, an agency can waive the limit.

IV. The Five-Year Limit on Service Contracts under the Service Contract Act of 1965

FAR § 22.1002-1 provides as follows:

> Service contracts over $2,500 shall contain mandatory provisions regarding minimum wages and fringe benefits, safe and sanitary working conditions, notification to employees of the minimum allowable compensation, and equivalent Federal employee classifications and wage rates. Under 41 U.S.C. 353(d), service contracts may not exceed 5 years.

41 U.S.C. § 353(d) says:

> (d) Duration of contract. Subject to limitations in annual appropriation Acts but notwithstanding any other provision of law, contracts to which this chapter applies may, if authorized by the Secretary, be for any term of years not exceeding five, if each such contract provides for the periodic adjustment of wages and fringe benefits pursuant to future determinations, issued in the manner prescribed in section 351 of this title no less often than once every two

> years during the term of the contract, covering the various classes of service employees.

The key to understanding the FAR and the statute is to understand how the five-year limit has been interpreted by the Department of Labor.[xx] In that regard, see 29 C.F.R. § 4.145, Extended term contracts, which provides as follows:

> (a) Sometimes service contracts are entered into for an extended term exceeding one year; however, their continuation in effect is subject to the appropriation by Congress of funds for each new fiscal year. In such event, for purposes of this Act, a contract shall be deemed entered into upon the contract anniversary date which occurs in each new fiscal year during which the terms of the original contract are made effective by an appropriation for that purpose. In other cases a service contract, entered into for a specified term by a Government agency, may contain a provision such as an option clause under which the agency may unilaterally extend the contract for a period of the same length or other stipulated period. Since the exercise of the option results in the rendition of services for a new or different period not included in the term for which the contractor is obligated to furnish services or for which the Government is obligated to pay under the original contract in the absence of such action to extend it, the contract for the additional period is a wholly new contract with respect to application of the Act's provisions and the regulations thereunder (see Sec. 4.143(b)).
>
> (b) With respect to multi-year service contracts which are not subject to annual appropriations (for example, concession contracts which are funded through the concessionaire's sales, certain operations and maintenance contracts which are funded with so-called "`no year money" or contracts awarded by instrumentalities of the United States, such as the Federal Reserve Banks, which do not receive appropriated funds), section 4(d) of the Act allows such contracts to be awarded for a period of up to five years on the condition that the multi-year contracts will be amended no less often than once every two years to incorporate any new Service Contract Act wage determination which may be applicable. Accordingly, unless the contracting agency is notified to the contrary (see Sec. 4.4(d)), such contracts are treated as wholly new contracts for purposes of the application of the Act's provisions and regulations thereunder at the end of the second year and again at the end of the fourth year, etc. The two-year period is considered to begin on the date that the contractor commences performance on the contract (i.e., anniversary date) rather than on the date of contract award.

Thus, as can be seen from the regulations of the Department of Labor, "term" of the contract means the term in effect. The exercise of an option or the start of an award term creates a "wholly new contract" for the purposes of the Act and thus resets the five-year clock. So a one-year contract with nine one-year options or provisions for nine one-year award terms does not violate 41 US.C. § 353(d).

V. Why *Five* Years?

Curiosity prompts one final inquiry: Why are the limits discussed above all set at *five* years? Why not *three* years? Why not *seven*? The five-year limits on multi-year

contracts and contracts with options originated with the Department of Defense, which suggests that they were based on the Department of Defense's five-year planning horizon, as reflected in its Five Year Defense Plan. [xxi] I have not been able to determine the reasons for the choice of *five* for the limits on the ordering period of task order contracts for advisory and assistance services and the term of service contracts to which the Service Contract Act applies; those reasons might be lost to us. They might reflect the budgetary planning horizons of the Executive Branch or some other rationale, or they might be entirely arbitrary. Five, after all, is a handy and popular number — neither too large nor too small, and as familiar to us as our fingers and toes.

VI. Conclusion

In conclusion, while the FAR sets four five-year limits on government contracts, those limits are not absolute limits on the duration of contract performance.

- The limit in FAR § 16.505(c)(1) on the total ordering period of task order contracts for advisory and assistance services is not a limit on the duration of contractor performance.
- The limit mentioned in FAR § 17.104(a) on multi-year contracts is not a limit on the delivery period of multi-year supply contracts and, if the ASBCA's *Freightliner* decision is correct, is not an absolute limit on either multi-year supply or multi-year service contracts with options or award terms.
- The limit in FAR § 17.204(e) on the total of the basic and option periods and quantities is not statutory and agencies can waive it in accordance with their own procedures.
- The limit mentioned in FAR § 22.1002-1 on the "term" of service contracts subject to the Service Contract Act of 1965, as amended, has been interpreted by the Department of Labor so as not to limit the number of options or award terms that an agency can use to extend the period of contract performance.

These five-year limits do not prevent the use of award-term incentives *if* the contract includes an award-term incentive clause that makes the contractor's right to an award term contingent upon (1) a continuing need for the service, (2) the availability of funds, and (3) government written affirmation of each award term based on need and funding. This is not to say, however, that the use of award-term incentives is a good contracting practice.

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[i] See "Award Term: What it is and how it works," by Vernon J. Edwards, at http://www.wifcon.com/analaterm.htm (October 2000); "The Award Term Incentive: A Status Report," by Vernon J. Edwards, at http://www.wifcon.com/analaterm2.htm (February 2002); and *Award Term Contracting: A New Approach for Incentivizing Performance*, by Vernon J. Edwards (Vienna, VA: National Contract Management Association, 2000).

[ii] That database includes Title 41 of the Code of Federal Regulations (CFR), Public Contracts and Property Management, and Title 48, the Federal Acquisition Regulation (FAR), including agency FAR supplements.
[iii] Many of the documents were in Title 41 of the CFR and were limitations on leases. I will not discuss them in this essay.
[iv] This regulation is in Title 41 of the Code of Federal Regulations.
[v] See the U.S. General Accounting Office's *Principles of Federal Appropriations Law*, 2d ed., Vol. I, Ch. 5, pp. 5-22 through 5-26.
[vi] FAR spells it "multi-year," but the statutes and some reference material spell it "multiyear," without the hyphen. I will follow the FAR spelling except in quotations.
[vii] Multi-year contracts have been called a special type of requirements contract. See "Multiyear Procurement: The Different Faces of Congress," in *The Nash & Cibinic Report*, Vol. 9, No. 7, ¶ 40 (July 1995) (9 N&CR ¶ 40).
[viii] See *Principles of Federal Appropriations Law*, 2d ed. (Washington, DC: U.S. Government Printing Office, 1991), Vol. I, 5-34 through 5-41.
[ix] Based on a 1925 decision of the U.S. Supreme Court, *Leiter v. United States*, 271 U.S. 204, the General Accounting Office has taken the position that, in order to avoid a violation of the Anti-Deficiency Act and the *bona fide* needs rule, the contract must provide for some "affirmative action" by the government as a prerequisite to any contractor entitlement. See *Principles of Federal Appropriations Law*, 2d ed., op. cit., pp. 6-25 through 6-28. It is not enough merely to condition the contractor's entitlement to an award term on the availability of funds. Thus, the contract award-term incentive clause should require the government to affirm (confirm) an award term in writing before it can take effect. See FAR §§ 32.703-2(a) and 52.232-18.
[x] Two members of the Board dissented. *Freightliner* has been ridiculed by two commentators; see: "Option Quantities in Multiyear Contracts: They just keep going…and going…and going," in *The Nash & Cibinic Report*, Vol. 8, No. 2, ¶ 7 (February 1994) (8 N&CR ¶ 7).
[xi] See, too, *Cessna Aircraft Company*, ASBCA No. 43196, 96-1 BCA ¶ 27,966 (September 21, 1995).
[xii] The "Government wide point of entry" (GPE) to federal business opportunities, a website — http://www.fedbizopps.gov. See FAR §§ 2.101 and 5.201.
[xiii] Old-timers who remember the ASPR may recall that the numbering system in their desk copy used a dash instead of a period between the part and the section number, e.g., 1-1504 instead of 1.1504. However, in its Code of Federal Regulations format the numbering system used a period instead of a dash.
[xiv] 32 C.F.R. § 1.1504(b) (1972).
[xv] 32 C.F.R. § 1.1504(c) and (d) (1972); § 1.1504(e) established a different rule for fixed price incentive contracts.
[xvi] See FAR §§ 17.206 and 17.207(f). The policy change to make the evaluation of options the rule rather than the exception was made in Federal Acquisition Circular (FAC) 84-37, 53 FR 17854, May 18, 1988, after the Comptroller General advised Secretary of Defense Caspar W. Weinberger that failure to evaluate options limited the effectiveness of competition under the Competition in Contracting Act. For background, see the proposed rule, 51 FR 39456, October 28, 1986. See, too, the Comptroller General's letter to The Honorable Caspar W. Weinberger, The Secretary of Defense, B-217655, April 23, 1986.
[xvii] 32 C.F.R. § 1.1503(c) (1972).
[xviii] If there is an explanation for this change, it is somewhere in the files of the DAR Council.
[xix] For a discussion of the difference between options to extend the term of a contract and award terms, see Edwards, *Award Term Contracting*, op. cit., pp. 2-5 through 2-6.
[xx] It is the Department of Labor that has the authority to interpret the Service Contract Act. See 41 U.S.C. § 353(b) and *Aalco Forwarding, Inc. et al*., Comp. Gen. Dec. B-277241, 98-1 CPD ¶ 87, 1998 WL 121352.
[xxi] Most agencies plan to a five-year budget horizon. See Office of Management and Budget Circular A-11, *Preparation, Submission and Execution of the Budget*.

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