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# US Export Controls and Technology Transfer Requirements' A UK Perspective

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# US Export Controls and Technology Transfer Requirements—A UK Perspective

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## Abstract

*It's not true that life is one damn thing after another; it is one damn thing over and over. - Edna St. Vincent Millay (1892-1950)*

The paper and discussion address the international impact of US export control and technology transfer regulations. They highlight the current importance of this issue for the United Kingdom and outline an NPS-Cranfield University research project in this area. The focus will be on the experience of the UK with these US requirements in connection with the Joint Strike Fighter (JSF) program. This is relevant as the dispute regarding JSF source



code access for the UK, resolved in 2006 at the President/Prime Minister level, was re-opened by the US in late 2009.

This is a key topic due to the White House announcement in August 2009 of an initiative to change the US export control regime. And it is a timely issue for the UK, as it prepares to conduct a Strategic Defence Review, including a review of international acquisition relationships.

The UK perception of its relationship with the US and the benefits of participation in US-led multinational projects will be influenced by its JSF experience. And the UK provides a unique perspective on the impact of US export control and technology transfer regulations, an issue of significance to those interested in multinational military cooperation with the US.

## Introduction

At the 2009 Acquisition Research Symposium, the researchers from Cranfield University presented a paper titled Innovative UK Approaches to Acquisition Management. It addressed four areas in which the experience of the United Kingdom had relevance for practitioners of defence acquisition. One of those areas involved UK participation in the Joint Strike Fighter (JSF) programme. The difficulties that arose over the US refusal to grant the UK access to JSF source codes was an indication of the extent to which US export control and technology transfer policies generate obstacles to US-led multinational programmes. The point was made that other countries would probably ask themselves the following question: If this is the way the US treats what is generally accepted to be its closest ally, what should other countries expect? The 2009 paper could at least note that this was a historical issue, resolved in 2006, once it had been elevated to the Presidential/Prime Ministerial level.

However, it was too soon to declare resolution of this issue. As noted in a December 2009 report to Congress (Gertler, 2009, pp. 14-15), the US will not be releasing the JSF source codes, and, quoting the head of JSF international affairs, "that includes everybody." The official added, "Nobody's happy with it completely, but everybody's satisfied and understands" (p. 14). Instead, a reprogramming facility will be set up to develop JSF software and distribute upgrades. Changes to the software will be integrated at that facility "and new operational flight programs will be disseminated out to everybody who's flying the jet" (p. 15). The UK MoD statement from December 2009 in response to that announcement simply noted that the JSF "is progressing well and the UK currently has the JSF data needed at this stage of the programme, and is confident that in future we will continue to receive the data needed to ensure that our requirements for operational sovereignty will be met" (p. 15).

The resurrection of the source code issue does not bode well for supporters of multinational defence programmes, particularly those led by the US. And it comes at a critical time for the UK. With a general election likely to be held before the 2010 symposium, both the major political parties have promised they will hold a Strategic Defence Review (SDR) following the election, whatever the outcome. The last SDR was done in 1998. The MoD has been working to generate the papers needed to prepare for the SDR, and most, if not all, address the importance for the UK of a strong defence relationship with the US. As no project epitomizes the UK commitment to work with the US more than the JSF, the US decision to re-open the source code issue could not have come at a more sensitive time in the UK.



There is an appreciation in the UK that the US has every justification for protecting its cutting-edge military technology. However, what may not be fully appreciated in the US is the extent to which US export control and technology transfer policies have generated disincentives among allies and partners to participate in a US-led development programme. And it is important to note that in efforts like the JSF, there is much that partner states can bring to the programme. For example, the UK is not just the only Level 1 participant in JSF, but BAE Systems is the largest sub-contractor.

The UK can provide a unique perspective on the impact of US policies, particularly due to the resurrection of the JSF source code issue. For that reason, the Naval Postgraduate School and Cranfield University will undertake a joint research effort over the next year into the impact of the US export control and technology transfer policies. The goal will be to provide the results at the 2011 symposium. The UK experience with the JSF can provide insights into the benefits and drawbacks of the US policies, which should be valuable to the US in pursuing multinational defence programmes.

## Current UK Review of Security and Defence Policy

**Green Paper.** It is worthwhile to consider the extensive work the UK is undergoing to review its security and defence policy. This is particularly valuable due to the views that have emerged regarding the importance to the UK of its defence relationship with the US. A discussion of the impact of US export control and technology transfer policies should be placed in the context of this major UK review and the key documents that have been produced.

The recent MoD paper *Adaptability and Partnership: Issues for the Strategic Defence Review (2010a)*, better known as the "Green Paper," notes that international partnerships and bilateral relationships will be important, "especially with the US" (p. 12). It goes on to comment that,

the UK has a range of close bilateral security and defence relationships. None is more important than that with the United States. The relationship is based on common values and interests which will endure in the 21st century, to our mutual benefit. The UK benefits greatly from bilateral co-operation in the nuclear, intelligence, science, technology and equipment fields. (p. 15)

The paper notably also comments that, "In Europe, the return of France to NATO's integrated military structures offers an opportunity for even greater cooperation with a key partner across a range of defence activity" (p. 15). This generated discussion in the UK, which has since abated. As indicated in the 2009 Cranfield paper, there is scepticism in the UK about the value of European programmes, such as the A-400M transport. However, it remains to be seen whether greater cooperation with Europe in general and France in particular will have any momentum when the SDR is undertaken. Certainly, to the extent that US decisions on the JSF or other programmes generates the view that the US is a difficult partner, this will buttress the case of those who support a greater emphasis on European cooperation.

One intriguing question for the UK is how the US would view a strengthened UK turn towards Europe. One of the issues the pending research will address is the perception of UK officials about the value the US places on UK contributions to the JSF. If the UK believes the US does not put great store in UK participation, reflected in the way in which it





is treated, then such a relationship could have an impact on UK views of European cooperation.

The issue of acquisition receives considerable attention in the paper, and the commentary is worth reciting in full:

In 2005, the Defence Industrial Strategy (DIS) set out a comprehensive statement of how the Government would engage with industry on the acquisition of equipment, support, and services. The *DIS* will be updated during the future Review, in the light of future military capability requirements. We will have to revalidate our overall approach to:

- Operational Sovereignty. Our Armed Forces rely on assured overseas sources for some important equipment and support but there are cases where specific industrial capability must be located in the UK for operational reasons.
- 
- International Collaboration. There are operational, industrial and economic benefits from working with other countries on acquisition. However such acquisition involves risks, constraints, and potential costs. We must choose the right approach for each project. But the Review must set guidelines.
- 
- The broader benefits to the UK from our acquisition. The Ministry of Defence must provide the Armed Forces with the equipment they require at best value to the taxpayer. However, our annual global expenditure with industry and commerce—some £20 billion per annum—means that our decisions have a significant and long-term impact on the UK's industrial base and therefore on the livelihood of many of our citizens. (p. 38)

The paper addresses the issue of defence exports, a key part of deciding whether and to what extent the UK will commit itself to a defence development programme. The paper notes that,

Support for defence exports remains an important aspect of defence policy, in that it can reduce equipment costs to the UK tax payer, support jobs, facilitate bilateral defence links with allies and friends and enables countries to take responsibility for their defence and security needs. It is therefore in the MoD's interest to work with industry to take account of possible future exports when developing equipment for the UK Armed Forces. Longer term certainty on our future equipment requirements will also help industry plan their investment in new technology. (p. 38)

Finally, the paper addresses military technology. It is fair to state that the UK has been inclined to see the benefits of cutting-edge technology. However, the paper has a more nuanced view of the issue, influenced by the UK experience in Iraq and Afghanistan. Such a shift in perspective, particularly in an era of tight defence budgets, can have an impact on the willingness of the UK to commit scarce resources to expensive, high-tech military programmes:

Loss of our technological edge in significant areas of military capability would have a profound effect on the way we operate. For at least the last twenty years, we have operated on the underlying assumption that our equipment would be more effective





than our adversaries'. If it were not, our operations would be more hazardous. Our casualty rates, in particular, could be expected to increase markedly.

We must also ensure we can bring technology to bear on the challenges we face. The most immediate threats may not be posed by the most advanced technology. The unique tactical threat posed by, for example an improvised explosive device or suicide bomber, can rapidly negate an assumed technological edge. We must be able to adjust our programmes rapidly to access the right technology in response.

A key challenge for Defence will be to monitor and respond to the increasing breadth and pace of technological change. We will need to develop a greater understanding of the requirement for technological edge in our systems and of the risks associated with losing it. We will need to be more agile in exploiting new technologies in our own capabilities. We need to recognise that the technology we require depends on the threat we face. (p. 23)

In short, the paper provides insights into some of the questions that will be addressed in the SDR, many of which will focus on the policy concerns regarding the UK-US security relationship. And the practical UK experience of operating alongside the US in Afghanistan, or in programmes such as the JSF, will have an impact on the policies that emerge from the SDR.

**Acquisition Strategy.** The MoD released *The Defence Strategy for Acquisition Reform* (2010b) to complement the Green Paper. The document notes the MoD spends £20 billion annually on goods and services, around two-thirds of the total Defence Budget (p. 6), with £6 billion on equipment and £5 billion supporting equipment in service (p. 7). The MoD reports that "nearly 90% of our equipment projects now deliver front-line needs to cost, and over 80% deliver them to time" (p. 6). However, the report highlights the challenges faced by the MoD, particularly in view of tighter budgets:

The difficulties we face in this area were considered in the independent report into Defence acquisition by Mr. Bernard Gray, which we published in October 2009. His sobering analysis, subsequently echoed by the National Audit Office (NAO), was that our overall plans for new equipment are too ambitious, and need to be scaled down to match the funding likely to be available. He also concluded that we must continue to improve the way we manage our equipment projects, both individually and as a portfolio. We accept this analysis and, building on previous reforms, have framed much of this strategy around it. (p. 7)

On the specific issue of international cooperation, the strategy outlines the key factors that should be considered, noting that

Deciding whether to acquire equipment in collaboration with other countries has crucial ramifications for its performance, cost and timescale. It often has important implications for international Defence relationships more generally, and for the Government's wider foreign and security policies. We need to make sure all these issues are properly weighed in reaching final acquisition decisions. (p. 20)

With regard to technology, the MoD states that it will be important to "examine the scope for managing technology and innovation better so that we can provide and update defence equipment more quickly, and at a price we can afford. This includes using incremental and modular approaches so that we can keep pace better with the evolving threats" (p. 10). The strategy also sets out a measurable standard for success in acquisition:



But the overall success—or otherwise—of the strategy will be visible in more transparent ways. Two clear indicators will be that, following the planned SDR, we can:

- demonstrate each year, with independent audit, that we can afford our equipment and support plans (Chapter 2); and
- demonstrate much lower levels of cost growth and delay across our equipment programme. We have set hard targets that, on average, cost growth should not exceed 0.4% a year, and slippage should be under 0.8 months. We have also set targets to ensure the large majority of projects are managed within tolerable cost and time limits each year. (p. 8)

While a program like the JSF may not be bound by the MoD's acquisition strategy, the document, like the Green Paper, provides a good insight into the key issues being considered by the MoD. As is probably the case with most military forces, the MoD's ability to tolerate cost overruns and programmatic disputes on issues like technology transfer has largely evaporated.

**Strategic Trends.** The third key MoD document is its *Global Strategic Trends* paper (2010, January 12). On the general topic of US export control and technology transfer policy and the specific issue of the JSF, the paper has particular significance due to its assessment of future trends. It predicts that "the hegemonic dominance of the U.S. will fade," and that "she is likely to remain the pre-eminent military power, although, in political, economic and military terms, she is likely to be increasingly constrained as others grow in influence and confidence" (p. 10). The paper predicts that "By 2040, the U.S. is likely to lose her hegemonic status as rising powers enjoy more rapid economic growth and close the technology gap in military capability" (p. 45).

However, the paper clearly indicates that while the balance of military power will become multi-polar, the US is likely to remain pre-eminent (p. 80). And there will remain, at least out to 2020, a global expectation that the US will provide international leadership in times of crisis (p. 46). Most pertinent for this discussion, the paper opines that while most developed countries will minimise defence expenditures, the US is likely to be the exception, "making by far the greatest commitment to defence, although its economic power and technological advantage is likely to become increasingly challenged" (p. 80).

The report notes that "Defence production is likely to become increasingly internationalised and most states will lack guaranteed access to industrial surge capacity during times of escalating tension" (p. 17). This is an issue that will become increasingly important for the UK, particularly in light of the need for supply chain agility. With regard to the JSF, it will be one of the topics the Cranfield researchers will be addressing from a UK perspective. And the specific chapter on military research and development has particular relevance to the focus of this paper and warrants extensive citation:

R&D funding can be divided into 3 broad categories: private sector; government non-military; and military. The first of these is much larger than the others and is likely to grow. However, it is increasingly likely that defence and government budgets will be unable to service the totality of the defence and security R&D need; novel approaches to address the shortfall will be sought. The development of specific military technologies will out of necessity remain largely a government activity. For the remainder, the industrial base will be stimulated through 'seed corn' initiatives that promote development of novel technologies. Other avenues that are likely to be



pursued include forming international, value-adding partnerships in military R&D. These are likely to sustain and acquire key enabling technological knowledge and capability, pull through technologies from multiple sources, particularly civil R&D, and harness the capabilities of academia and other civil research institutions. However, even where the civil sector is the dominant driving factor, transforming non-defence technologies into military advantage may require significant expenditure in defence R&D. (p. 136)

Returning to the issue of Europe and its future development in the security arena, the report judges that,

Within Europe, the EU is likely to increase its influence and expand its economic, foreign policy and security role. However, a more extensive defence relationship that would extend EU power into and beyond Europe's near abroad is unlikely. For European powers, NATO is likely to remain the defence organisation of choice. (p. 44)

And specifically with regard to further European defence integration, the assessment is that,

Further coordination of military forces is likely. In particular, financial restraints are likely to result in a requirement to pool and share capabilities, for example, capabilities such as strategic airlift. NATO is likely to remain the guarantor of European security, despite the fact that the U.S. will be less focused on Europe. The EU is likely to remain reluctant to project military power beyond the Petersberg tasks even in cases of clear multilateral interest such as in the Balkans, or where the humanitarian imperative is clear. (p. 48)

In short, the MoD prediction is that while the US will no longer have as much of a lead over all other nations as it has now, it will still be the pre-eminent military power. And while Europe may develop more capabilities, that is not synonymous with sufficient capabilities. Finally, the requirements for defence acquisition programmes will become more complicated, even without the added burden of an onerous export control and technology transfer regime.

**Character of Conflict.** The fourth MoD document concerns the *Future Character of Conflict* (2010, February 12). On defence acquisition and the importance of strong ties to the US, the paper addresses two points. The first is that in the key period around 2020, "the UK's strength in defence technology, along with many other Western nations (but probably excluding the U.S.), may have been surpassed by these emerging powers," emphasizing the likelihood is that UK defence budgets will be tight in this period (p. 29). The opinion in the paper is that "investments now in technology could hedge against relative technology decline in UK defence" (p. 29).

The second point is commentary of the centrality of the US for UK military planning. One of the key assumptions is that "the UK will act with others where shared interests and values coincide. We will routinely operate with allies and partners, in particular as a supporting partner in a U.S.-led coalition," adding that "it is extremely unlikely that the UK will conduct warfighting without U.S. leadership, but in other operations the UK may be called upon to lead a non-U.S. coalition" (p. 3).

**Bernard Gray Report.** The report from Bernard Gray (2009) was commissioned by the MoD, and intended to provide an independent assessment of UK acquisition policy. It has become an important part of the UK discussion on defence acquisition. While not



coming to any conclusion regarding the benefits to the UK of participation in multinational projects like the JSF, Gray provides the following commentary:

A number of UK acquisition projects that are currently underway involve collaboration with other nations to jointly procure equipment for use by the military forces of all of the participants. The potential economic benefits of acquiring equipment in this way are significant:

- fixed development costs can be defrayed amongst a number of partners, generating economies of scale and associated reductions in unit costs that would not be otherwise be realised. This has led the UK to participate in some smaller scale collaborative projects, including NLAW (light anti-armour missile), GMLRS (guided multiple launch rocket system); and
- projects that are very large and which could not realistically be undertaken independently by the UK; in such circumstances, collaboration affords access to technologies and capabilities that would otherwise be out of reach. This means the set of collaborative projects in which the MoD is involved are high-profile such as Typhoon, A400(M) and PAAMS on the Type 45 destroyer.

The potential benefits of collaboration are most evident on large, expensive projects with significant technical challenges to be overcome. Equally, these projects tend to have a high profile; any delay or overrun on these projects is likely to be very visible and embarrassing to the MoD.

The inherent difficulties in ensuring that all participants in any collaboration have their interests aligned is widely held to be at the root cause of many problems and, more generally, the view across the MoD and the wider defence industry is that such problems are a characteristic of all collaborative projects to a greater or lesser extent.

It is certainly the case that the divergence between the objectives of the various partners has led to problems on some projects. However, the question of whether the poor reputation of collaborative projects is warranted across the board remains open. This study has not examined the relative performance of collaborative projects in detail; the small sample and the specific issues raised in relation to each project render any such analysis relatively meaningless on a statistical basis. (p. 83)

**Haddon-Cave Report.** While not directly relevant to the issue of export controls and technology transfer, another document has relevance to the general discussion topic. The report from Charles Haddon-Cave (2009) focussed on the loss of a NIMROD aircraft in Afghanistan in 2006. The task for Haddon-Cave was to address the problems that had developed in MoD acquisition that led to a weakening of the attention to safety. However, one of the underlying themes of the report was the need for the MoD to be an intelligent customer, and not find itself at the mercy of industry and suppliers with whom the MoD were not able to properly engage.

A further point noted by Haddon-Cave was the need to control the supply chain. Again, this was under the overarching issue of the MoD's need to manage the acquisition process. But the issue has relevance regarding the extent to which the UK must be in a position to manage complex multinational programs, such as the JSF. One final theme is the need to manage capabilities through-life, and a focus on details after the initial procurement is completed. One of the issues with regard to the JSF is that the Lockheed support solutions for the F-35 may not be fully compatible with the systems the UK has in



place. As the UK has learned from other acquisitions, as well as Iraq and Afghanistan, the task is not simply providing materiel to the central distribution point, but being able to transport it that last mile. This is all the more significant for cutting-edge fighter aircraft deployed at sea.

## UK Participation in the Joint Strike Fighter

**Background.** Having placed the JSF and the specific issue of US export control and technology transfer policies in the context of the UK policy review, it is now time to turn to the JSF and UK involvement. A short review of the background of the JSF, the largest multinational development program ever and the DoD's largest procurement program in terms of total acquisition cost, is worthwhile, as is the genesis of UK participation in the JSF.

The DoD plans for acquisition of over 2,400 JSFs for the Air Force, Marine Corps and Navy for \$246 billion, with hundreds of F-35s to be purchased by US allies (O'Rourke, 2009, p. 1). In the 1990s, the US Navy, Marine Corps and Air Force were working on a next-generation strike aircraft. In 1996, the JSF project was announced by the US. At about that time, the British Royal Navy was looking at new Future Carrier Borne Aircraft capability for its CVF programme. The US and UK decided to combine efforts. The requirements of the US services drove the program, but the UK focus was on an attack aircraft with advanced Short Takeoff and Vertical Landing (STOVL) capabilities so that it could operate from forward battlefields as well as from aircraft carriers. The UK preference for the JSF was confirmed in a 2001 MOU with the US. In 2002, the UK selected the STOVL variant to meet its future requirements, with a positive review of the JSF programme and the STOVL design completed in 2005 (National Audit Office, 2008, p. 45).

It was important that as an indication of US support for this endeavour, the Office of the Secretary of Defence sent down instructions that the JSF program should emphasise international participation, and there was a consensus that the UK would participate in the program (Franck, Lewis & Udis, 2009). The US and UK engaged in extensive, detailed exchanges on the nature of the program and the UK role, compiled in the US-UK Engineering and Manufacturing Development Framework Memorandum of Understanding. Comprised of agreements, letters and other supporting material, it provides the details of the US-UK relationship on JSF.

While decisions on specific numbers of fighters to be purchased were not required at the outset, the Royal Navy and Air Force were looking at the purchase of some 150 STOVL fighters to replace the Harriers. The UK participated from the outset of the program, and is the only "Level 1" partner contributing \$2 billion to the system design and development phase (Bolkcom, 2009, February 17, p. 9). That designation means the UK has significant access to most aspects of the programme as well as the ability to influence requirements and design solutions. And the UK will not have to pay the non-recurring R&D cost recoupment charge that normally accompanies the purchase of US military equipment and will receive a share of the levies on sales to third parties.

However, the UK commitment to the JSF is not primarily based on programmatic considerations such as cost savings, but on a key national security determination. The UK made a policy decision on the need to retain an aircraft carrier capability, and the requirement for carrier-based fighters derived from that critical decision. The postponement of the aircraft carrier production schedule by another two years due to constraints on the defence budget mean that the two carriers now have projected in-service dates of 2015/16





and 2016/17. However, that decision on the carriers is separate from the discussions on the JSF fighters that will operate on those carriers.

There is no doubt that the UK has made a significant wager in tying itself to the JSF program, for if there are major problems with the fighter, the UK will need to generate a "Plan B" to avoid having its aircraft carriers merely serving as floating platforms. If the STOVL version of the JSF does not emerge, then the UK would be faced with the challenge of re-designing ships so that, for example, they would have new catapults. The UK plans to bring in a total of 138 JSF fighters, with 60 to be acquired in the period 2015-19 (Joint Strike Fighter, 2007). The MoD is already in the process of working through modelling and simulation to optimise the safety and operability of the new aircraft carriers and the JSF when the fighters arrive (Scott, 2009).

The delays and cost increases in the Eurofighter program were a factor in the UK deliberations on whether to participate in JSF. In the aftermath of the Eurofighter experience, the fact that the JSF was structured so that the most competitive firms would win contracts was appealing to the UK, and in line with the goal of pursuing more efficient acquisition programs. And the fact that the US was providing the overwhelming amount of funding for a program with cutting-edge military technology was significant to the UK.

Adding to the list of factors pressing the UK to participate in JSF, the Defence Industrial Strategy emphasises the need for the UK to remain interoperable with Allies, particularly the US. And British industrial participation amplifies the UK focus on the JSF. BAE Systems is the largest non-American participant in JSF and has hoped for around £14 billion in development and production contracts (McGhie & Gee, 2006). Such a high level of BAE participation is to be expected, as it does the majority of its business in the US and is one of the largest suppliers to the DoD. Indeed, BAE participation in the JSF was viewed in the UK as a seal of approval on the British ability to participate in cutting-edge military projects. And there are potentially significant economic benefits. Bolckcom (p. 17) notes that the DoD conducted a 2003 assessment that determined that partner nations could potentially earn between \$5 and \$40 of revenue for every \$1 invested in JSF program contracts.

It is also important to note the extensive US-UK military cooperation as the backdrop for discussion of the JSF source code dispute. Franck, Lewis & Udis (2009) note that it is estimated that 99.8% of licenses for UK-US transactions are approved, which accounts for some 8,500 items with a value of \$14 billion (p. 88). This indicates that the routine operation of bilateral defence cooperation and technology transfer proceeds without friction. Moreover, the extent of UK-US defence industrial interconnection has increased substantially. Franck, Lewis, and Udis (p. 98), citing Chao and Niblett (2006), note that aside from BAE, UK firms have acquired 50 aerospace and defence firms in the US since 2001, which constitutes some three-quarters of all foreign investment in the US defence sector. And major American defence contractors are established in the UK or have acquired operations or set up a presence in the UK.

**JSF Source Code Dispute.** With this backdrop of strong bilateral defence cooperation, the specific problems that arose regarding UK access to JSF source codes generated doubts in the UK regarding US-led military cooperative efforts that should (and could) have been avoided. Initially, UK commentary on the JSF was full of praise as a model for future multinational defence cooperation. That turned to criticism of the JSF as an example of why such efforts may not pass an all-encompassing cost-benefit analysis.





It is a key operational requirements as well as a matter of sovereignty for the UK to be able to have the information needed to integrate, upgrade, operate and sustain the JSF as required. As a practical matter, the UK cannot buy into a system that requires a US maintenance team to take care of any problems that may arise or to arrange for required modifications. The House of Commons Defence Committee (2005) reported:

It is vital that the UK gets all the information and access to technology it requires from the U.S. to have 'Sovereign Capability'—the ability to maintain the Joint Strike Fighter aircraft and undertake future upgrades independently. The UK must receive adequate assurances that it will get all the information and access to technology it requires before the programme is too far advanced. If these assurances are not given, it is questionable whether the UK should continue its involvement in the programme. (p. 3)

The Committee (2005, p. 29) emphasised the UK could not accept a situation in which it could not operate the JSF independently of the US and pressed the Defence Minister to ensure the UK would have operational independence. It noted its expectation that the MoD would set a deadline by which the assurances on sovereign capability would be obtained from the US. In December 2006, as the source code issue was heating up, the Committee warned that an assurance from the US was needed by the end of the year that it would provide the UK with all requested technical information. In the absence of an agreement by the end of 2006, the Committee called on the government to develop a “plan B” to obtain alternative aircraft (BBC News, 2006).

From the UK perspective, the history of the political discussions to resolve the source code issue is not the best advertisement for multinational programs. The fact that such issues never seemed to be fully resolved added to UK frustration with US policy. The technology transfer dispute had been raised in 2004, when Secretary of State for Defence Hoon wrote to Secretary of Defence Rumsfeld and referred to the fact that the US had signed an outline agreement on defence technology cooperation in 2002 (O'Connell, 2004). Prime Minister Blair believed he had reached an agreement with President Bush in May 2006, but the dispute lingered on unresolved until the end of the year (Baldwin, 2006). Indeed, in the US *Defense Authorization Act for Fiscal Year 2007* (2006), Congress, aware of UK concerns over this issue, flatly wrote that "It is the sense of Congress that the Secretary of Defense should share technology with regard to the Joint Strike Fighter between the United States Government and the Government of the United Kingdom consistent with the national security interests of both nations" (Section 233).

The importance to the UK of technology transfer in cooperative arrangements with the US was already set out in the MoD's *Defence Industrial Strategy (DIS)*, in which the significance of the US defence market and US defence spending was acknowledged. The *DIS* commented:

To meet our own sovereign needs, it is important that we continue to have the autonomous capability to operate, support and where necessary adapt the equipment that we procure. Appropriate technology transfer is therefore of crucial importance. This is so for any cooperative project, but in practice difficulties have arisen particularly with the U.S., whose technology disclosure policy we have found less adapted to the needs of cooperative procurement than those of our partners in Europe. To reiterate, this is not about gaining competitive advantage for UK industry; it is about being confident that the equipment we buy meets the capability requirements against which it is procured and can be modified effectively to meet



emerging requirements through life. We fully recognise the need to ensure that intellectual property is protected, and that appropriate measures are put in place to ensure this; security is a key issue for us, just as it is for the USA. But a certain degree of technology transfer is required if we are to be able to fully cooperate with the USA (or any other partner) on our equipment programmes. What we are striving towards is an agreed framework which facilitates this whilst ensuring that our mutual security needs are met. (p. 45)

Frustrations with US policy are exacerbated when problems arise even when sensitive technology is not involved. One Lockheed Martin employee noted that the restrictions on technology transfer have been “far more cumbersome and impenetrable than originally envisioned” and it is necessary to ask for Washington’s approval of “even unclassified information exchanges” (Metz, 2005, p. KN3-7). Other close allies such as Australia have found the American approach extremely trying, with Australia, at about the same time, pushing “for a resolution of long-standing technology release issues with the USA” (La Franchi, 2006). Such requirements make it difficult for partners to participate and generate a large administrative burden on team members, who face the requirement that “all information is releasable under penalty of jail terms—not a conducive atmosphere for co-engineering a product” (Metz, 2005, p. KN3-7). And this has an impact on the UK evaluation of whether participation in US-led programmes is possible, and if the benefits outweigh the costs. In late 2006, with the issue of source codes at its most contentious, an unnamed UK MoD official was quoted as stating, “If we can’t trust the Americans to provide this, then you would have to ask what else we should be doing with them in defence terms” (Baldwin, 2006).

It is worth noting the report of the Inspector General (IG) of the DoD (2008) on security controls regarding JSF classified technology that assessed seven applications from Northrup Grumman and BAE Systems for detailed review. The IG’s office also evaluated security reports on BAE facilities. While the assessment from the IG’s office was a frank statement that JSF advanced technology “may have been compromised by unauthorized access at facilities and in computers at BAE Systems” (p. ii), the specific criticism was that the DoD did not always use sufficient controls to evaluate potential unauthorised access to such technology (p. i). Indeed, the specific recommendation with regard to BAE Systems is that the Defence Security Service (DSS) could have bolstered its efforts by collecting, analysing and retaining security audit reports completed by BAE Systems, a point on which the Director of DSS concurred. And the other recommendations involved the actions of DSS.

**JSF Source Codes—The Sequel.** After the source code issue was resolved in 2006, the JSF became a low-profile project. The House of Commons Defence Committee (2009) simply noted that the MoD has assessed that the JSF programme is “progressing well” and the Committee would monitor the progress of the program (p. 47). Secretary of State for Defence Hutton announced in March 2009 that the UK would purchase three F-35B operational test aircraft, indicating the UK commitment to the Operational Test and Evaluation phase of the JSF (JSF, 2009).

However, the announcement in late 2009 from the JSF project office that source codes will not be released has re-opened the issue. And while the MoD response avoided a direct challenge on the matter, there is every reason to anticipate that UK objections raised the first time around will be reiterated. The House of Commons Defence Committee commented in its report *Defence Equipment 2010* (2010), “We also note that there still



appear to be outstanding issues concerning technology transfer for the JSF, which are of key importance to the success of the programme" (p. 25).

The second edition of the source code debate may be more heated than the first, as key UK concerns have been thrown into the mix. The US discussion on the JSF is centered on the Administration's push to cancel the second engine (the F136). As the F136 is a General Electric/Rolls Royce effort, the UK has an economic interest in the future of the second engine option. As Bolkcom (2009, February 18) noted to Congress, the UK's senior defence procurement official had stated the UK would discontinue participation in the JSF if the technology transfer issues were not resolved and if the F136 engine were cancelled (pp. 9-10). Dr. Liam Fox, currently the Conservative party shadow defence secretary, said in 2006 that a US decision to drop the F136 would "invariably effect future procurement decisions, with seriously negative consequences that may not be fully appreciated on this side of the Atlantic" (Cahlink, 2006; Warwick, 2006). In short, while not an export control or technology transfer issue, a debate on JSF source codes will probably be intensified if the second engine is deleted.

An added factor is the increase in the cost of the JSF. The UK defence budget is expected to come in for some cuts, irrespective of the outcome of the general election. The cost increases that have been noted for each JSF (from £37 million four years ago to approximately £62 million today) have generated speculation about whether only one aircraft carrier might be fully fitted out with F-35s. Other options include upgrading older aircraft, buying "off-the-shelf" competitors (such as the Rafale M or F/A-18E Super Hornet), using the CV version of the JSF instead of the STOVL version, at least on the carriers, or altering one of the carriers to an "assault" role, equipped with helicopters, Royal Marine Commandos and UAVs (Norton-Taylor, 2010). While all of this is still in the realm of speculation, the fact that such options are being considered are critical, as they arise from the fact that there is no prospect of savings with regard to the two carriers. The only savings can come from the aircraft that will be placed on those carriers.

A final consideration is the fact that the US-UK Defence Trade Cooperation Treaty, signed in 2007, is still on hold. The House of Commons Foreign Affairs Committee (2010, p. 3) noted that "We are disappointed that despite promises to do so, the U.S. Senate has not yet ratified the UK-U.S. Defence Trade Cooperation Treaty. We conclude that its swift ratification is imperative and would bring a range of benefits to both countries." The goal of the treaty, to cut red tape in the bilateral exchange of defence goods, services and information, would be a productive step forward. It is an open question whether the treaty, had it been in place, would have had any impact on the resurrection of the JSF source code dispute. What is clear is that the delay in ratification indicates to the UK that improving the bilateral defence relationship is not a top priority for the US. And it is notable that the Committee, although not referring specifically to the JSF, stresses that the UK should continue to work closely with the US but that "the UK needs to be less deferential and more willing to say no to the U.S. on those issues where the two countries interests and values diverge" (p. 7).

It is worth reiterating that the resumption of this US-UK dispute has an impact on the perceptions of other nations regarding the attractiveness of US-led military development programs. As noted by Chao and Niblett (2006):

if the United States and the UK, the two closest of allies, are unable to overcome the continuing obstacles to the efficient sharing of defense-related technologies, what hope is there for broader transatlantic defense industrial and technological



cooperation? Bilateral U.S.-UK cooperation in the fields of intelligence, nuclear defense, and military deployments is unprecedented in U.S. alliances. And the U.S. and UK defense industrial bases have become increasingly intertwined through investment and trade. And yet, the U.S. and UK governments have proved unable to institute a more open system for exchanging and transferring defense technologies, despite the stated intent of senior political leaders and extensive efforts by both sides over the past couple of years. (p. 3)

The authors stress that there is substantial willingness on the part of the UK to make this bilateral defense relationship work. The problem is the lack of a corresponding effort on the part of the US. As the authors note,

The bottom line is that UK political leaders remain committed to working with the United States as the closest of security allies. They want to be capable to deploy and operate UK forces from the outset, shoulder to shoulder with U.S. forces in the most intense and complex of battlefield situations. They also want to take advantage of U.S. defense equipment and technology for UK armed forces and to see the UK defense industry grow stronger through its involvement in the U.S. market. But this vision presupposes a level of bilateral technology cooperation that U.S. leaders appear to be unwilling to concede. (p. 5)

As indicated previously, the UK is clear about the value it places on US military and technological capabilities. However, there is, at times, a UK perception that the US does not appreciate what the UK can bring to the table in this area. As Chao and Niblett note,

In addition, the UK can bring—as it already has brought—valuable technologies to the table for the United States. The UK's track record of useful military technology innovation includes the contemporary examples of the vertical, short take-off and landing engine system and the anti-IED capabilities now deployed in Iraq. A common perception of the threats also means that the UK defense science and technology establishment is focused on solving problems in areas that are of value to the United States, such as counter-terrorism and net enabled warfare. And UK investment in cooperative programs such as the JSF can lessen the development cost for an increasingly-strained U.S. defense budget while decreasing the per unit costs of the system once they go into production. Furthermore, while incomparable in size to the U.S. marketplace, the UK defense market does offer opportunities for major defense contracts. (p. 6)

The question which seems to arise in the minds of UK officials is whether the US believes the UK actually makes a significant contribution to the JSF. This will be a topic addressed by Cranfield researchers as part of the upcoming project. However, it is worthwhile noting that this indirect question (what does the UK think the US is thinking?) is not as valuable as the direct question (what does the US think?), an issue that should be addressed in questions to US officials. At this point, the case could be made that the UK perception is that the US does not place a significant amount of value on what the UK or British industry can bring to the JSF project.

Chao and Niblett note that it should be possible to establish a close bilateral relationship on defence acquisition, as has been developed in far more sensitive areas. Confidence was built up over an extended period of time due to a body of experience, based on established procedures, and a similar long-term process will be needed in the defence acquisition area. There is already an extensive bilateral defence relationship: ten umbrella MOUs between the MoD and the DoD have generated over 100 exchange agreements and





30 project agreements. For the US, this is the largest collaborative relationship. For the UK, it is about 50% of the MoD's Defence Science and Technology Laboratory's projects. And for over a decade, US defence industries have exported over \$1 billion a year to the UK, and UK exports to the US were about \$350 million, with US defence firms having either set up operations in the UK or acquired firms (p. 21). As the authors note:

The heart of any solution must lie in the exceptional closeness of the U.S.-UK political and military relationship. The fact that there are "trusted communities" in the intelligence, nuclear and operational military fields indicates that a similar trusted community could be built in the defense-industrial realm for sharing defense technologies. And, just as with the intelligence and nuclear trusted communities, the answer probably lies in developing a set of special practices, policies, and procedures for defense technology that both sides can have confidence in. (p. 8)

**Does It Matter to the US?:** The DoD has made clear the damage done to US security policy interests by US export control and technology transfer policies. Under "Reforming the U.S. Export Control System," the key excerpts from the *Quadrennial Defense Review Report (2010)* clearly note that

Today's export control system is a relic of the Cold War and must be adapted to address current threats. The current system impedes cooperation, technology sharing, and interoperability with allies and partners. It does not allow for adequate enforcement mechanisms to detect export violations, or penalties to deter such abuses. Moreover, our overtly complicated system results in significant interagency delays that hinder U.S. industrial competitiveness and cooperation with allies.

The United States has made continuous incremental improvements to its export control system, particularly in adding controls against the proliferation of weapons of mass destruction and their means of delivery. However, the current system is largely out-dated. It was designed when the U.S. economy was largely self-sufficient in developing technologies and when we controlled the manufacture of items from these technologies for national security reasons...

The global economy has changed, with many countries now possessing advanced research, development, and manufacturing capabilities. Moreover, many advanced technologies are no longer predominantly developed for military applications with eventual transition to commercial uses, but follow the exact opposite course. Yet, in the name of controlling the technologies used in the production of advanced conventional weapons, our system continues to place checks on many that are widely available and remains designed to control such items as if Cold War economic and military-to-commercial models continued to apply.

The U.S. export system itself poses a potential national security risk. Its structure is overly complicated, contains too many redundancies, and tries to protect too much. Today's export control system encourages foreign customers to seek foreign suppliers and U.S. companies to seek foreign partners not subject to U.S. export controls. Furthermore, the U.S. government is not adequately focused on protecting those key technologies and items that should be protected and ensuring that potential adversaries do not obtain technical data crucial for the production of sophisticated weapons systems.

These deficiencies can be solved only through fundamental reform. The President has therefore directed a comprehensive review tasked with identifying reforms to



enhance U.S. national security, foreign policy, and economic security interests. (pp. 83-84)

The DoD certainly recognizes the new technological landscape. A recent example of the DoD's use of advanced technology is the order by the Air Force for 2,200 Sony Playstation 3 videogame consoles to form the basis of a new super computer (The Economist, 2009).

And recent research indicates that European firms are responding to the difficulties imposed by US policies. Bialos, Fisher, and Koehl (2009) write that "Virtually every interview we conducted highlighted U.S. defense trade controls as a 'barrier' significantly impeding Transatlantic cooperation" (p. 37). Bialos et al. note four key concerns. The first is limits on operational sovereignty, which was noted previously as of particular significance to the UK regarding the JSF. In fact, Bialos et al. writes that "The UK, one of our closest allies, as well as France and Italy, expressed strong concerns about this issue" (p. 113). The other three points noted by Bialos et al. are reliance on US International Traffic in Arms Regulations (ITAR) controlled systems generating risks of schedule delays and increases in costs; re-export restrictions; and the complications the regulations generate for multinational facilities (p. 113).

Bialos et al. also note, "There is clear evidence, beyond rhetoric, of a behavioral shift in Europe toward 'designing around' or designing out components or subsystems" controlled by the ITAR, "which has a particularly adverse impact on U.S. subsystem and component suppliers" (p. 2). Bialos et al. write,

Over more than a decade, one study after another has highlighted the problems inherent in U.S. export controls—notably the ITAR. While the specifics of these ITAR issues are beyond the scope of this study, the impact of ITAR on the Transatlantic defense market relationship is not. Market participants, U.S. and foreign, consistently report that ITAR slows the speed of obtaining licenses needed for sales and collaboration, limits the release of U.S. technology, creates business uncertainty, and generally makes the process of Transatlantic defense industrial cooperation difficult. Fairly or not, most European governments are concerned about relying on ITAR systems and subsystems because they potentially limit their operational autonomy over major systems (especially in real-time crises), introduce program delays and risks, and curtail their export flexibility for systems with U.S. components.

Years of European talk of "designing around" or "designing out" ITAR have now begun to translate into action, according to market participants—with increased evidence that U.S. ITAR policies and practices, for better or worse, are limiting opportunities for U.S. firms competing in Europe (especially at the subsystem level). This is increasingly true even among our staunchest allies.

The ITAR also inhibits U.S. firms from working with foreign firms on domestic U.S. programs and creates challenges for foreign firms seeking to enter the U.S. market. By declining to release certain information on technologies, the acquisition community can effectively preclude foreign participation.

While strong and well-enforced export controls are an important tool of U.S. national security, it is clear that the U.S. failure to address these concerns will curtail the extent of Transatlantic defense technology sharing, defense cooperation and the development of an open and competitive Transatlantic defense market. (p. 20)





Bialos et al. provide specific examples of this development. On a policy level, the French White Paper "explicitly cites the need for non-ITAR-controlled electronics components to avoid limitations on French freedom of action" (p. 114). In another instance, a country ensured operational sovereignty by "requiring that the program be staffed with domestic engineers free of ITAR restrictions" (p. 114). European firms have developed policies specifically aimed at avoiding the use of ITAR items, developing "dual track" production lines of ITAR and non-ITAR items and favouring suppliers of non-ITAR components (p. 114). Certainly, if ITAR items are superior to the non-ITAR items, the added complications may be worth the added capability. However, if the gap is not that great; ITAR requirements can be a consideration. As noted by Bialos et al., "Where the differential is not great, European governments and firms are increasingly opting for the non-ITAR choice" (p. 114).

Complaints about US export control and technology transfer policy are long-standing, and it is not clear how heavily they will weigh on the decisions of other nations to work with the US on military projects when compared to the costs of cutting-edge military development programs. As Franck et al. (2009) point out, "very few national military establishments can generate sufficient orders to sustain a weapons source of efficient size in any category" (p. 17). And with the rapid growth of military technology (and the concomitant cost growth) the essential nature of the US in any development program will clearly increase.

However, the US should consider whether it can afford to be indifferent to the willingness of other nations to participate in, and carry some of the costs of, such defence programs. Spreading the cost burden would be presumably appealing to the DoD. And increasing costs also have an impact on the production phase and potential overseas sales. It is an open question whether DoD contracts alone would be sufficient to sustain US military contractors. The Congressional Research Service noted that while the US aviation industry is positioned to compete in the growing global market for civil aircraft, "the extent to which such economic conditions may preserve an adequate U.S. defence industrial base for the development and production of combat aircraft is debatable, however, given the significant differences between civilian and military aircraft requirements and technologies" (Bolkcom, 2009, February 17, p. 17). Even US firms and the DoD may need to focus on overseas sales to sustain programs. And if the US wishes to generate sales to other nations, it will need to address the key issues of operational requirements and sovereignty which have been critical to the UK in the JSF.

Bechat, Rohatyn, Hamre, and Serfaty (2003) note that there will always be a concern in the US, as in all countries, about the leakage of technology as a result of multinational programs. However, there are benefits that also need to be considered:

Governments seeking to strengthen the transatlantic defense relationship must weigh the potential benefits of cooperation against the risks that technology shared with allies might eventually leak to hostile states or subnational groups. Although technology transfer to allies generally involve acceptable risks, those responsible for safeguarding U.S. military technology and for preventing the spread of conventional arms and WMD view technology transfer, even to close allies, as a potential threat and, therefore, as something to be tightly controlled. Close transatlantic cooperation, however, may also reduce the potential risk of technology leakage as it improves each side's perception of sensitive issues and encourages adequate levels of protection. (p. 19)



Bechat et al. note that "there continues to be broad consensus that the U.S. export control system attempts to control too much in light of the widespread diffusion of technologies with defense-related applications" (p. 30). Indeed, one of the key criticisms in the UK that will be explored in the research project is that the US approach is all-encompassing, and does not distinguish between high- and low-tech equipment. There is substantial recognition in the UK that the US has every reason to closely protect cutting-edge military technology, which it developed at significant time and expense. The problem is that the export control and technology transfer policies extend far beyond such sensitive technology to adjacent areas that, to non-American eyes, do not appear to warrant such draconian measures.

However, it is clear that transatlantic cooperation cannot work unless the tech transfer and export control issues are addressed. As Bechat et al. clearly state,

Export control difficulties go to the core of the problems that hamper transatlantic defense cooperation. Changes in the United States and in Europe will be necessary if this critical impediment to enhanced cooperation is to be removed. The U.S. export control system is broken; its technology transfer rules increasingly self-defeating and out of step with broad trends in the global and European economies. Export control reforms in the United States are therefore imperative, including shrinking the U.S. Munitions List to critical items, instituting greater corporate self-governance with government audits of performance and creating a stronger appeals process for disagreements. (p. 52)

## Conclusion

The resurrection of the JSF source code issue is an opportunity to assess the impact of US export control and technology transfer policies, and the UK perspective on this matter is of particularly value. The JSF experience may be an indication of structural problems with multinational defence projects, which may be too difficult to be feasible. Technology transfer disputes may be insurmountable. Decisions on the awarding of contracts may be too hard to overcome. Cost increases may be inevitable and excessive and outweigh political and economic interests.

If these problems are inherent in multinational development programmes, perhaps the better option might be for multinational acquisition programs. In such arrangements, there would be fewer states participating in development and more states signing up for purchase of the equipment. This could reduce the impact of some of the problem areas while increasing interoperability. However, there would still be major difficulties, and technology transfer problems, for example, would be reduced, but not eliminated.

But it is not yet apparent that issues such as export controls and technology transfer are an inherently insurmountable barrier to effective programmes. It is certainly important for friends and Allies to appreciate the concerns and interests of the US in protecting its technology. However, the US should acknowledge the views of those who it may wish to participate in a US-led defence programme. And UK views are particularly valuable, particularly as they involve a key programme like JSF. These are the sorts of issues to be addressed as part of the joint NPS-Cranfield research to be conducted over 2010-2011, with the results to be presented at the 2011 symposium.

If multinational defence programmes allow for more efficiency in development and production, and address concerns regarding protection of sensitive technology, they might



be a cost-effective option, particularly in an era of tight military budgets and rapid technological advances. However, a prohibitively restrictive export control and technology transfer regime could well negate any benefits from such multinational cooperation, and make it difficult for the US to convince other nations that they should commit themselves to a US-led military development project. In short, if the US does indeed wish to lead multinational programmes that allow for the pooling of finances, talent and technology, this is an issue of importance, not just to the UK and other friends and Allies of the US, but particularly for the US.

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# 2003 - 2010 Sponsored Research Topics

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## Acquisition Management

- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- BCA: Contractor vs. Organic Growth
- Defense Industry Consolidation
- EU-US Defense Industrial Relationships
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Managing the Services Supply Chain
- MOSA Contracting Implications
- Portfolio Optimization via KVA + RO
- Private Military Sector
- Software Requirements for OA
- Spiral Development
- Strategy for Defense Acquisition Research
- The Software, Hardware Asset Reuse Enterprise (SHARE) repository

## Contract Management

- Commodity Sourcing Strategies
- Contracting Government Procurement Functions
- Contractors in 21<sup>st</sup>-century Combat Zone
- Joint Contingency Contracting
- Model for Optimizing Contingency Contracting, Planning and Execution
- Navy Contract Writing Guide
- Past Performance in Source Selection
- Strategic Contingency Contracting
- Transforming DoD Contract Closeout
- USAF Energy Savings Performance Contracts
- USAF IT Commodity Council
- USMC Contingency Contracting

## Financial Management

- Acquisitions via Leasing: MPS case
- Budget Scoring
- Budgeting for Capabilities-based Planning





- Capital Budgeting for the DoD
- Energy Saving Contracts/DoD Mobile Assets
- Financing DoD Budget via PPPs
- Lessons from Private Sector Capital Budgeting for DoD Acquisition Budgeting Reform
- PPPs and Government Financing
- ROI of Information Warfare Systems
- Special Termination Liability in MDAPs
- Strategic Sourcing
- Transaction Cost Economics (TCE) to Improve Cost Estimates

## **Human Resources**

- Indefinite Reenlistment
- Individual Augmentation
- Learning Management Systems
- Moral Conduct Waivers and First-tem Attrition
- Retention
- The Navy's Selective Reenlistment Bonus (SRB) Management System
- Tuition Assistance

## **Logistics Management**

- Analysis of LAV Depot Maintenance
- Army LOG MOD
- ASDS Product Support Analysis
- Cold-chain Logistics
- Contractors Supporting Military Operations
- Diffusion/Variability on Vendor Performance Evaluation
- Evolutionary Acquisition
- Lean Six Sigma to Reduce Costs and Improve Readiness
- Naval Aviation Maintenance and Process Improvement (2)
- Optimizing CIWS Lifecycle Support (LCS)
- Outsourcing the Pearl Harbor MK-48 Intermediate Maintenance Activity
- Pallet Management System
- PBL (4)
- Privatization-NOSL/NAWCI
- RFID (6)



- Risk Analysis for Performance-based Logistics
- R-TOC AEGIS Microwave Power Tubes
- Sense-and-Respond Logistics Network
- Strategic Sourcing

## **Program Management**

- Building Collaborative Capacity
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Collaborative IT Tools Leveraging Competence
- Contractor vs. Organic Support
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to AEGIS and SSDS
- Managing the Service Supply Chain
- Measuring Uncertainty in Earned Value
- Organizational Modeling and Simulation
- Public-Private Partnership
- Terminating Your Own Program
- Utilizing Collaborative and Three-dimensional Imaging Technology

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