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Impact of Export Control and Technology Transfer Regimes: International Perspective

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Impact of Export Control and Technology Transfer Regimes: International Perspectives

7 January 2012

by

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Abstract

The U.S. International Trade in Armaments Regulations (ITAR) regime is a major national security and public policy issue. Exploring the ITAR environment through a set of case studies was the central idea in a project involving participants at Cranfield University (UK) and the Naval Postgraduate School.

Our colleagues investigated the effects of ITAR within the ongoing F-35 Joint Strike Fighter program, which involves the U.S. and a number of international partners, including the UK. The Cranfield report (under separate cover) was based on a survey of UK stakeholders. The results were unambiguous and striking. Our British partners conclude ITAR is a good idea gone horribly awry. Section II provides a summary.

Our main interest (Section III) is the F/A-18 tactical fighter program, which eventually involved many international partners. This collaboration was highly successful and managed to the general satisfaction of the parties involved. It was, in short, a significantly different outcome within the ITAR regime.

An introduction (Section I) provides a brief overview of ITAR and illustrates the reasons for its being controversial. Finally, our concluding section summarizes the Obama Administration's initiative to reform ITAR and offers some questions for further research in export controls in the global defense marketplace.

Keywords: Export Control, ITAR, Export Control Reform, F/A-18, F-35.

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Table of Contents

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I. Introduction

This report primarily concerns the F/A-18 as a U.S. arms export and as a case illustrating the operations of the International Traffic in Arms Regulation (ITAR) regime. It is a companion piece to a study done by our colleagues at Cranfield University at the Defence Academy of the United Kingdom titled, *Impact of U.S. Export Control and Technology Transfer Regime on the Joint Strike Fighter(JSF) Project—Views of Key UK Stakeholders* (Ito, 2011), which is summarized in Section II below.

Section I provides a brief overview of the ITAR regime. There is no intent to undertake a comprehensive introduction or to fully summarize the process. In fact, there is good reason to believe the "process" has been ill defined and not transparent (e.g., Government Accountability Office [GAO], 2007). Section I will instead explain what ITAR is intended to do and will provide some understanding of the current controversies that attend that regime.

Section II summarizes the report filed by our colleagues in the UK, whose findings and conclusions are a persuasive indictment of the current ITAR system. Section III contains our main effort—a case history of the F/A-18 as an international program. Taken with the Cranfield study, it indicates that outcomes vary across programs. This section also offers hypotheses about variables that affect outcomes for programs within the ITAR regime. Finally, Section IV provides concluding comments.

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II. ITAR: A Brief Overview

This background section provides a very brief overview of the U.S. export control scheme, known generally as ITAR (International Traffic in Arms Regulations),1 and some of its consequences. The ITAR regime was originally instituted primarily to prevent the export of U.S. and allied military technology to the Soviet Bloc during the Cold War, and as part of a multilateral framework. Principal legislative authority for the ITAR export control regulations is the Arms Export Control Act of 1976 (U.S.C. 2778(a)(2), which, inter alia, assigns regulation of the import and export of defense products to the Executive Branch.

The ITAR regime seeks to safeguard U.S. military technology by ensuring that sharing of U.S. military technologies (and related information) occurs only with U.S. persons, or after receiving U.S. Government approval (via specific approval or special exemption).

These export controls are executed by performing a number of tasks, including the following;

- maintaining a list of goods and services to be controlled—the United States Munitions List (USML);
- maintaining a registry of vetted persons who are eligible to apply for permission to export items on the USML;
- screening and evaluating applications for exports (or provision of related technical information) from the Munitions List to "non-US persons;"
- controlling resale ("retransfer") of Munitions-List items to third parties; and
- enforcing the ITAR regime (of course).

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[1] Those interested in becoming more fully informed about ITAR can find an excellent starting point in Wikpedia's ITAR article ("International Traffic in Arms Regulations," 2011) and in the Wikipedia Arms Export Control Act article ("Arms Export Control Act," 2011).

A. ITAR Rationale

The reasons for controlling military technology and keeping military materials from enemies, or potential enemies, are as old as organized warfare. It is generally fashionable (and likely correct) to consider the human element of war as being more important than the materiel. However, even if the three-to-one assessment offered in the old saying[2] is literally true, a one-third advantage in combat effectiveness can nonetheless be decisive.

There are other reasons to protect intellectual property in various forms, as the Russians have recently learned in their dealings with China. According to a number of reports (e.g., Page, 2010), the Chinese have purchased Russian tactical fighters and have exploited those sales in ways counter to Russian national interest. For example, China ordered 24 Su-27s from Russia in 1992. In 1996, the two countries reached an agreement for licensed production of 200 Su-27s (called the J-11). In 2004, the Chinese cancelled the contract after completing half of the license agreement. Fairly soon thereafter, China introduced the J-11B—with 90% domestic content (according to official statements). Chinese tactical fighters are now actively competing against Russian exports in a number of countries, including areas in Russia's "near abroad" like Azerbaijan. As one Russian official put it, "we didn't pay enough attention to our intellectual property …" (Page, 2010).[3]

While Page's (2010) report emphasizes commercial damages to the Russian aircraft industry, the harm also extends to Russian national interests. Directly, China competes with Russia for military sales—that also involve political ties and leverage. Indirectly, Chinese copies affect the capabilities of Russia's defense industries, which likely can't survive only on the Russian internal defense market (even with

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[2] The three-to-one weighting is generally attributed to Napoleon: "In warfare, the moral is to the material as three is to one" (Napoleon).

[3] More detailed discussions of the J-11 are available at *Air Force World* ("J-11," 2010), and SinoDefense.com ("Jian-11 Multirole Fighter Aircraft," 2009).

higher energy prices). Moreover, this is part of a long-established pattern of technical "borrowing" of various kinds going back many decades—certainly into the Cold War era and Chinese practice since then (Saunders & Wiseman, 2011; Tsypkin, 1992).

B. ITAR Outcomes

There is a significant body of anecdotal experience with ITAR outcomes, which includes successes. In 2005, for example, ITAR enforcement prevented the retransfer of F-16s from Venezuela to Iran (ITAR, 2011). In short, ITAR restrictions prevented retransfer of a first-line U.S. tactical fighter to a declared adversary. There were subsequent reports of the Iranians seeking fighter aircraft from Russia and China, but none of these initiatives have yet borne fruit ("Islamic Republic of Iran Air Force," 2011).

However, there are also costs, which appear in a number of forms. First are the registration fees and administrative costs of dealing with the ITAR bureaucracy. In this context, it is worth noting that the Government Accountability Office (GAO; 2005) reported an increase in nominal ITAR processing times in this decade, which means higher costs per case both for defense firms and the U.S. Government. These direct costs also include ITAR compliance personnel within defense firms ("ITAR," 2011). In a perhaps untypical example, Boeing reported (in 2006) that over 100 people in the 787 program were dealing with export-control matters (Gates, 2006).

Second are the indirect costs (difficult to quantify) of firms taking measures to avoid the ITAR regime. The motivations for doing this are made abundantly clear in our British colleagues' Joint Strike Fighter (JSF)-focused report, which is summarized in this report and has also been published under separate cover.

To take one example, Boeing, according to one source, "embarked on surreal tasks" to keep its new 787 transport aircraft completely out of ITAR reach (Gates, 2006). According to Gates, this problem originated largely in 2005—when the U.S.

State Department alleged 94 violations of the Arms Export Control Act because of exports of commercial jets which contained a “tiny gyrochip” with defense applications (Gates, 2006). In response, Boeing management concluded that the 787 must be “ITAR-free” in order to avoid significant reductions in export sales. Beyond the man-hours directly expended, , there are other questions to consider, such as the following:

- To what extent were Boeing engineers driven to “second-best” design choices to avoid ITAR strictures? For example, structural members that would have been aluminum in previous generations were simply replaced with composites (a “black aluminum” design; Gates, 2006). This falls short of the technology embodied in aircraft such as the B-2 and F-35. To what extent did the black aluminum design reflect prudent technical conservatism or acceptance of an inferior approach motivated by the need to avoid ITAR?
- To what extent did the diversion of technical and management resources into resolving ITAR difficulties prevent Boeing from forestalling or mitigating the well-publicized difficulties of the 787?

C. Other Unintended Consequences

In addition, U.S. export control regulations have been much criticized over the years by partners in multinational projects. Criticisms have stressed difficulties encountered in retaining operational sovereignty by the buying state, resulting, on occasion, in a reluctance to acquire American weapon systems.[4] This issue has been stressed by some as an important reason behind the recent decision by India to reject the U.S. entries of the F-16 and F/A-18 into its competition for a Medium Multi-Role Aircraft (Majumdar, 2011). The French have been widely reported to have stressed technical sharing in their efforts to sell the Rafale to Brazil (e.g., Colitt, 2010).

[4] Operational or “appropriate” sovereignty is a key theme in the UK’s defense industrial strategy (UK Ministry of Defence [MOD], 2005).

Also, there is reason to believe that the ITAR regime has generally lessened the international competitiveness of American industry. Supporting evidence is found, for example, in studies of ITAR and the commercial space industry by Ryan Zelnio (2006a, 2006b, 2007). He asserts, and offers empirical support for, adverse affects on U.S. firms' positions in the international commercial space market associated with changes in ITAR enforcement practices:

> prior to the change … , the US dominated the commercial satellite-manufacturing field, with an average market share of 83 percent. Since that time, market share has declined to 50 percent. While this cannot be blamed entirely on changes in export regulation, they have played a significant role in the decline. (Zelnio, 2006b)

While the Zelnio (2007) study cited (a) concerns one industrial sector and (b) has apparently not yet received standard peer review, the conclusions deserve notice. It suggests significant indirect costs associated with the ITAR regime.

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III. The Cranfield F-35 Study

The Cranfield study, "Impact of U.S. Export Control and Technology Transfer Regime on the Joint Strike Fighter(JSF) Project—Views of Key UK Stakeholders," is a serious and successful effort to determine the nature of ITAR system impacts on the Joint Strike Fighter (JSF or F-35) project from the perspective of UK industry and government players (Ito, 2011). Specifically, the study set out to ascertain UK stakeholders' perspectives for both development of the aircraft and the F-35's logistic support.

Our colleagues' conclusions are unambiguous and should be cause for concern among U.S. policy makers. Although the UK respondents believe the ITAR regime serves legitimate and useful purposes, it is, in practice, costly and counterproductive—"fundamentally flawed in its implementation" (Ito, 2011, p. 31). The predominant UK perspective that surfaced is that the ITAR system in practice (a) creates delays, (b) discourages (to the point of effective prohibition) cost-saving measures and innovations, (c) unnecessarily restricts information sharing, and (d) makes supply chain management unnecessarily complicated. One primary cause for dissatisfaction is the tendency of the U.S. Government to implement ITAR directives to protect everything, without any real sense of what information is critical and what is not. It "fails to provide a focus on effective security for truly sensitive items." Moreover, there was considerable "frustration with the extent to which U.S. requirements come into play on non-U.S. military items, such as the Eurofighter Typhoon." (Ito, et al., 2011, p. 2).

The result is an export and technology control system that actively (a) delays development and acquisition, (b) discourages cost reduction measures, and (c) impedes improvement in performance of the equipment purchased. Moreover, the UK respondents suspect that the ITAR system, as currently implemented, is not very good at protecting sensitive U.S. technology. Consequently, there is considerable impetus in the UK toward defense acquisition processes that fall outside the reach of

the U.S. ITAR regime. As the Right Honourable James Arbuthnot put it, "I would encourage UK industry to design around the U.S. International Trafficking in Arms Regulations (ITAR) and produce ITAR-free items." (Chairman of the UK House of Parliament Defence Committee, quoted in Ito, 2011, p. 30).

IV. The Boeing F/A-18 Hornet[5]

Our effort centers on a U.S. perspective based on past experience. We chose to study a similar, but nonetheless different, program, the F/A-18 tactical fighter—with emphasis on its international dimensions. From this study, a much different picture emerges. We conclude that the F-18 international consortium has been well organized and well managed—with all concerned parties generally satisfied with the results. We essay explanations for those differences below.

A. Background and History

The F/A-18 aircraft is a supersonic, all-weather, multi-role fighter designed for carrier operations against air or ground targets. The aircraft is operated by the U.S. Navy and Marine Corps principally from carriers; although, foreign buyers utilize it as a land-based system. The prime contractor is Boeing (after its absorption of McDonnell Douglas) while Northrop Grumman serves as primary subcontractor. Northrop's responsibilities include the center and aft fuselage sections of the aircraft while Boeing is responsible for the rest—this includes final assembly. By work share, Northrop Grumman (formerly Northrop) provides about 40% and Boeing (formerly McDonnell Douglas) about 60%. For the E/F model, discussed later in this section, Northrop's work share increased slightly to 42%.

The F/A-18 emerged from the U.S. Navy's Naval Fighter-Attack, Experimental (VFAX) program that was charged with developing a multirole aircraft capable of replacing the A-4 Skyhawk, the A-7 Corsair II, remaining F-4 Phantom IIs and to complement the F-14 Tomcat.[6]

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[5] Various Wikipedia articles provide good historical and technical background information on the F/A-18, especially the McDonnell Douglas F/A-18 Hornet (2011) and VFAX (2010). The report on the Boeing F/A-18 by Richard Aboulafia (2010) is also very useful.

[6] In fact, the VFAX term applies to two specifications for two different naval fighter projects. The first sought a light, low cost complement for the F-111B capable of replacing the F-4 Phantom II for air

Responding to 1973 Congressional mandate, the Navy sought a cheaper alternative to the F-14. Grumman and McDonnell Douglas each proposed somewhat less expensive variants of the F-14 and F-15 but their costs were still viewed as too high. Defense Secretary James Schlesinger then directed the Navy to examine the two competitors for the Air Force's Lightweight Fighter (LWF) program, the General Dynamics YF-16 and the Northrop YF-17. However, that program was focused on a day fighter without strike capacity and thus, failed to meet the Navy's needs. However, some in Congress saw the possibility of new technologies developed for the LWF program making a useful contribution to the Navy's needs and in May 1974, the House Armed Services Committee transferred $34 million from the VFAX program to a new effort, the Navy Air Combat Fighter (NACF) program.

Although the YF-16 won the Air Force LWF competition, its single engine and narrow landing gear led the Navy to conclude that it was not suitable for carrier service. The YF-17, however, offered two engines and was seen as possibly of interest for naval needs. Subsequently, the Navy received permission to pursue such possibilities and it asked McDonnell Douglas and Northrop to design a new aircraft using the configuration and design principles which had been utilized on the YF-17. Northrop had recruited McDonnell as a secondary contractor to benefit from its long experience in building carrier aircraft.

What emerged from the partnership was the F-18, and while it differed significantly from the YF-17, its family connection should be recognized. On the F-18, the two companies originally planned to evenly divide the parts production with McDonnell building the wings, stabilators, forward fuselage, and being responsible

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control, escort, and air-to-ground missions in the early 1960s. This vision was eliminated when the F-14 Tomcat was selected as the VFX winner, but it soon became clear that this aircraft was too expensive to replace the variety of missions performed by all Navy fighter and attack models. The second VFAX saw the Navy "invited" by the Secretary of Defense to examine the entrants to the Air Force's Lightweight Fighter Program. As noted in text, the Navy selected the loser of the Air Force competition, the YF-17 ("VFAX," 2010).

for the final assembly, while Northrop was to build the center and aft fuselage and vertical stabilizers. Northrop saw a possible export market for a land-based version (the F-18L) and assumed prime contractor responsibility and final assembly of that version while McDonnell acted as prime contractor for the naval version.[7]

McDonnell undertook substantial modifications of the YF-17 to prepare it for carrier operations. These modifications enlarged and modified the structure of the aircraft and added to its range. A most important modification was to replace the computer-assisted control system of the YF-17 with a digital fly-by-wire system with quadruple-redundancy, the first to be introduced into a production fighter aircraft.[8]

Northrop's[9] hopes for a significant export market for the F-18L were not realized. The F-16 became highly successful on export markets and Northrop's relations with McDonnell deteriorated over what Northrop saw as a violation of original plans to avoid direct competition abroad between the F/A-18 and F-18L. Northrop sued McDonnell in late 1979 for unauthorized use of Northrop technology for foreign sales of the F/A-18. The case was settled in 1985 when McDonnell paid Northrop $50 million for full rights to the design with no admission of wrongdoing. The significance of the settlement was limited because by then, Northrop had ended work on the F-18L.

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[7] The original plan called for production of three versions—a single seat fighter, a single seat attack plane, and a dual seat trainer that contained full mission capability except for a reduced fuel load. Improvements in stores stations and more advanced avionics and multifunction displays enabled the separate fighter and attack versions to be combined into a single aircraft. This was recognized in 1980 and the name was formally changed in April 1984 to the F/A-18A. The two seat model became known as the F/A-18B ("McDonnell Douglas F/A-18 Hornet," 2011).

[8] Another significant improvement resulted from having the issue of maintenance incorporated into the design, which resulted in the F/A-18 requiring much less downtime than heavier predecessors such as the F-14 Tomcat and the A-6 Intruder. Its mean elapsed time between failures is three times greater than other strike aircraft and it requires half of the maintenance time. The same design principles were utilized in the development of its General Electric F404 engines, which are less susceptible to stall and flameout than other comparable-sized engines ("McDonnell Douglas F/A-18 Hornet," 2011).

[9] We refer to "Northrop" as the aircraft manufacturer prior to merger with Grumman (1994).

The F/A-18A had its first flight in November, 1978, and its first Navy flight in March, 1979. It entered operational service in Marine and Navy squadrons in January and March, 1983. Its first combat operations took place in April 1986 during Operation Prairie Fire against Libyan air defenses. Funding for the C/D models began soon after in the FY1986 budget. The new model saw a number of improvements introduced.

F/A-18C/Ds were equipped to carry up to six AMRAAM (Aim-120) missiles and up to four IR Maverick (AGM-65) missiles. In addition, provision was made for integration of the AN/ALQ-165 Advanced Self-Protection (ASP) Jammer system and reconnaissance equipment. Stores management was improved with upgraded computer hardware and memory capacity. An improved mission computer and new Flight Incident Recorder and Monitoring Set (FIRAMS) were also installed. Models produced after 1993 were equipped with APG-73 radar, which was more capable than the APG-65 original equipment.

Despite these improvements, in 1987, the DoD commissioned McDonnell Douglas to study possibilities for further upgrade packages, with Project Hornet 2000. Four configurations were produced, which were aimed at addressing the frequent criticisms leveled at the F/A-18s: limited range and weapons load. Although Project Hornet 2000 was dropped, its studies provided useful approaches for the redesign of the A-D models into the E/F, or Super Hornet.

The arrival of development funds for the E/F versions was accompanied by reductions in appropriated funds for the earlier C/D models --especially in FY1995 and the DoD requested no R&D funding for C/D models in FY1997. U.S. procurement of C/D models ended in FY1998 at a total figure of 635 aircraft.

Although the E/F version continues the basic name and design concept of the original F/A-18, it was significantly redesigned. Although originally maintaining 90% avionics and software commonality with the F/A-18C/D model, its airframe is 25% larger and features radar, avionics, and weapons upgrades and more powerful

engines. Its weapons and fuel stores capacity have been significantly increased and it can be utilized as an aerial refueling tanker. The newer models also provide frontal stealth qualities.

The enhanced capabilities of the F/A-18E/F Super Hornet are a possible explanation for the Navy's decision not to seek to develop a direct replacement for the F-14 Tomcat. The multiple mission suites of the Hornet and Super Hornet may have allowed the retirement of a sizeable number of specialized Navy aircraft,[10] which had been fulfilling its combat aircraft roles with an associated reduction in logistics complexity.

The first production model of the Super Hornet was delivered to the Navy in December 1998. It is built by a team consisting of Boeing, Northrop Grumman, GE Aircraft Engines, Raytheon, and more than 1,800 suppliers (domestic and foreign).

B. Export Sales of the F/A-18

The F/A-18 represents the largest multinational cooperative program in which the U.S. Navy has ever been involved. To date, seven foreign countries have purchased variants of this aircraft, principally the A-D models, and Australia has also chosen to acquire the E/F model. The others in the user community are Canada, Finland, Spain, Switzerland, Kuwait, and Malaysia. With the exception of Canada, all of the others have chosen to use the Foreign Military Sales (FMS) route.

In other words, the export customers for the F-18 joined the acquisition process when it was almost complete. The U.S. Navy was the intended customer for the F-18 in its original form. Everything in the process from user needs to the Production Decision at Milestone C (inside a triangle) occurred with that in mind -- only after the design was final, testing completed, and production well underway. In

[10] Aboulafia (2010, p. 16) identifies such retired aircraft as the F-14, A-6, S-3, KA-6, and EA-6. While recognizing the associated loss of specialization, he concludes that "the Super Hornet does these jobs very well."

contrast, the F-35 JSF international partners became involved early on in the process, and as it turns out, that involvement has made a significant difference.

Because the U.S. Navy is the military Service employing the F-18, with Navy practices, it is the intermediary that acts as the purchasing agent for the foreign buyers in dealing with the manufacturers of that product. It should be noted that, unlike the F-35 Joint Strike Fighter case, these countries are buying an already existing aircraft currently in use by the U.S. Navy. Hence, although slight modifications are possible, their role essentially is that of customer rather than partner.

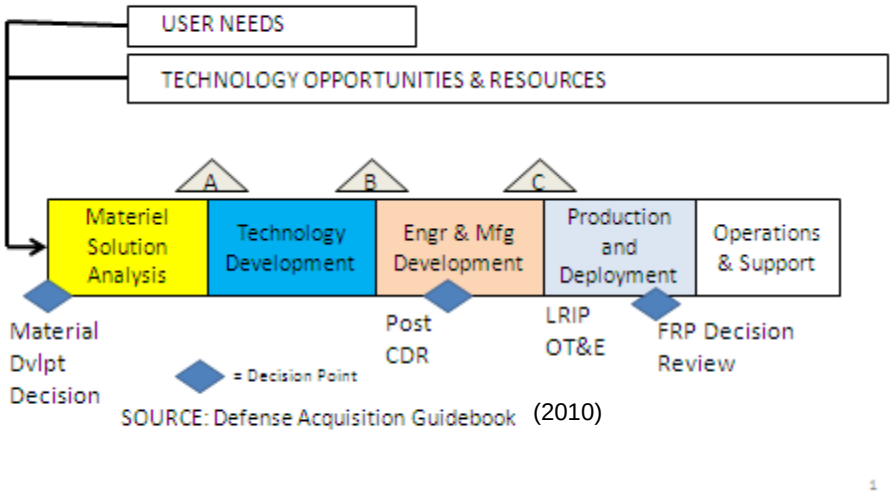

Figure 1. Lifecycle Framework View

Matters such as the location of the assembly facility and the identity of the organization doing the assembly as well as subsequent maintenance and modification, unless specified in the respective Memoranda of Understanding (MOUs), is an issue for determination between the customer and the principal contractors. In effect, this takes the U.S. Government outside of the process concerned with industrial participation in the buyer country.

Throughout the entire post-World War II period, countries buying foreign aircraft and other advanced technology products have attempted to acquire the underlying technologies in order to lessen their dependence on foreign sources. Frequently, this goal also reflected a belief that advanced technologies were the key to modern economic growth and a higher standard of living. These demands for industrial participation were often a major factor in selecting the winner of contract competitions (Udis, 2009). Not infrequently, they led to conflict with the supplier state over a perceived need to protect what were viewed as technologies crucial to national security. In the F/A-18 case, these conflicting goals were played out in the context of U.S. export control and technology transfer regulations.

C. Export Controls and the International F/A-18 Program

This section focuses on the export control issue but first, we will examine some production figures which have a bearing on the topic. A recent Naval Air Systems Command (Navair) report identified total deliveries of F/A-18 aircraft between 1980 and 2000 at 1,480, which includes exports in excess of 400 (Powell & Renko, 2010a) The dates of the announcements of purchase decisions ranged from 1981 (Australia) to 1993 (Malaysia). With the exception of Kuwait and Malaysia, all of the export buyers participated in the assembly of their aircraft. The same group (Australia, Canada, Spain, Switzerland, and Finland) all participated, also to varying degrees, in the mid-life upgrades that they had all ordered. Without exception, all of the countries in this group claimed significant industrial benefits and technological advances from their experiences with the aircraft.[11] This resulted in a high level of satisfaction with the performance of their aircraft and their working experience with U.S. Navy and industry personnel.

However, not all the projects were trouble-free, particularly with respect to the application of U.S. export control and technology transfer regulations. As noted

[11] This and related information was obtained in a series of confidential interviews held with representatives of these five countries in June, 2010, and February, 2011.

above in this section, this aircraft was an already existing and in-service weapons system in the U.S. Navy and no sophisticated buyer would have expected to have *carte blanche* access to its complete technology suite. They did not enter as dues-paying partners, participating in the development process almost from the very start (as in the F-35 program). Most of the complaints dealt with more mundane issues like transfer of spare parts and test and repair capabilities between countries that had already been certified as members of the F-18 user community.

One would have thought that the securing of a blanket retransfer agreement in 2001,from the State Department would have resolved such problems. Ostensibly, it covered the retransfer of

> common and unclassified items and tech data of the F/A-18 weapon system between the international users; [freed such users from any] requirement to apply for advance USG consent for items on the "Master List" ; [and delegated to PMA265] authority to amend/mod the "Master List" by Department of State (DOS)..

Over time it became clear this authority was also necessary to allow users to coordinate joint development efforts.

An MOU was obtained in 2005 to address this issue. It allowed "multinational exchange of information and initiation, conduct and management of cooperative efforts [and also permitted] cooperation in acquisition arrangements and research, development, testing, evaluation, and production (including follow-on support) efforts" (Powell and Renko, 2010b).

The arrangement that arose from these understandings is depicted in Figure 2. The agreements between the U.S. and the FMS customers allowed for much freer exchange of information between the various F-18 air forces and their trusted industry partners.

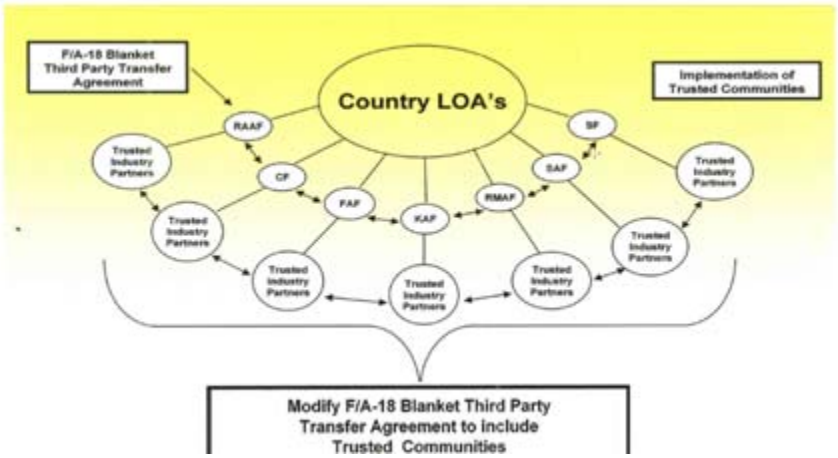

Figure 2. F-18 FMA Process

Source: Powell and Renko, 2010a

Bilateral clarifications and modifications would appear on their face to alleviate potential problems, but a seemingly minor point (that they apply only to government-to-government transactions) became a troublesome issue. For example, it was assumed that international customers would make use of in-country support, which is to say local industry in support of government organizations. The ownership of the support organization would play a role in determining the necessity for a third party transfer permit from the U.S. Department of State.

Thus, if the support organization was a government organization, perhaps an armory, no third party transfer would be necessary because the transaction would then be considered government to government. If, the facility were privatized,[12] and nothing else changed, such a transfer permit would likely be required. If there were two private support organizations located in different countries attempting to deal with one another, the complexity could easily grow even more.

[12] Any ownership share of less than 100% by the government is considered private by the State Department.

A related problem is found in the State Department's definition of the term "agent." Existing FMS rules limit transfer rights and the ability to use intellectual property and material to a customer government and/or its agents. The word "agent" has been used to mean a freight forwarder only. Contractors fall outside of that definition,and in an environment where increased use has been made of outsourcing, wherein government employees work with a workforce of contractors, such a narrow definition has caused difficulties.

Under current ITAR regulations, the export of components and spare parts must be separately approved, even when they are to be used in support of previously approved and exported end products.

Although the above examples represent problems that have been encountered through the life of the F/A-18 export sales, a new and widespread concern has appeared as the U.S. Navy approaches the end of its production run for that aircraft as its planned acquisition of the F-35C looms. Many of the foreign users of the F/A-18 intend to continue their use of that aircraft after the U.S. Navy expects to retire its use of that plane. The closure of U.S. production lines has introduced a serious concern about continued access to U.S. supplied parts and other essential components for foreign inventories. The Navair International Programs group has undertaken a major effort to alleviate that potential problem through careful advance planning. This effort has been described in the Navair document entitled "Sundown/Sunrise Plan" (Powell and Renko, 2010b). This effort was widely praised by the foreign representatives with whom we met.

D. Summing Up the F/A-18 Program Experience

In our ongoing series of studies of multinational weapon system projects, we have encountered somewhat different attitudes toward the problem of dealing with U.S. export control and technology transfer regulations. We have identified several factors that may explain such different experiences. They may not be completely

independent of one another but they may help in understanding how essentially the same set of regulations may have varied so widely in the reactions of the players.

1) Where the foreign participants appeared on the scene in the life cycle of the system. U.S. defense acquisition and life cycle management processes basically center on three stages: (a) pre-systems acquisition (engineering and manufacturing development); (b) acquisition (continued engineering and manufacturing development, production and deployment); and (c) sustainment (operations and support). All other things being the same, the closer the foreign party enters prior to systems acquisition (or earlier in the process), information sharing will generally be easier.

2) Exogeneous conditions surrounding the entry time. For example, the stringency of enforcement can be expected to increase in periods of crisis such as what occurred after the attacks on the U.S. on 11 September 2001 (GAO, 2005).

3) The degree of risk tolerance among project administrators. It is generally easier (and safer) to reject a request for change than to grant it. The attitude of superiors plays an important role here. For example, is a mistake viewed as a learning opportunity or a "kiss of death"?

4) The culture from which the administrator originates. Engineers, broadly speaking, are trained to be problem solvers, whereas lawyers are more inclined to be problem finders (and then take steps to close loopholes).

5) The nature of the purchase agreement may influence access to information. Foreign Military Sales (FMS) arrangements are often viewed as more likely to be associated with more liberal information sharing than direct commercial sales because the military Service whose weapon system is involved in the transaction serves, to some extent, as the intermediary between the buyer and the U.S. government.

E. Postscript: Is the F/A-18 Program a Good Fourth-Generation Hedge for a Fifth Generation Program?

The combination of the continued success of the F-18 program combined with the well-known, long-running, and very expensive troubles with the F-35 Joint Strike Fighter (JSF) may well make the F-18 something of an embarrassment to the U.S. Department of Defense, which seems to have gone "all in" with the F-35 for tactical

fighter modernization. The F/A-18 successes have been embodied in new models such as the Super Hornets (F/A-18 E/F and EF-18G), but also in upgrades to older models.

For example, in January 2011, Defense Secretary Gates announced that the U.S. Navy would buy 41 additional F/A-18s (Super Hornets) to address the gap caused by delays in F-35 deliveries. Somewhat earlier, Australia increased its order of Super Hornets by 24 units for the same reason—and also to fill the gap in its forces caused by the retirement of F-111 aircraft. (Warwick, 2011; Hennigan, 2011)

Whether Warwick's (2011) journalistic spin, which suggests that the "growth Hornet" is a "JSF Killer," is prophetic or far off the mark remains to be seen. Spokespersons for the U.S. and Australia insist that the additional F/A-18 orders are simply gap fillers (Warwick, 2011). In any case, Boeing is offering a menu of F-18 upgrades, including signature reductions, for F-18 customers (current and potential, Fulghum, 2011). It appears that the F-18 case rests on that fighter often being good enough (perhaps with upgrades), and significantly cheaper than fifth generation designs.

V. Wrapping Up

As noted above, this report is a companion piece to the efforts of our colleagues at Cranfield (Ito, 2011). They focused on a current international tactical fighter program—the F-35 Joint Strike Fighter. We took on the F/A-18 Hornet—also an international tactical fighter program. Without taking exception to their findings and conclusions, we conclude that ITAR's effects vary with a number of situational variables, including the structure of the program, timing of the transactions (post-9/11 vs. pre-), and the parts played by the many program administrators (both aircraft program managers and ITAR administrators).

A. The Administration's Export Control Initiatives

Export control in general, especially ITAR, is a moving target for researchers. After a long and rather unsuccessful history of attempts to reform the Cold-War vintage collection of U.S. arms transfer regulations, a new attempt shows promise of adoption. In April 2010, the White House announced a new Administration plan for sweeping reforms aimed at the establishment of a single control list, administered by a single agency for licensing and enforcement, using a single information technology.

The foundation for this initiative comes, among other things, from a review of the U.S. Export Control System to identify possible reforms, which was directed by President Obama. In an August 2009 statement, he commented that "we need fundamental reform in all four areas of our current system in what we control, how we control it, how we enforce those controls, and how we manage our controls" (White House, 2010).

The "interagency task force" that conducted the review reported the current system as seriously (if not comprehensively) broken. This assessment was based on observed fragmentation and duplication of function and authority, grossly inadequate communications and coordination processes, and a swollen control list

(White House, 2010). The overarching recommendation from the task force was "to build higher walls around a smaller yard" and focus efforts on the "crown jewels."[13] The President supported those findings and recommendations, and embarked on a program of "fundamental reform" (White House, 2010).

Furthermore, the Administration has made those reforms a major initiative. The effort was launched in 2010, and was reaffirmed in 2011 (White House, 2010, 2011b). In addition, a number of initiatives have been introduced to establish special understandings with various nations with whom the U.S. is on good terms—a recent example being India (White House, 2011a). Incidentally, this effort dovetails nicely with the Administration's proposals for export promotion (Kaye-Scholler LLP, 2010).

The reform program focuses on four key areas: control list, enforcement coordination, information technology (IT), and licensing. The overall intent is to achieve "transformation" to a unified system (e.g., with a single control list). Getting there entails changes authorized by both the Executive (Executive Orders) and Congress (new legislation).

The Administration views reform as occurring in three phases. First, items are stated as immediate improvements to the existing system (likely built on Executive Orders)—in all four areas. The second phase is a "fundamentally new U.S. export control system," and entails notification of, and coordination with, Congress. The third phase completes the transition to the new system and involves new legislation (White House, 2010).

[13] In a very real sense, this echoes the old saying "he who protects everything protects nothing," attributed to Sun Tzu and Frederick the Great, among others. Our Cranfield colleagues found similar sentiments among F-35 stakeholders in the UK.

B. Export Control: Some Questions for Further Research

There is a considerable body of research done in case study form. There are also a number of publicly available reports (e.g., Gates, 2006), which provide interesting anecdotal information. There is more research to be done.

Based on our research thus far, we believe the following is a partial list of questions to be pursued.

1) What are the full costs imposed by the ITAR regime? To taxpayers? U.S. industries? To allies? Although there is a broad understanding that ITAR does indeed impose costs, there is clearly more to be done -- including (a) cataloging the impacts, (b) quantifying those impacts, and (c) measuring the effects (perhaps in monetary terms).[14]

2) To what extent can ITAR reform address those costs?

3) Is ITAR fundamentally incompatible with operational sovereignty? If not, how can that problem be addressed? "Operational sovereignty" (or "appropriate sovereignty") was a key part of the UK's Defense Industrial Strategy (UK MOD, 2005). We think it is key to understanding the defense industrial concerns of allied nations in the international defense market.

4) Is a network of "most favored nations" workable in the current ITAR regime?[15] Advantageous? Inadvisable? Would it be useful if effective export control reform were fully implemented?

[14] These steps are, of course, part of standard Cost-Benefit Analysis (CBA) methodology (Boardman, et al., 2006, p. 6).

[15] This is part of a set of bilateral initiatives involving Australia, the UK, India, and other nations. Both the Bush (II) and Obama administrations have pursued them.

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