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Injecting New Ideas and New Approaches in Defense Systems: Are "Other Transactions" An Answer?

by

Richard L. Dunn

CENTER FOR PUBLIC POLICY AND PRIVATE ENTERPRISE
SCHOOL OF PUBLIC POLICY

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Abstract

"Other Transactions" (OT) Authority permits a form of contracting for research, development and for conducting prototype projects (and their production and deployment follow-ons) that is an alternative to military contracting under the *Defense Acquisition Regulations* and related statutes and regulations. This research shows that OT contracting can often produce better results, faster and at lower cost than contracting under *FAR*. Moreover, OT contracting has proven to be attractive to commercial firms that traditionally have spurned DoD R&D business. Thus, it has the potential to greatly expand the industrial base available to DoD. OT contracting has been limited by a number of factors: DoD acquisition personnel are generally poorly equipped to engage in freeform OT contracting; OTs have also been restricted by a broad misperception of their potential and risks involved; and there has been a tendency to restrict OTs to a niche role and to impose restrictions by regulation and statute. DoD could benefit greatly by expanding its use of OTs and recognizing them as a significant alternative to traditional contracting.

Injecting New Ideas and New Approaches in Defense Systems—Are "Other Transactions" an Answer?

Introduction

An analysis of today's defense acquisition landscape might engender a variety of reactions, depending on the critic. Some, like Dr. Pangloss in Voltaire's *Candide*, might see a system that is the "best of all possible worlds" despite some imperfections. Others might see a cumbersome, arcane, virtually irrational system, and ask "why?" Still others foresee that with strong leadership, changes in culture, a "can do" attitude and relatively minor changes in laws and regulations, a much improved system could be established. They ask, "why not?"

The "best of all possible worlds" view asserts that the defense acquisition system has allowed the United States military to operate world-class weapons systems in virtually every category. "How can you argue with that?" they challenge. The counter argument is that defense systems cost too much, take too long to develop, and often do not actually meet the needs of the current operating environment, despite their technical sophistication. Moreover, our adversaries have access to commercially available technologies and are quickly and successfully incorporating them into makeshift weapons; thus, we are hard pressed to keep up with rapidly changing threat environments. Those who argue "why not" assert that the weaknesses of the defense acquisition system are well known: they have been repeatedly studied over the decades and have persisted despite numerous reform attempts. It is clear that leadership and vision, culture change, getting rid of the "deadwood" (both unnecessary regulation and business-as-usual "just say no" personnel) and learning to incorporate the skills needed in the globalized, commercial marketplace are the essentials to creating an acquisition system that meets 21st Century needs.

This research explores whether an alternative method of contracting available to DoD ("Other Transactions") can be a significant instrument in creating a rational, alternative acquisition system that, where applicable, can facilitate a broad culture change in DoD acquisition processes, and if it can allow access to a globalized, commercial market—in order to satisfy many defense needs.

This report seeks to answer several questions about the implementation of OT, including: can "Other Transactions" attract commercial companies ("non-traditional contractors") to participate in defense programs, either on their own or in collaboration with traditional defense contractors? What are the obstacles to achieving that result? Will achieving that result solve significant problems of the defense acquisition process? Are there additional benefits from "other transactions," such as integrating the innovation, speed and low-cost of commercial firms with the experience of defense primes in major systems acquisitions?

Today's Challenges: Innovation and the Rapid Transition of Technology to Defense Capabilities

The Response to the Current Threat Environment.

In the first decade of the 21st Century, the U.S. faced several challenges to its national security: the U.S.S. Cole was attacked in a foreign port; the United States was attacked on its own soil and was engaged in hot wars that evolved into counter-insurgency/nation building operations in Afghanistan and Iraq; and, as a result of this involvement, the U.S. also responded to a variety of other contingencies. These challenges were markedly different than those America faced in the Cold War or early post-Cold War period. The force structure, training and equipping of our military all had to change to meet these new conditions.

Additionally, the acquisition system was challenged by several new trends. One was the increased presence of civilian contractors going in "harm's way" to provide essential support to deployed military forces. Another was the prevalence of rapidly developing, asymmetrical threats. Iraqi insurgents had access to readily available, abandoned or

imported munitions, which were then combined with commercially available technologies to create improvised explosive devices (IEDs). IEDs became characteristic of the conflict in Iraq, inflicting many American casualties and wrecking unarmored or lightly armored vehicles. The variety of suicide bombing techniques required new ways to ensure the security of military personnel and installations. The possibility of cyber-attacks on our increasingly net-centric operations constantly looms as a potential catastrophic threat. Challenges such as understanding "human terrain" and battlefield forensics require skill sets and technology that may not be the strong suit of either military or defense industry professionals.

The Department of Defense acquisition system reacted to these new challenges by inching away from business-as-usual and extemporizing. The IED threat was addressed by the creation of Joint IED Defeat Organization and a Joint IED Defeat Fund (more than $4B in FY 2008). In addition to organizations previously established to rapidly demonstrate and transition new capabilities (e.g., Advanced Concept Technology Demonstrations and Joint Technology Demonstrations within USD (AT&L)), new offices, projects and funding lines outside the traditional acquisition process proliferated. A number of these were created within the Office of the Secretary of Defense (OSD), while others were created within the Military Departments. One such office within the OSD was the Rapid Reaction Technology Office. The military services additionally possessed funding elements (and corresponding program offices) titled Rapid Equipping Soldier Support (Army), Rapid Technology Transition (Navy), and Warfighter Rapid Acquisition Program (Air Force). By some counts, there were two dozen of these "rapid" or "agile" acquisition, or transition, programs. The term applied to these offices and programs, "Heinz 57," suggested there were even more than that. Alternatives to the main requirements process were created (e.g., Joint Urgent Operational Needs process and Joint Rapid Acquisition Cell), along with budgeting alternatives (e.g., JIEDDO transfer account).

It is not the purpose of this report to assess the effectiveness of the numerous rapid/agile acquisition programs that exist as partial alternatives to the formal acquisition system. The continued existence of these organizations is uncertain once supplemental war

funding and immediate threats in Iraq and Afghanistan diminish. Their mere existence is evidence that the traditional system was and continues to be neither rapid nor agile, and cannot meet critical needs of troops in combat.

Globalization and the Commercial World.

Some argue that the western world is in a post-industrial era, dubbed an information age. Regardless of whether or not this is a proper characterization, industrialization and information technology are clearly proceeding apace, even in what were once called third-world countries. Thomas Friedman pointed out that we are living in an increasingly "flat" world.[1] Internet access and other forms of communication technologies are on the increase. Even adversaries in remote regions can make use of modern technology.

Our adversaries are not limited to access to information and communications technology. They also have access to products that can become asymmetrical military threats via the commercial marketplace. In the fight against IEDs, it was found that some devices incorporating simple garage-door opener technology could be adapted to detonate explosives. Once simple threats were countered, our adversaries accessed more sophisticated technology. Even unmanned aerial vehicles can be purchased commercially.

Commercial technology is not only a threat, but an opportunity. Industrial research and development involves billions of dollars of investments, much of it relevant to defense systems. Civil-military integration policy exists in law,[2] though it is more often honored in the breach than in the observance. Contracting regulations state a preference for commercial products and non-developmental items.[3] However, DoD has generally done a poor job integrating commercial technologies and systems into weapons systems.[4] "Commercial" in this sense implies the products and technologies of the commercial industry in the general industrial base and global economy, in contrast to products developed by the defense industry under government-imposed regulations, standards and processes.

The Government Accountability Office has pointed out that DoD has an opportunity to improve the process of transitioning technology into fielded systems and capabilities by learning from the best practices of commercial industry.[5] Again, the term "commercial industry" is used to refer to the broader industrial base, which is unconstrained by government-imposed procurement regulations and processes. Commercial industry tends to launch new products only when they embody relatively mature technologies. Cycle-times between improved versions of products are relatively short, often a few years or even months, compared to DoD cycle times of several years.[6]

Innovation.

The evolving nature of national security threats and challenges, combined with globalization and the commercialization of high-technology products and services, means it is no longer good enough for DoD to simply maintain existing strengths. If, like Dr. Pangloss, DoD is comfortable with the acquisition world as it is, it will surely end up between a rock and hard place. One aspect of the problem is the uncertainty of a future in which the nature of threats cannot be forecast in advance and in which they change quickly. Tackling such threats requires not only a rapid acquisition process, but one in which innovation—especially innovations in products and capabilities not traditional to DoD—takes place. This need for a vibrant "innovation cycle" should make the fast cycle-times of commercial industry, as well as its huge investments in research and development, very attractive to DoD. Unfortunately, DoD has not currently implemented a truly effective strategy to emulate the commercial sector or leverage its investments through mutually beneficial collaboration. Secretary of Defense Gates has articulated the need to be "more innovative" and "bold" in meeting emerging threats, but the challenge to actually do so is daunting.[7]

The System for Acquiring Defense Capabilities

Big "A" and Little "A" Acquisition.

In the community of defense acquisition, it is common to distinguish "Big A" acquisition from "Little A" acquisition. The "Big A" acquisition process encompasses: (1) requirements generation, primarily exemplified by the Joint Capabilities Integration and

Development System (JCIDS) in the formal process; (2) the budget planning and oversight process, under the Planning, Programming and Budget Execution (PPBE) process; and (3) the contracting process, under *DoD Instruction 5000.2* and the *Federal Acquisition Regulation*. The third area is "acquisition" in the narrow sense ("Little A")—the primary focus of which is the actual process of buying goods and services (procurement), but also concerns testing and other functions. A description of the acquisition system as divided between "Big A" and "Little A" may have value, but there are many processes which are inter-dependent across separate parts of the system. Thus, while this research focuses on a contracting method ("Other Transactions"), it should be kept in mind that contracting techniques affect, and are affected by, requirements processes and budget processes.

The Defense Industry.

Before World War II, the defense industry was relatively small. The government had its own arsenals and shipyards dedicated to developing and producing weapons. Industrial firms also supplied various items for many of the military's needs, but few of them relied solely or primarily on the military as their principal market. During World War II, major industrial firms were mobilized to supply the weapons needed by the military. After the war, most of the firms that had been converted to defense production returned to their former lines of business. However, a specialized defense industry began to emerge as the post-war period chilled into a Cold War. It supplied the high-tech weaponry and technology that was then unique to the military—for example, fighter aircraft, nuclear weapons, sophisticated weapons' electronics, advanced materials, and radars.

Today, only a few areas of high technology are unique to the military. The non-military commercial sector invests in research and development and introduces or upgrades innovative products rapidly. A comparison between DoD research and development contract awards, as reported in *Federal Contract Reports* (and other sources), and industry segment leaders, as identified in *Fortune* magazine, shows that the top firms receiving DoD RDT&E awards are not leaders in any industry segment except defense and aerospace. Moreover, leaders in high-tech industry sectors other than defense and aerospace receive little, if any, DoD RDT&E funding. They do, however, make major

investments in R&D. This and other evidence demonstrates that the defense industry is segregated from the broader national industrial base.[8] This segregation is not based on the specialized technology needs of the defense industrial base, but on government-unique business practices imposed on defense companies via the DoD acquisition system. This is the reason why the decline in defense spending at the end of the Cold War resulted in a consolidation of the defense industry; defense companies were generally not in a position to diversify into commercial markets because they were burdened with government-imposed business practices that made them non-competitive in the commercial marketplace.[9]

DoD recognizes the value of dealing with a broader industrial base and often tries to take advantage of existing commercial systems or emerging commercial technologies that can be adapted for defense purposes. However, in doing so, DoD often requires the commercial supplier to partner with a traditional defense contractor familiar with DoD contracting procedures, typically with the commercial supplier in the subordinate position of subcontractor. This approach has resulted in recent, high-profile failures that have been studied and documented by the Defense Science Board.[10] DoD's imposition of government-unique requirements has been proven to add to program costs, while the utility (benefit compared to cost) of many government-unique business practices are subject to question.[11] Many government-unique requirements are imposed in the contracting process and appear in contract specifications or terms and conditions, including those mandated by contracting laws or regulations.

Research Findings – General

"Other Transactions" – Background.

There is a long history of the military resisting new ideas, concepts and technologies. Historical examples include Napoleon's preference for the smoothbore musket over the rifle, the Navy's reticence to fund the construction of the Monitor, and the years it took the Army to contract with the Wright brothers to demonstrate the aeroplane. In the last case, the inflexibility of the applicable contracting regulations proved to be part of the

problem. A partial fix to this inflexibility of contracting statutes when applied to research, development and purchases for experimental purposes came with enactment of the *Air Corps Act of 1926*, and later with emergency exceptions to the general procurement laws already in place for the duration of WWII. A more comprehensive solution came in 1947, with enactment of the *Armed Services Procurement Act*. The promised flexibility of that statute was soon restricted by narrow implementation regulations (today embodied in the *Federal Acquisition Regulation* and its supplements) and additional legislation.[12] In 1958, additional flexibility was sought, and resulted in an alternative approach under the *Grant Statute*. As implemented, however, this non-procurement authority was restricted to basic and applied research with academic and non-profit research institutions.

An important milestone was reached in 1958 with the enactment of the *National Aeronautics and Space Act*. Section 203 (c) of that statute authorized a variety of contractual actions, including "such *other transactions* as may be necessary" (emphais added). In addition to utilizing the basic contracting laws, NASA used this alternative authority selectively to enter into a variety of innovative contractual relationships, with the interpretation that the contracting laws did not apply to "other transactions" (usually referred to as "Space Act agreements"). The first active communications satellite was actually privately owned and developed at no expense to NASA, which launched the satellite for AT&T on a reimbursable basis. The technical reports on Telstar I delivered to NASA are identical to technical reports delivered under a government procurement contract. The relationship between NASA and AT&T became a model for a class of "Other Transactions" called Launch Service Agreements. Over the years, NASA has found many applications for "Other Transactions," structured as funded, unfunded or reimbursable arrangements.

In the late 1970s, the enactment of the *Federal Grant and Cooperative Act* distinguished purchasing under basic contracting laws ("procurement") from grants and cooperative agreements ("assistance"). Procurement (purchasing goods and services for the direct benefit and use of the government) was regulated by contracting statutes and acquisition regulations, while assistance (supporting and stimulating a recipient for a public purpose) was regulated by Office of Management and Budget (OMB) circulars and certain non-

procurement statutes. NASA took the position that its "Other Transactions" constituted arrangements outside both systems; OMB concurred. NASA continued to enter into Space Act agreements not subject to the procurement laws and regulations, statutes such as the *Bayh-Dole Act* (patent rights) or the OMB circulars covering assistance relationships.

DoD "other transactions."

In 1989, the Defense Advanced Research Projects Agency (DARPA) sought and received authority to enter into OTs to support basic, applied and advanced research. This authority could be used when *standard* procurement contracts and grants were not feasible or appropriate. This criterion presented little difficulty considering the subject matter of the authority (basic, applied and advanced research), since such activities, while mission-oriented, are seldom executed for the primary purpose of acquiring goods and services; rather, they have motives—such as the acquisition of knowledge, establishing standards or proofs of concept, engendering scientific collaboration and other purposes. Equal cost sharing was not a requirement but was to be considered to the extent *practicable*. This practicability standard was not an inhibitor when flexibly applied by DARPA, but tended to become applied bureaucratically when the authority extended beyond DARPA.

In 1994, DARPA received additional authority to carry out prototype projects directly relevant to weapon systems using OT—which were not subject to cost sharing and could be used even if a procurement contract was feasible and appropriate. Unlike the original authority, which had a dual-use character and was also aimed at expanding the defense industrial base, the prototype (or "Section 845") authority was specifically aimed at defense contractors and prototyping defense systems. This intent has been broadly misunderstood and, subsequently, resulted in an amendment in 2000 that required cost sharing or the involvement of non-traditional defense contractors (very narrowly defined) before a Section 845 project was authorized.[13] Section 845 could be used in situations in which a standard procurement contract was typically used; it is an alternative to a procurement contract.

Congress has been inconsistent in its support for OT. The original DARPA authority was made permanent after a trial period and was expanded to DoD as a whole. Section 845 authority was expanded to the military departments but subsequently encumbered with the restrictions noted above. In 2004, Congress again expanded the authority by authorizing a non-competitive award of a follow-on production contract after a competitively awarded Section 845 prototype project. Section 845 and the follow-on production authority have never been made permanent and are subject to sunset provisions. There have been high-level endorsements of OTs within the DoD on several occasions, but the "bureaucracy" does not know quite how to deal with them and has written regulations that arguably restrict the potential flexibility of OTs.[14]

Types of "other transactions."

A variety of contractual arrangements can be structured under OT authority. Many OTs look similar to procurement contracts or research grants, with the distinction that certain terms and conditions mandated by contracting or assistance regulations are not applicable, and mutually beneficial terms and conditions can be negotiated unfettered by "one-size fits all" rules in those areas. This is not a very imaginative use of OT authority, but it is potentially important when the recipient of the OT is a traditional defense contractor (familiar with *FAR*-based contracting, and that realizes the primary value of the OT is avoiding flow-down requirements that would be unattractive) to a potential subcontractor (familiar with commercial practice) or a venture capital-supported start-up company to whom *FAR*-based contracting is either unfamiliar or unattractive.

The OT authority has been used in some creative and innovative ways beyond those outlined in the preceding paragraph. Forms of competition invented for particular programs or a class of programs can be uniquely structured, unconstrained by contracting statutes and regulations. OTs have been used to structure joint funding arrangements in which DoD and industrial firms pool their funds to sponsor third parties in research that addresses common problems. Innovative systems produced through government research funding (and that the government is unable or unwilling to use as an operational system) can be commercialized, and the government can gain the benefit of its investment

through access to the commercial product (and potentially receive payments as a result of successful commercialization). A variety of consortia arrangements can be formulated to bring together a sufficient mass and variety of intellectual power in order to address difficult problems. Consortia created in this way need not have a "prime contractor" when formed via an OT. Prototype projects can be formed such that the industry "team" is a true team, in which leadership of the project changes as it proceeds through various phases, as one performer may have the skills necessary to manage a particular phase. Several OT consortia have been formed to bring together expert capabilities in particular fields of technology (highly energetic materials; robotics; counters to chemical, radiological and biological threats) and have been able to respond to emerging threats or opportunities by getting new projects started in days, rather than weeks, months or years.

Critics of "other transactions."

It is worth noting that OTs have their critics. The author met with DoD's senior official for procurement and acquisition policy last summer. During the course of that meeting, the official stridently and authoritatively asserted that the three most wasteful acquisition programs in the Department's history were Section 845 OT programs, specifically citing the Air Force's C-17 (Globemaster III military transport aircraft), the Navy's LPD-17 (amphibious transport dock ship), and the Army's Future Combat System (FCS). Two were actually conducted as traditional procurement programs, and not OTs. The third, FCS, was a troubled program that was initiated as an OT. However, analytical studies of that program concluded its problems had nothing to do with it being conducted as an OT; in fact, the program benefitted from initially being conducted as such. It turns out that the vociferous and inaccurate denunciation of OTs witnessed by the author was not an isolated incident. The author interviewed a GS-15 former employee of that office who had been brought in to oversee OT policy. The employee related that on arrival, his supervisor greeted him with a diatribe against OTs, citing Arsenal Ship as the prime example. That program is included among the case studies below. Arsenal Ship was a well-executed program that was cancelled for reasons not related to its being conducted as an OT.

The DoD Inspector General's office has issued reports on OTs that contain criticisms of their varying degrees of substance. Generally, these criticisms fail to demonstrate an understanding of OTs, and the essence of the criticism is usually that OTs are not business as usual, and their use is not justified. The IG reports often contain a comment that the traditional system has "served us well." They never state that there is a financial cost to operating under the government-unique rules of the traditional system. They also fail to note the isolation of the defense industry as caused by government-mandated business practices. Finally, IG criticism follows a consistent trend in which the IG has been dubious of acquisition reform in general.[15]

One of the most highly publicized critics of OTs was the Chairman of the National Legal and Policy Center, who testified before the Senate Armed Services Committee in March 2005 concerning Boeing's OT agreement in the Army's Future Combat System (FCS) program.[16] His testimony was filled with examples of abuse, a litany of statutes from which OTs are exempt, and a warning of the abuses that could occur. A careful reading of the testimony shows that his numerous examples of abuse (the Darleen Druyun case included) were not specifically related to the FCS OT agreement. In fact, he merely cited examples of "safeguards" from which an OT might be exempt, and he never testified to any connection between his examples of abuse and the actual OT agreement. One gets the distinct impression from his testimony that he never actually read the OT agreement. If he had conducted an intellectually disciplined and forthright inquiry, he would have known that the FCS OT contained nearly 100 *FAR* clauses, and the issues he raised were more hypothetical than real; in the FCS context, his testimony was bogus. In contrast, the witness from the Government Accountability Office found problems in the FCS program but did not include the OT agreement among them.[17] Moreover, a study of the FCS OT agreement by the Institute for Defense Analyses found a number of benefits flowing from the agreement, among which were the ability of Boeing to deal with innovative companies that might not have participated in FCS under a procurement contract.[18]

Most credible research studies of OTs have found them to have multiple benefits and few, if any, negatives. However, one research paper sponsored by the Naval Postgraduate School did find that the version of OTs called Technology Investment Agreements (TIA)

had generally failed to attract the participation of for-profit commercial firms (data to FY2000).[19] Subsequent research shows that, to the extent this finding was accurate for the period reviewed, it is no longer valid (data to FY2006).[20] In addition, the finding in the Naval Postgraduate School paper is inconsistent with earlier studies of OTs (prior to the use of the TIA terminology).

In addition to outright criticism, some studies of OTs have noted concerns raised by government personnel. The most commonly identified concerns are government loss of intellectual property rights, absence of cost standards, and unavailability of metrics for success. These and other concerns remain essentially theoretical, as they have not been documented as actual problems by knowledgeable personnel who have participated in the execution of OTs. All are issues that can be intelligently dealt within the negotiation process.

Research Findings – Case Studies

Maritime Fire Support Demonstrator (MFSD).

Originally called Arsenal Ship, the MFSD program was a joint DARPA/Navy Section 845 prototype project intended to demonstrate massive, precision fire support (up to 500 vertical launch cells), as well as a variety of acquisition reform techniques.[21] The demonstrator ship was to be capable of being converted to a fully operational fleet asset, and was to become the lead ship for a fleet of up to five additional concept-development ships. Technically, the ship was to have onboard or off-board control via Cooperative Engagement Capability; was to demonstrate new approaches to damage control; and was to reduce cost of ownership through innovative maintenance and operating procedures, as well as an exceedingly small crew size. A Unit Sail-away Price ($550M for the production vessels) was established, and all technical decisions had to be made in the context of both the established acquisition cost and projected lifecycle cost. Starting from an award of five concept-development phase agreements in July 1996, the program was on track to have the test article in the water and ready for testing in October 2000, when it was cancelled by the Navy at the end of 1997.

According to the Arsenal Ship lessons learned report, the:

> process being followed by Arsenal Ship demonstrated a 50% reduction in acquisition time for the design portion of the ship, compared to the traditional approach […] This was primarily enabled by using an industry-led acquisition [approach] operating under Section 845 authority, with industry having full trade space and responsibility for the design.

The "price as established" trade-off technique spurred innovation and drove down acquisition cost; albeit at some added risk. Summarized findings from the lessons-learned report include that an industry-led design competition could be more meaningful than a government analysis of alternatives. Industry proved to be fully capable of designing a complex Navy ship, with minimal government direction being a key factor in success. When unique industry teaming arrangements are encouraged, adequate time is needed for industry team formation and growth (teams with "cradle to grave" capabilities were required). Section 845 permitted a "try before you buy" policy for Navy ships, with no time lost to full production.

In light of the foregoing brief summary, one might ask, "if Arsenal Ship was so great, why was it cancelled?" With the death of Chief of Naval Operations ADM. Jeremy Boorda early in the program, Arsenal Ship lost its chief proponent within the Navy. Arsenal Ship was revolutionary. It was (according to Norman Polmar) the first truly new concept in warships since the ballistic missile submarine. The potential capabilities of Arsenal Ship competed with the submarine navy (which was then seeking to establish new roles), and the aircraft carrier force (which was believed to have the primary role of providing support to expeditionary ground forces). One can speculate that Arsenal Ship was viewed as a threat by some of the Navy's key submarine and air admirals (or merely closely associated with their former nemesis, ADM. Boorda); it is likely that a number of other vested interests came into play. A relatively small shortfall in one year of Arsenal Ship's funding profile provided an opportunity to terminate the program. More generously, perhaps, the Director of DARPA ascribed the failure to correct the funding shortfall to Navy mismanagement of the budget process.

In the wake of the cancellation of Arsenal Ship, it is crucial to remember that the Navy's Program Executive Officer, Ships, Rear Admiral Charles S. Hamilton stated at the Naval Postgraduate School's annual acquisition research conference in 2006 that the Arsenal Ship experience revolutionized the way the Navy thinks about warship design and development. The Arsenal Ship program left many other legacies, including a more affordable and more capable Mark 41 Vertical Launch System. Both acquisition approaches pioneered with Arsenal Ship and a large amount of technology developed under the program found their way into subsequent Navy shipbuilding efforts. Despite its cancellation, Arsenal Ship proved to be of excellent value to the Navy.

Future Combat Systems (early phases).

FCS is a major Army modernization program. Following some initial work done by DARPA, the Army continued FCS as a Section 845 OT before transitioning it to traditional contracting.[22] FCS combines an array of manned and unmanned systems connected through a common communications network, allowing for a flexible and modular response to threats in complex environments.

The FCS OT allowed for fast progress to be made in concept development and technology design, while a competition to select a lead systems integrator (LSI) was undertaken. Prior to selection of the LSI, notable innovation was observed through the efforts of non-traditional contractors—especially iRobot and Austin Information Systems. The OT proved very adaptable to program changes, which occurred frequently due to tradeoffs and the evolving nature of the huge and multifaceted program. The degree of involvement of the Army user community was unprecedented. Rapid prototyping and development of manufacturing capabilities occurred. Commercial technologies in existence and under development were effectively transitioned into the program. Important capabilities from FCS are currently transitioning to ground forces in action in Iraq and Afghanistan.

A deficiency in this program was a profound need for training of Army acquisition personnel unaccustomed to the flexibility of Section 845 contracting. Another problem was that the LSI selected Boeing for FCS, which was soon (as a result of the Air Force's

"Darleen Druyun scandal") being highlighted as a poster-child of corruption in the defense industry. The association of Boeing with the Army's highest profile development program and its execution under an OT resulted in bad publicity and an unjustified correlation between OTs and unethical conduct by defense contractors. This has had a profound negative effect on the perception of OTs.

Case Study – Joint Unmanned Combat Air Systems (JUCAS) at DARPA.

DARPA, the Air Force and Navy combined to develop a system of highly capable unmanned combat air vehicles networked through a common operating system.[23] These vehicles are to penetrate deep into high-threat environments, be survivable and constitute a persistent combat capability. The program involved major defense companies (Boeing and Northrop), as well as offered significant roles for nontraditional contractors.

Cost was reduced in this program because both major contractors organized their efforts as IR&D projects (allowed under OTs, with government payments offsetting IR&D balances), eliminating general and administrative expenses (such as facilities capital and cost of money, and fees); labor and material rates were also reduced by about 15%. In addition, Boeing invested about $300 million in the effort. Funds were also saved because the streamlined management and change-order processes that were adopted were estimated to reduce the schedule by more than a year.

The flexibility of the OT helped attract nontraditional companies to the project. Some were unique, including a supplier of composite materials whose main line of business was manufacturing surfboards. In the case of Northrop Grumman, nontraditional companies provided essential capabilities. The differing nature of the participants and the highly innovative nature and state-of-the-art operating procedures of the project resulted in adjustments in industry's position on intellectual property matters. The OT could accommodate flexible IP arrangements.

The project was financed through payable milestones that both improved cash flow and focused the project on key technical accomplishments. Milestone payments incentivized contractors to achieve observable results at less-than-estimated cost. These milestones

were modified in the light of experience, presenting a flexibility that would have been difficult to achieve under a *FAR* contract, with its typical, inflexible, contract line-item numbers.

As in FCS, both government and industry personnel noted a need for training and culture change with this program. Government personnel tried to regulate the program in a "business as usual" manner rather than collaborate, which would have been consistent with the vision of the program's leadership. Unlike FCS, there was inadequate effort devoted to identifying and engaging the potential user community.

In 2005, DARPA was confronted with a problem created by Congress. The original JUCAS OTs with Boeing and Northrop were nearing the end of their terms. As a result of an amendment to Section 845 in 2000, new Section 845 agreements would require either 1/3 cost sharing or an upfront determination that nontraditional contractors (defined in an exceedingly narrow fashion) would be "significantly" involved in the program. Since cost sharing was unlikely, and an *a priori* determination of significant nontraditional involvement could not be made for the next phase of the program, DARPA planned to award a traditional procurement contract for that phase. The program successfully transitioned from the DARPA joint program office to Air Force leadership before that occurred. The subsequent history of the program under the Air Force is not part of this case study.

Chemical, Biological and Radiological Technology Alliance (CBRTA).

The CBRTA was part of a multifaceted consortium (National Technology Alliance) authorized by Congress to inject commercial technologies for security and defense needs.[24] It consisted of thirteen commercial firms and academic institutions, awarded under an OT agreement, with 3M leading the consortium in an administrative capacity. The National Geospatial-Intelligence Agency (NGA) acted as executive agent and provided the contracting support.

CBRTA afforded the government access to a reservoir of intellectual talent consisting of thousands of the best and brightest scientists and engineers employed by the CBRTA-

member companies and institutions. Projects were initiated, as a modification to the basic agreement, in the form of task orders. Because industry could formulate a program plan in response to a government need in a matter of days (potentially hours), work could begin under an approved plan almost as quickly. Work could be performed by members of the Alliance or subcontracted if the requisite expertise existed outside CBRTA companies.

Administrative costs were funded separately from R&D efforts, with most projects being funded as time-and-materials efforts, while others were funded based on either cost-reimbursement or fixed-price milestones. The government obtained the leverage of industry investment, which was often five or ten times that of the government in many of the technologies supported by CBRTA member companies. Project time was shortened due to the reduced need for cost and pricing data, elimination of a formal engineering change process, and simplified terms and conditions with suppliers—all of which were, in turn, due to the inclusion of these terms and conditions within the OT instrument.

This type of consortium embraces nontraditional participants both as consortium members as well as subcontractors. OT allows flexibility in intellectual property and freedom from government-unique requirements (such as hourly timecard reporting and DCAA compliance), which would be absolute nonstarters for many of the commercial companies and scientists involved in CBRTA projects.

The CBRTA operated as a highly successful program for several years. It was a potential model that could be applied to many areas of technology relevant to DoD needs.

However, chemical, biological and radiological technology was not a main interest of its executing agent, the NGA (CBRTA funding came primarily from agencies other than NGA). A supportive NGA director early on was succeeded by a director uninterested in CBRTA. Even more disheartening to industry and damaging to the previous efficiency of CBRTA was the assignment of a new NGA legal counsel to an oversight role, despite a lack of background in OTs. Agreement modifications were subjected to legal reviews that took much longer than they had previously. This attitude seemed to infect Agreements Officers responsible for administering the OT. Issues between CBRTA and the

government that had previously been raised and resolved were reopened, and the government (new legal counsel) took a more restrictive view than it had previously held. As of this writing, the CBRTA agreement has expired, and there is faint hope that it will be resuscitated. Ultimately, a highly successful program with virtually unlimited potential to provide the government with novel solutions has been allowed to lapse.

Hummingbird Unmanned Aerial Vehicle.

The A-160 Hummingbird UAV is rotor-craft built by Frontier Systems, a small nontraditional contractor.[25] It incorporates revolutionary rotor technology and is intended for reconnaissance, surveillance, target acquisition, communications relay and precision resupply missions in autonomous operation. It has long endurance and can fly thousands of feet higher than conventional helicopters. The Hummingbird has successfully undergone flight tests and is under active consideration for use in a number of operational applications.

The Section 845 OT proved to be very cost-effective in the Hummingbird program. It enabled dealing with the small commercial firm and particularly kept down cost in the early R&D phase. Additional cost savings had been accrued through time savings in both the pre- and post-award phases and as a result of the streamlined changes process. This work would not have occurred under a *FAR*-based contract; Frontier Systems would not have accepted such a contract in the first place.

Particularly important in this case was flexibility in intellectual property, especially patent rights, as Frontier has patented inventions related to its revolutionary rotor technology. This project demonstrated the flexibility of an OT to accommodate a performer that had specific products or revolutionary ideas of importance to DoD.

In this case, an OT was essential to gain access to a technology controlled by a small, nontraditional contractor. An acquisition team well schooled in OT contracting was crucial to successfully working with this contractor; “business as usual” attitudes or on-the-job-training would not have worked. This may be a case in which the follow-on

production authority provided by Congress in 2004 (or a modified version of it) would prove particularly useful.

Dual-use and Commercial Operations and Support Savings Initiative (COSSI).

The previous case studies have highlighted individual Section 845 OT programs.[26] Major successes have also been achieved in broad programs involving hundreds of agreements, including DoD's dual-use technology programs (originally the DARPA-led Technology Reinvestment Project) and COSSI. The dual-use programs used the original (10 U.S.C. 2371) OT authority, and COSSI was executed using a combination of the original authority and Section 845 OT agreements. The interesting thing about both the dual-use programs and COSSI is that, despite a record of success, both have been allowed to fade away. Although vestiges of both programs persist, neither exists as a coherent entity. When programs are successfully piloted at the Office of Secretary of Defense level, there is no guarantee of their institutionalization or continued existence when they are transitioned to military departments. "Business as usual" attitudes and the budget priorities of the individual services seem to trump innovative approaches, even though the latter may open the technology base to new entrants and cost savings.

DARPA's success in promoting dual-use technologies (those with both commercial and military applications) through cost-shared collaborations with commercial firms using OT contracting was far reaching. A distinguished panel, under retired Marine General Al Gray, soon recommended the dual-use approach to be the DoD's primary means of undertaking new technology developments. Other reports also found that these OT programs were highly successful.

The COSSI program was started in 1997 to reduce operations and support costs by replacing (often expensive and outdated) military-specific components in DoD systems with components adapted from commercial products or technology. The program was premised on funding from DoD for modification, testing and adaptation of the commercial component for military needs on a cost-shared basis, while the commercial

partner gained the promise of a fixed-price procurement if the savings were successfully demonstrated. Since OT production authority did not exist, COSSI was designed to use *FAR* Part 12 commercial item contracts for the follow-on procurement. COSSI was successful in the sense that documented OS cost savings exceeding the government's R&D investment were realized; eventually the program attracted considerable participation by nontraditional firms. However, DoD's credibility suffered when, contrary to program guidelines, it refused to grant a preferred position to the cost-shared developer, and either went out competitively to procure the improved component (often from a traditional defense contractor) or opted not to procure the improved item despite demonstrated cost savings. Eventually COSSI died as a major program, but it episodically serves as a model that is put into use by various DoD components.

In both the dual-use programs and COSSI, flexibility in intellectual property rights and streamlined business practices were important components of attracting commercial firms. These programs were competitive in nature, but the competitions that were held were more informal than competitions under Part 15 of the *FAR*, and generally resembled "broad agency announcements."

Research Findings – Surveys and Data Collection

Data sources.

This part of the report summarizes and analyzes data collected via interviews, surveys and other means. It includes research undertaken by a five person team from the Logistics Management Institute led by John Ablard. This team included three members with many years of experience in DoD acquisition and assistance, including significant experience with OTs; they were aided by researchers experienced in survey techniques and statistical analysis. This team conducted interviews with 26 individuals representing industry and government and including both executives and program personnel. All persons interviewed had recent (as of 2007) experience with OTs. In addition, the responses to 30 questionnaires sent to government program managers and agreements officers were recorded and analyzed. In total, the responses to the questionnaire represented experience on 46 OT programs, with some individuals having experience on more than one program.

There was overlapping coverage by more than one respondent on some programs. The data collected by the LMI research team has been made available to other researchers but, as of this writing, has not been formally released.

Another compilation of data summarized below was collected by Robert Spreng, the recently retired president of an industry association (Integrated Dual-use Commercial Companies or IDCC) that consists of large commercial firms with significant R&D budgets that wish to collaborate with DoD on R&D. However, these firms do not want to be subjected to onerous, government-imposed requirements that are inconsistent with their normal business practices. Spreng's data comes through the access and analysis of two sources: (1) publically available information (his methodology is described in published articles cited in the endnotes) and (2) data from surveys of IDCC-member companies.

A final section includes insights from interviews and surveys personally conducted by the author. This is supplemented by notable data uncovered during the author's literature review, which is not reported elsewhere in this paper.

LMI research data.

The top-level findings of the LMI research team were: (1) persons with experience in using prototype (Section 845) and research OTs (TIAs) viewed them positively; (2) effective use of OTs offers benefits to R&D program managers and contracting officers (among these benefits attributed to prototype OTs are streamlining, flexibility, performance improvements, schedule reductions, and cost reductions); (3) use of OTs has given DoD access to for-profit companies that traditionally do not do R&D business with the federal government (these entities' participation, either alone or in consortia, has been of significant value); (4) use of OTs is most effective in research and prototyping efforts or in certain programs developing manufacturing technology; and, (5) understanding and acceptance of OTs within DoD needs to be improved, so that the full benefits of these instruments can be realized.

Award time. Nearly two-thirds of respondents to the questionnaire stated that OTs reduced pre-award cycle-time, while about a quarter said it had no effect, and a small minority said it caused an increase. Among those saying there was a decrease in pre-award cycle-time, there was unanimity that the administrative simplicity of OTs resulted in reduced time. Three-fifths of the respondents identified freedom from *FAR* competition standards, and an equal number thought project partners working together efficiently resulted in the quick development of a research plan. A small number of respondents noted an increase in pre-award cycle-time, but all respondents identified offerors' unfamiliarity with OT contracting and time-consuming negotiations over intellectual property as reasons for this increase.

Post-award schedule. About three-fifths of respondents stated that use of OT authority reduced post-award program execution time; about two-fifths said it had no effect. Primary reasons given for this time reduction were: reduced administrative burden allowed for more focus to be placed on technical research goals; minimum internal systems' compliance requirements accelerated processes; flexibility to restructure and make mid-course corrections created an efficient work environment; and lack of flow-down clauses sped up the process. About four-fifths of respondents stated that overall, OTs (pre- and post-award) resulted in significant or moderate time reductions in their programs. Most of these (63.3%), however, thought the time reductions were only moderate.

Cost reductions. Nearly three-fourths of respondents attributed cost reductions to the use of OT authority (compared to 6.7% saying OT increased cost). The top reason given was that tradeoffs allowed for better use of available funds. Other top reasons were that shortened cycle-times reduced overall program cost, fewer non-value added activities, and the enabled use of cost sharing. In addition to noting the reduction in current project costs, more than half the respondents stated that use of the OT would result in reductions in future acquisition and support costs for their programs. With a single exception, the remainder of respondents thought use of an OT would have no effect on program costs.

Performance improvement. In the area of performance of the systems or products resulting from their OT projects, half the respondents said OT authority resulted in significant improvements in performance. Forty percent identified moderate performance improvements, while the remainder saw no impact on performance from using an OT.

Relationships. More than four-fifths of respondents said that OTs had a positive impact on various aspects of the team relationships and practices. No respondents identified any negative impacts. Positive influences were found in relationship-building among team members, increased focus on technical aspects of the program, better management and control of the program and other practices.

Flexibility. More than ninety percent of respondents found that OT authority resulted in a streamlined and flexible program. Reasons given included various accommodations of commercial practices, including flexibility in negotiating technical data, computer software license rights, various auditing and cost practices and elimination of flow-down clauses. Another top factor was ease in making changes.

Overall assessment. When asked to assess the overall impact of OT authority on their projects, 46.7% responded that it had a significant positive impact: 50.0% said it had a moderately positive overall impact, and one respondent (3.3%) said no impact could be observed. In addition, more than three-fourths of respondents answered affirmatively to the question, “Did use of OT authority allow development of program/s that may not otherwise have occurred?” These general findings, as well as many of the specifics derived from the survey of government personnel, were reinforced by information derived from interviews with government and industry personnel.

Deficient training. The survey responses summarized above are all the more remarkable in light of additional information LMI derived from its interviews. A deficiency in training on OTs was noted in nearly all the programs profiled in the interview process. This deficiency at times related to both government and industry personnel and sometimes only to government personnel. In one major program, it was identified as “a compelling need.” Thus, the benefits of OTs identified in the LMI study were

documented despite the fact that these programs may not have been conducted by well-trained government personnel nor executed up to the full potential of OTs.

Integrated Dual-use Commercial Companies (IDCC) research data.

Since the early 1990s, Robert C. Spreng has conducted a series of studies showing the profound divide between large defense contractors that receive the vast majority of DoD RDT&E awards and leading U.S. industrial firms that receive little or insignificant DoD R&D funding. Spreng found that a handful of defense contractors account for half of the total DoD RDT&E awards; adding a few more brings the total to three-quarters of all such funding. Of hundreds of top industrial firms (*Fortune* 500 or 900 firms in *Business Week* R&D Scoreboard), 92% receive little or no DoD research and development funding.

A review of the data sources that Spreng has assessed provides details that are consistent with what former Defense Secretary William Perry and many other knowledgeable observers have said: namely, many technology areas that DoD depends upon (such as electronics, semi-conductors and computer software) have equivalents in the commercial sector, and there is no need to maintain defense-unique capabilities in those areas. However, ending reliance on defense-unique industrial capabilities requires that DoD be able to access the equivalent commercial market.

IDCC has analyzed some of the government contracting practices that discourage their members' participation in government R&D programs or constitute barriers to entry. In a 2006 survey of IDCC member companies, eight of the top 15 barriers identified related to intellectual property, and three related to the way the government handled costs. In a 2008 survey, seven of the top 15 barriers related to intellectual property, and two were cost related.

Some of the issues identified were: intellectual property rights/proprietary data concerns including trade secrets; *Buy-American* provisions/concerns with foreign technology/production; cost accounting standards; pass-through requirements; profit policy; overhead policy; cost or pricing data; documentation; audit rights; and contract

dispute resolution. Other issues were operational in nature, such as: awareness of business opportunities; work specification problems; government oversight problems; and billing problems. Many of industry's concerns flow from the requirements of the *Federal Acquisition Regulation* (or parallel provisions contained in assistance regulations). Other issues were related to the attitude and culture of government personnel involved in R&D contracting.

The IDCC has recommended expanded use of OTs as a way to address many of the concerns of its member companies. IDCC has noted that many government contracting personnel are not familiar with OTs or even with potential flexibility under the *FAR* with regard to matters such as technical data. The IDCC recommends the establishment and thorough training of a cadre of contracting officers who understand innovative contracting and are prepared to accommodate key imperatives of commercial companies. The IDCC has noted that typically their companies will not be prime contractors; therefore, DoD needs to structure changes that will permit the participation of IDCC companies as subcontractors. Commercial firms such as IDCC-member companies recognize the need to partner with traditional defense primes in order to participate in platform-centered defense systems acquisitions. Many are willing to do this if appropriate terms can be structured.

Government policies embodied in legislation promote civil-military integration (10 U.S.C. 2501) and a preference for commercial products (10 U.S.C. 2377), but the years of IDCC efforts to open DoD R&D contracting to primarily commercial, high-tech companies indicate these policies have been less than fully honored by DoD in its approach to systems acquisition.

Other research.

In discussions with the former Assistant Deputy Under Secretary of Defense (Industrial Policy), it became clear to the author that IDCC companies do not have a monopoly on encountering barriers to entry in the government contracting system. Moreover, there is not just a single barrier or set of barriers to entry. Numerous interactions with representatives from companies and industry associations convinced the ADUSD

(Industrial Policy), as well as the author, that the barriers differed depending on the company or industry segment. Thus, no single magic bullet or tweak of the system will suddenly open up government procurement contracting to much broader participation. The entire system is too arcane, prescriptive and inflexible to be broadly attractive. As one expert observer noted, it is inconceivable that a rational person or committee of rational people charged with devising a contracting system for the federal government would possibly come up with our current system.[27]

An example of a barrier caused by a single government requirement provides an informative illustration. According to the government contracts counsel of a major commercial company (multi-billions in sales; in excess of $2 billion annually in R&D), his company created an accounting system compliant with government Cost Accounting Standards (CAS) so it could receive government, cost-reimbursement contracts. The company was attracted to government R&D business for patriotic reasons, as well as access to government funds to expand its research capabilities, and as a possible way to expand its markets (the government was already its largest single customer at 2% of sales). With its CAS accounting system in place, the company was awarded and performed a number of DoD cost-reimbursement research contracts. The company's ability to obtain government contracts soon declined, as its key scientists refused to write proposals for work that would require them to be subject to government requirements for hourly time reporting. The same scientists were, however, willing to do work under an OT without hourly time reporting. The notion that hourly time reporting was a sore point among highly motivated scientists was confirmed by the response to a survey question circulated by the author. One respondent was the executive director of an optoelectronics industry association, whose previous experience included management at a start-up company; he also worked as both a DARPA program manager and attorney at law. He pointed out that experiments do not always fit into neat eight-hour segments. Hourly time reporting to a highly qualified scientist who is paid an annual salary seems artificial and redundant. In a variation on this theme, legal counsel for a large, highly innovative company advised the author that it was motivated to seek government R&D funding for the same reasons mentioned above. His company investigated setting up a CAS -ompliant accounting system and made the determination that it was not worth the expense and

effort involved. One additional variation on this theme was given in the 1990s by Martin-Marietta's Norman R. Augustine, who included lack of "commercial accounting" in the reasons why defense firms could not diversify into the commercial marketplace. If one were to multiply this one example many dozens of times, one would get the Gordian knot of government contracting. Yet OTs, like Alexander's sword, can unravel the conundrum.

The author was present at a 2008 briefing by an experienced program manager presented to an Office of Secretary of Defense task force that was considering funding a major prototype project involving a highly innovative airship application and was seeking an appropriate program office to execute the program. The program manager represented one of the military service's major development and contracting commands and had been asked to contrast a *FAR*-based approach with an OT approach. The program manager was supported by experienced contracting officials. The way the presentation was made suggested that the program manager had a superficial and stereotyped view of OTs and seemed to have difficulty understanding why anything other than "business as usual" made sense. Later, it also came to light that getting management approval for an OT approach from that command would be a "hard sell."

There have been many reviews or research studies of OTs conducted since the 1990s. Examples of the small minority of reports that have been critical have been mentioned in the section on criticism in this paper. The vast majority of studies have found benefits flowing to DoD from OTs—with any risks being either minor, manageable or both. Once OTs graduated beyond DARPA, a general deficiency in training and expertise in negotiating and executing OTs has been noted. Inaccurate perceptions, general misunderstanding, and false allegations about OTs have become common among both policy-makers and personnel potentially responsible for executing OTs. The LMI research has been highlighted in this paper because it is a recent and disciplined study of the subject. Its findings are generally consistent with many earlier studies.[28] The IDCC data is also of interest. Unfortunately, it merely represents views of companies who are interested in, and relatively educated about potential pitfalls of, doing business with DoD. One respondent to a survey question circulated by the author pointed out that many

companies, including highly innovative companies supported by venture capital, never consider doing R&D business with DoD. Among many companies, DoD contracting has a reputation for being unthinking, bureaucratic and limited to companies that are “the usual suspects.”

Conclusions and Recommendations

Utility and potential.

OTs have demonstrated that there can be a better, faster, cheaper way to conduct defense research, development and prototype projects than the use of procurement contracts. They have demonstrated outstanding utility and benefit to DoD projects in basic, applied and advanced research, prototype projects relevant to weapons and weapons systems, and in distinctively innovative transactions. They are potentially applicable to transactions that have not yet been conceived. Far from being a niche authority, OTs are capable of being a fully acceptable alternative for many of the Department's science, technology and prototype projects. The potential of OTs to transition successful prototype projects seamlessly into production is limited under current legal authority. Amendments to Section 845 enacted in 2000 are inconsistent with original legislative intent, are unduly restrictive and inhibit broader use of the authority.

It is recommended that the Under Secretary of Defense (Acquisition, Technology and Logistics) direct DoD guidance on OTs for research and prototypes be revised to assure that OTs are considered a mainstream authority, fully equal (where applicable) to *FAR* contracting and assistance instruments. Such guidance should clearly indicate that research OTs may overlap in the "assistance" category but are not confined by it. Guidance on both research and prototype OTs should stress their flexibility and minimize unnecessary regulatory restrictions. Delegations of authority to exercise or approve the use of OTs should be issued to effectuate their vigorous use.

It is recommended that Congress repeal the 2000 amendment to Section 845 and restore its original intent. In lieu of a complete repeal, limitations on Section 845 should be substantially modified. If retained, the definition of "nontraditional" contractor should be changed to a company whose main focus of business is in markets other than DoD. Dollar amounts for approval requirements for OTs should be repealed. Follow-on production authority should be simplified and made permanent.

Subcontracts.

A primary way to get innovative commercial companies involved in major defense programs is via subcontracts. Many commercial firms are unwilling to participate in defense procurement when flow-down clauses under the *FAR* system impose unattractive business practices on them. Many of the same firms will accept OT arrangements. The likely significant participation of a nontraditional firm, as it is currently narrowly defined, may not be known up front; thus, many programs will be initiated as *FAR* contracts under current limitations to Section 845. Once initiated as a *FAR* contract, mandatory flow-down of *FAR* conditions will discourage participation by innovative commercial companies.

It is recommended that, pending legislative changes to Section 845, USD (AT&L) direct the military departments to authorize parallel OT agreements to be used to enter into relationships with commercial ("nontraditional," broadly defined) firms. These firms might then contribute to a defense project being conducted with a defense prime contractor under a procurement contract. Consistent with policies endorsing the modular-open-systems approach (and incremental and spiral developments), opportunities should be sought for including commercial firms in prototype and development programs. Parallel OT agreements closely integrated with the main development procurement contract should be funded with any available funds, including funds originally allocated to the prime contract.

Training and education.

The defense contracting workforce has primarily been trained to follow a set of prescriptive rules (which potentially inhibit developing initiative and good business judgment) in order to craft transactions advantageous to DoD, while honoring the interests of DoD's industrial partners. In significant measure, the acquisition workforce is woefully ill-equipped to engage in freeform OT contracting. Both DoD acquisition policy offices and the DoD acquisition education community have failed to provide the leadership, incentives and recognition necessary to enable the acquisition workforce to

better utilize OTs. Top-level leadership has been absent or insufficient in matters of education and training pertaining to OTs.

It is recommended that USD (AT&L) engage OSD and service acquisition policy offices, senior acquisition executives and other key acquisition leaders in a mandated, high-level conference or other means so as to dispel prevalent misinformation and initiate leadership education on OTs. The services and defense agencies should initiate OT training and create centers of excellence on innovative contracting that emphasize OTs. The Defense Acquisition University should create a significant on-campus series of courses on innovative contracting, emphasizing OTs. DAU online training modules on OTs should be substantially revised to emphasize the potential flexibility of OTs and how to handle non-standard situations, rather than reinforce “look it up in the book” education.

End Notes

[1] Friedman, *The World is Flat*, Farrar, Straus & Giroux (New York 2005).

[2] 10 U.S.C. 2501.

[3] Federal Acquisition Regulation or FAR (title 18 Code of Federal Regulations) 12.101(b); policy for acquiring major weapons systems as commercial items (requires a SecDef determination) is found at DFARS 234.7002.

[4] *Buying Commercial: Gaining the Cost/Schedule Benefits for Defense Systems*, Defense Science Board (Feb. 2009), 9-14.

[5] General Accounting Office, *Defense Acquisition: Best Commercial Practices Can Improve Program Outcomes*, GAO/T-NSIAD/99-116.

[6] It has been argued (by the Packard Commission among others) that DoD's unreasonably long acquisition cycle is a central problem leading to many other problems, Ward & Quaid, *It's About Time*, Defense AT&L (Jan-Feb 2006), 14. The same article points out that the automotive industry reduced its average development cycle times from nearly eight years to less than two years in the 30 years before the turn of the century. During the same period, DoD development cycle-times rose from as low as five to six years (Air Force and Navy) to eight to ten years for all services, *op. cit*. 16.

[7] Erwin, *Despite SecDef Pleas, Pentagon Is Losing the Innovation War*, National Defense (June 2008).

[8] Spreng, *R&D Contracting by Non-traditional Defense Contractors*, briefing to Defense Science Board (20 May 2008). Robert Spreng (former President, Integrated Dual-use Commercial Companies) has conducted and published the results of many similar comparisons and other related research since the 1990s. See for example, Spreng, *Commercial Firms Are Conspicuously Absent from Top Defense Contractors*, National Defense (Feb. 1995), 3.

[9] See generally Gansler, *Defense Conversion*, Twentieth Century Fund (1995), 23-24; and, Daly, *But Can They Make Cars?*, New York Times (30 Jan. 1994).

[10] *Buying Commercial* (footnote 4).

[11] Lovell et al, *An Overview of Acquisition Reform Cost Savings Estimates*, RAND (2003) summarizes a number of reports estimating the added cost of government-unique requirements at 10 to 50%. A Coopers & Librand report (*The DoD Regulatory Cost Premium: A Quantitative Assessment*, 1994), probably the most disciplined in methodology, placed the added cost at 18%. Both the Lovell study and a GAO report, *Efforts to Reduce the Cost to Manage and Oversee DoD Contracts* (GAO/NSAID-96-106) indicated that DoD's acquisition reform attempts had done little to reduce the regulatory cost premium.

[12] Nagle, *A History of Government Contracting*, George Washington University (1992), 468-471.

[13] See the notes in the United States Code following section 10 U.S.C. 2371, for the legislative evolution of DoD OTs.

[14] High-level endorsement—for example, former USD (AT&L) Paul Kaminski personally signed an innovative OT, and, more recently, John Young heartily endorsed an "Open Business Cell" that (among other things) would specialize in OT contracting. Regulations—the DoD Grants and Agreements Regulatory System; and, "Guidelines" for section 845 agreements issued by the Director, Defense Procurement and Acquisition Policy.

[15] An example of the DoD IG anti-acquisition reform position is *Debunking Myths of Acquisition Reform*, prepared testimony of Derek Vander Schaaf, DoD IG (Small Business Committee, U.S. House of Representatives, 3 Aug. 1995). An example of an IG report *is Management of the Commercial Operations and Support Savings Initiative* (DoD IG, D-2001-081, March 19, 2001).

[16] Boehm, Kenneth M., Future *Combat System Agreement with Boeing: A High Risk Program with a Higher Risk Agreement*, prepared testimony, Subcommittee on AirLand, Armed Services Committee, U.S. Senate (March 2005).

[17] Francis, Paul L., *Future Combat Systems: Challenges and Prospects for Success*, Government Accountability Office (GAO-05-442T, March 2005).

[18] Graham, David R., IDA Findings on the Use of Other Transactions Authority for the Army Future Combat Systems Program, prepared testimony, Subcommittee on AirLand, Armed Services Committee, U.S. Senate (March 2005).

[19] Tucker, *Analysis of For-Profit Commercial Firm Participation in Technology Investment Agreements*, Naval Postgraduate School (2002). Data collected for DoD's FY 2006 report to Congress on OTs (via DD form 2759) showed 91% of 116 section 845 OTs had involvement by a total 185 non-traditional contractors (under a very narrow definition of non-traditional).

[20] Ablard et al, *An Analysis of Special Instruments for Department of Defense Research Acquisition and Assistance*, Logistics Management Institute (2007), 2-15.

[21] The primary sources for this case study are Hamilton, *Arsenal Ship Lessons Learned*, Arsenal Ship Joint Program Office (1997); and, the author's personal knowledge of the program and interaction with program participants. Charles Hamilton (RADM, USN, ret.) reviewed and provided comments on this case study.

[22] Sources for this study include the LMI report (note 17), App. C 12-14; testimony in Senate hearings; conversation with a program participant, and GAO and IDA reports referred to in the "Criticism" section of this paper; and, helpful comments by Hon. Claude Bolton, former Assistant Secretary of the Army.

[23] Sources for this study include the LMI report (note 17), App. C 1-3; the author's personal knowledge of the program and interactions with both government and industry participants.

[24] Sources for this study include Daly et al, *CBRTA: Six Years of Operation*, (briefing Aug. 2008); the LMI report (note 17), App. C 7-8; and conversations with program participants. Richard Kuyath, counsel, and George Sundem, contracting officer of 3M Company, provided helpful comments on this case study. Review and additional comments were provided by Kathleen Harger, former Assistant Deputy Under Secretary of Defense (Innovation & Technology Transition).

[25] Based on LMI report (note 17), App. C 5-7.

[26] Based on Gray et al, *Dual Use Research Project Report*, Potomac Institute for Policy Studies (1996); LMI report (note 17), App. C 9-11; the author's personal involvement in these programs and conversations with program participants; former Deputy Assistant Secretary of the Navy (and former Assistant Deputy Under Secretary of Defense responsible for COSSI) Michael McGrath provided insightful comments.

[27] Nagle (note 12), 519.

[28] Studies go back to the early 1990s—e.g., Nash et al, *Participant Views of Other Transactions* (Institute for Defense Analyses, 1995); several have been conducted by RAND, e.g., Smith et al, *Assessing the Use of Other Transactions for Prototype Projects* (National Defense Research Institute, 2003); and include research done at NPS, e.g., Wong & Liu, *Analysis of the Transitioning Opportunities for Non-traditional Contractors Under Other transactions Authority* (Naval Postgraduate School, MBA Professional Report, 2008).

Appendix 1. Draft memorandum

From Under Secretary of Defense (Acquisition, Technology and Logistics) to DOD Components on Use of Alternatives to *FAR* Contracting

MEMORANDUM FOR THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
DIRECTORS OF DEFENSE AGENCIES

SUBJECT: Use of Alternative Contracting Authorities

The Department needs to increase its ability to find and field innovations from companies that have not traditionally done business with the Department but which have products or research capabilities that could be adapted to meet critical Warfighter needs. The process of identifying potential solutions to new threats, whether from traditional or nontraditional sources, and fielding them rapidly, also needs to be improved. One way to meet these challenges is to simplify and expedite the process of contracting for new capabilities.

Despite the best intentions of those responsible for creating and administering the system, the Department's primary method of contracting under the Armed Services Procurement Act, Federal Acquisition Regulation and related authorities has evolved in a way that is often not well suited to respond to current national security challenges. Large segments of American and foreign industry are unable, or unwilling, to partner with the Department either directly, or through subcontracts, with major defense contractors because our business practices are, from a commercial perspective, too slow, inefficient, and arcane. In large measure, our business practices are driven by the requirements of our contracting system.

Congress has provided the Department with an array of contracting authorities that allow the Department to conduct research, development, and test and evaluation outside the constraints of the normal contracting system. Authority exists to engage in basic, applied, and advanced research (10 U.S.C. 2371), conduct prototype projects (section 845, Public Law 103-160 as amended), and make selected purchases for purposes of test and experimentation (10 U.S.C. 2373). These authorities have been used for a number of years and have proven successful both in appealing to nontraditional sources and in expediting research, development and prototyping efforts. Despite the record of success and the availability of lessons learned on these authorities, they are poorly understood and little used by many contracting activities of the Department. Other authorities potentially useful to expedite the evaluation or development of new systems that have been under utilized include Part 18 of the Federal Acquisition Regulation and a rapid acquisition waiver authority enacted by Congress (section 811, Public Law 108-375).

The Military Services and Defense Agencies will take action to ensure that contracting activities that support research, development, product evaluation, prototyping or similar efforts make effective use of these authorities. This includes providing training for key contracting and legal personnel, familiarizing relevant technical personnel with these authorities, and revising policies that may tend to inhibit or unnecessarily encumber the use of these authorities. As in all of the Department's activities, these authorities are to be exercised in a responsible and legal manner. However, "responsibility" is not be equated with "the way things have always been done." These authorities allow unprecedented opportunity to experiment with innovative forms of collaboration, new technical, as well as business approaches, and allow goals rather than rules to be the primary force in forming the contractual relationship. Collaborations should include arrangements between government laboratories and programs of record to address the "valley of death" transition issue, as well as collaborations between government and industry. Innovative arrangements to combine funding from various budget categories in successive phases of program development as well as acceptance of commercial standards and technology can be adopted when appropriate.

Authorities to engage in "other transactions" (10 U.S.C. 2371 and section 845), and make purchases for experimental purposes (10 U.S.C. 2373) are not to be considered niche or last resort methods; but are to be used whenever they are legally appropriate, and have the potential to contribute to the Department's mission. Planning for actual fielding of capabilities and follow on production needs to be carefully considered as part of the use of these authorities.

As an initial step, the Military Services and Defense Agencies will, at the earliest practicable date, assure, through demonstrated past accomplishment or accelerated training, that they have at least one contracting activity fully capable of using alternative contracting authorities in an effective manner, and acting as a lead center for alternative contracting. A lead alternative contracting activity or resource team to support other contracting activities will be established in each major command of the services and agencies with relevant contracting responsibility. The Services and Defense Agencies will conduct a review of policy guidance at all levels, including delegations of authority, to identify impediments to effective utilization of alternative contracting authorities. Contemporaneously, plans for training at all contracting activities with the potential to utilize alternative contracting authorities will be undertaken. Within sixty days from the date of this memorandum component heads will report on the status of measures taken to comply with directives in this paragraph. Reports will be sent to directly to my office.

Appendix 2. Change to Title 32 Code of Federal Regulations Part 37, "Technology Investment Agreements" (DOD Grants and Agreements Regulatory System)

Change section 37.105 of the DOD Grants and Agreements Regulatory System (DOD 3210.06-R) as follows (change added in italics):

Sec 37.105 Does this Part cover all types of instruments that 10 U.S.C. 2371 authorizes?

No, this part covers only TIAs, some of which use the authority of 10 U.S.C. 2371 (see Appendix B to this part). This part does not cover assistance instruments other than TIAs that use the authority of 10 U.S.C. 2371. It also does not cover acquisition agreements for prototype projects that use 10 U.S.C. 2371 authority augmented by the authority in section 845 of Public Law 103-160, as amended. *This part does not cover unfunded agreements or agreements that are neither assistance nor acquisition instruments but that are used for purposes other than standard assistance or standard acquisition purposes*.

Appendix 3. Recommended Changes to Section 845, Public Law 103-160, as amended (Prototype Project Authority)

Recommended changes that include deletions give a brief rationale for the deleted text in brackets []. New language is shown in italics.

1. Delete from section 845 (a): "(1) Subject to paragraph (2)"; and, delete paragraph (2) in its entirety. [Paragraph (a) (2) imposes approval requirements by the pertinent senior procurement executive or Under Secretary (AT&L), respectively, for prototype projects exceeding $20 million or $100 million. These restrictions were not in the original version of the law. They tend to stigmatize section 845 as a niche authority rather than a proven means to conduct prototype projects in a timely and cost effective manner as they have been shown to be. Given the nature of DOD bureaucracy such approval requirements tend to discourage use of the authority].

2. Delete section 845 (d) in its entirety. [Section (d) was added in 2000 as an attempt to "clarify" section 845. It imposed requirements for either cost sharing or significant participation by "non-traditional" contractors, under an extremely narrow definition of non-traditional. This was directly contrary to the original intent of section 845 which was aimed at defense contractors without cost sharing. That intent was clearly memorialized in a floor colloquy between Senators Nunn, Warner and Bingaman, 139 Cong. Rec. S1158, 9 Sep. 1993. Section (d) requirements have contributed to the confusion, misunderstanding and under utilization of section 845].

3. Delete sections 845 (e) and (g) and consolidate in a new section (d). [Section 845 contains two separate provisions authorizing follow on production after a competitive prototype project. Each has a different approach, and both seem more complicated than necessary].

4. Administrative changes. Delete section 845 (f). [In light of the deletion of section (d), the definition in (f) has no purpose]. Renumber section 845 (h) as 845 (e). Delete section 845 (i). [This is a sunset provision. Deletion makes section 845 permanent legislation].

5. Add a new section 845 (d): *(d) Follow-On Production Authority. (1) The Secretary of Defense may authorize follow-on production after prototype projects conducted under paragraph (a) of this section on an individual or class basis under the following circumstances: (A) the prototype project agreement was awarded on a competitive basis; (B) the solicitation leading to the award of the prototype project stated a follow-on production contract might be awarded; and, (C) a determination is made that the prototype project provides an adequate basis for determining the key performance characteristics of the production systems, articles or processes; and, provides an adequate basis for determining a fair and equitable price.*

(2) The types of follow-on contracts that may be awarded under this paragraph are (A)(1) a procurement contract awarded without competition notwithstanding the

requirements of 10 U.S.C. 2304; (2) in the case of a contract or subcontract awarded to an organization whose primary line of business is other than providing goods and services to the Department of Defense, the contract or sub-contract shall be exempt from statutes listed pursuant to 41 U.S.C. 430, or, (B) an extension of the prototype project agreement suitably modified to address production issues.

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About the Author

Richard L. Dunn is a private consultant providing advice on the implementation of technology in the military and civil sectors through innovative means. He analyzes laws, policies and practices and their impact on the development and deployment of technology. Mr. Dunn served as Visiting Scholar and Senior Fellow at the University of Maryland (2000-2007). He was General Counsel of DARPA (1987-2000). Previously, he was with the Office of General Counsel, National Aeronautics and Space Administration, with a private legal practice, and served nine years on active duty with the U.S. Air Force. Mr. Dunn has served as a consultant on task forces of the National Academy of Science and Defense Science Board. He has law degrees from the University of Maryland and George Washington University and a bachelor's degree from the University of New Hampshire.

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