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# Policy Issues for Department of Defense Technology Transfer

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**About This Publication**

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# Executive Summary

Technology transfer is the process of sharing, transmitting, or conveying technology data and information (intellectual property) between the government agencies, industry, and academia. The broad goal of this assessment was to identify exemplar practices and policies for technology transfer at Department of Defense (DoD) laboratories. This report presents technology transfer issues and potential policy actions that the Office of the Secretary of Defense (OSD) could consider to enhance existing technology transfer mechanisms or to create new ones. A companion report, *Exemplar Practices for Department of Defense Technology Transfer,* is also available.[1]

## Literature Review

A review of academic literature, government reports, and legal documents on technology transfer highlighted strategies and factors for success, but not specific practices. The exemplar practices presented in the literature focus on high-level strategies to improve technology transfer at DoD laboratories. These strategies include providing guidance to DoD laboratories to strategically plan and engage in technology transfer; to empower and reward researchers to engage in technology transfer; to create effective and efficient technology transfer offices; to establish processes that streamline executing technology transfer agreements; and to leverage other technology transfer resources at the local, state, and national levels.

The literature identified the following critical factors for a successful technology transfer program: an effective Office of Research and Technology Applications (ORTA), engaged researchers, well-managed intellectual property, effective use of technology transfer mechanisms, efficient technology transfer processes, and meaningful interaction with industry through marketing or partnerships.

The literature highlighted challenges for implementing and encouraging technology transfer at DoD laboratories. For example, the DoD is more focused on technology transition than technology transfer. The goal for technology transition is to spin DoD-developed technologies back into the DoD as products and processes. This requires a combination of technology transfer and acquisition, two distinct processes. In addition,

[1] S. V. Howieson, S. S. Shipp, G. K. Walejko, et al. *Exemplar Practices for Department of Defense Technology Transfer*, IDA Paper P-4957, January 2013.

many DoD technologies may not transition to commercial products in the private sector or may be classified or sensitive.

In short, the literature provided high-level recommended practices and strategies, critical factors, and implementation challenges. To identify specific technology transfer policy issues at DoD laboratories, interviews with DoD laboratory ORTA staff and other stakeholders were chosen as the primary data-collection method.

## Approach

The research team conducted semi-structured discussions with individuals to gather information on practices and policy recommendations. Using the themes identified in the literature, a discussion guide was developed. These discussions were held from June to September 2012. The research team established criteria to assess whether policy issues identified during the discussions should be included in the report.

## Technology Transfer Policy Issues

Based on the interviews with DoD laboratory ORTA personnel, legal staff, and other stakeholders, a set of policy issues related to technology transfer was collected. Policy issues pertain to legislation, DoD instructions or guidance, or Service policies. Each policy issue has an accompanying potential action or actions to clarify authorities or create new ones. Several technology transfer practices discussed in the body of the report could be improved or more fully adopted if these potential actions are implemented.

In the case of each proposed policy issue, the research team first reviewed whether to further research the proposed issue based on a set of criteria: whether there was enough information to locate the relevant policy and a rational basis for the recommended potential action; whether there was an independent assessment that assessed the benefits of the policy action; and whether there were differing opinions about the proposed action.

The research team selected 15 policy issues (see the table on pages v–vi) for discussion and organized them into the following six categories:

- *Ensuring effective ORTA organization and staffing*. A poorly placed comma in the Air Force instruction on technology transfer has led to confusion about who is responsible for technology transfer program management. OSD could encourage the Air Force to amend the instruction to clarify who has technology transfer program management responsibility.
- *Empowering, training, and rewarding scientists and engineers*. Policy issues in this category relate to royalties in the case of an inventor's death or disappearance, trademark royalty distribution, and technology transfer authorities at Federally Funded Research and Development Centers (FFRDCs) and University Affiliated Research Centers (UARCs). There is inconsistency

between the technology transfer policies of DoD FFRDCs and UARCs for researcher consulting and partner company exclusions, among other elements. A potential action is the review of DoD FFRDC and UARC policies and issuance of guidance to ensure they are utilizing the full extent of their authority.

- *Capturing and managing intellectual property*. Policy issues include the authority to license inventions or other intellectual property (IP), software copyright, and technology transfer and acquisition. The lack of the ability to copyright software and other technical material was the most often discussed policy issue. OSD could consider seeking an amendment to the Copyright Act to allow a limited ability to copyright technical works created by researchers at DoD laboratories.
- *Using technology transfer mechanisms to full potential*. Examples include the Small Business Innovative Research (SBIR)/Small Business Technology Transfer (STTR) legislation change, facility Cooperative Research and Development Agreement (CRADA) funding, delayed compensation from start-ups, material transfer agreements, and non-disclosure agreements. DoD laboratories work around these issues since they do not have authority to sign material transfer agreements and non-disclosure agreements. While some felt there was no need to change the status quo, others recommended seeking legislative amendments to provide these authorities.
- *Managing and monitoring technology transfer processes*. Policy issues include engineering services implementing policies and trademark signature authority. Both involve encouraging the services to implement policies allowing their laboratories to use the new engineering services mechanism and sign trademark agreements with headquarters notification and period of review, respectively.
- *Building partnerships*. These include the Partnership Intermediary Agreement (PIA) legislation and leveraging the Manufacturing Extension Partnership. Interviewees asserted that the PIA legislation is unclear regarding allowable PIA activities and limits the definition of assisted partners to include to only small businesses. Potential actions are to amend the legislation to clarify the definition and to expand allowable partnership intermediary activities to all businesses, not just small ones.

These are the same categories as used to describe the exemplar practices discussed in the companion report (excluding marketing laboratory technologies and capabilities to industry, which had no related policy issues).

**Technology Transfer Policy Issues**

| Theme | Policy Issue | Potential Action by OSD (or relevant organization) |
|---|---|---|
| Ensuring effective Office of Research and Technology Applications (ORTA ) organization and staffing | Air Force instruction regarding technology transfer is confusing as to whether the Technology Executive Officer (TEO) or Air Force Research Laboratory (AFRL) Commander has responsibility for technology transfer program management | Encourage the Air Force to amend the instruction to clarify who has technology transfer program management responsibility, the TEO or the Commander of AFRL |
| Empowering, training, and rewarding scientists and engineers | Inconsistent treatment of royalties in case of an inventor's death or disappearance across DoD laboratories | Clarify DoD instruction regarding the proper treatment of royalties in the event of an inventor's death or in the event he or she cannot be located after leaving the laboratory |
| | Trademark royalties are not distributed to inventors when the trademark is directly associated with a licensed invention or patent by law | Issue a legislative amendment such that trademark royalties related to technology developed at a laboratory are distributed to the inventor under the same guidelines as patent royalties |
| | Technology transfer policies of DoD Federally-Funded Research and Development Centers (FFRDCs) and University-Affiliated Research Centers (UARCs) are inconsistent, including those related to researcher consulting and limitations on company partners | Review DoD FFRDC and UARC policies and issue guidance to ensure they are utilizing the full extent of their authority |
| Capturing and managing intellectual property (IP) | Service policies are inconsistent regarding permissibility of licensing inventions or "other IP" | Clarify full scope of licensing authority available to DoD laboratories through policy guidance, while concurrently exercising care to avoid patent misuse and the improper extension of patent royalty payments beyond the patent term |
| | Inability to copyright government works, particularly software and other technical material created at the laboratories | Evaluate and seek an amendment to the Copyright Act to allow limited ability to copyright technical works created by researchers at DoD laboratories |
| | Government data rights and other considerations in technology transfer agreements are not given adequate consideration such that future acquisition needs may be limited or restricted | Encourage communication between the technology transfer and acquisition communities |

| | | |
|---|---|---|
| Using technology transfer mechanisms to full potential | Congress overruled a decade-long Small Business Administration (SBA) policy directive prohibiting the use of Small Business Innovative Research (SBIR) or Small Business Technology Transfer (STTR) funds for collaborations with Federal laboratories | Publicize the reversal of the previous SBA policy to facilitate changing the practice and culture of DoD technology transfer personnel and researchers |
| | A variety of methods for delayed compensation from start-ups are used across DoD laboratories, including using a third party to hold equity on their behalf or an agreement with deferred compensation | Provide guidance on methods for delayed compensation from start-ups |
| | Some DoD laboratories use shortened and expedited CRADA material transfer agreements (MTAs), since they do not have the authority to enter into MTAs | Support legislation to allow DoD laboratories the authority to enter into MTAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA MTA |
| | Laboratory researchers do not have signature authority for non-disclosure agreements (NDAs), but some laboratories use an acknowledgement of criminal liability or shortened and expedited CRADA NDAs | Support legislation to allow someone other than contracting officers or the secretaries' designees (most likely the laboratory commanders) to have authority to sign NDAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA NDAs |
| Managing and monitoring technology transfer processes | Military services have not yet finalized their implementation policies for providing engineering services to delegate authority for engineering services agreements to the laboratory directors who will be able to contract out laboratory facilities, services, and equipment | Encourage the services to finalize their implementation policies for engineering services which would delegate authority to the local laboratory commander |
| | Signature authority for trademark license agreements resides at headquarters level instead of with laboratory commanders/directors, who have signature authority for CRADAs (with headquarters notification and a review period). | Encourage the services to issue policies allowing laboratory commanders to sign trademark licensing agreements with headquarters notification and a period of review. |
| Building partnerships | The partnership intermediary agreement (PIA) legislation is unclear regarding allowable PIA activities and limits the definition of assisted partners to include to only small businesses | Seek to amend the PIA legislation to clarify which definition is preferable—the broad definition of 15 USC § 3715 (a)(1) or the narrower definition of 15 USC § 3715 (b)<br>Also consider seeking an amendment to expand allowable partnership intermediary activities to all businesses, not just small ones |
| | The Manufacturing Extension Partnership (MEP) is an underutilized commercialization resource for the DoD's technology transfer efforts | Interact with the National Institute of Standards and Technology (NIST) to formalize a relationship<br>DoD guidance could also be issued that calls out MEP as a commercialization partner resource for DoD laboratories |

The additional policy issues brought up during interviews were either too nonspecific or the interviewees did not provide enough detail for them to constitute a concrete policy action.

## Summary and Next Steps

Adoption of appropriate policy actions would require implementing or clarifying DoD guidance or instructions, potentially leading to improvements in technology transfer practices. Actions that would require new legislation would take longer, but have the potential to provide new or improved technology transfer tools to DoD practitioners. Interested stakeholders could help facilitate drafting, negotiating, and implementing such policy actions.

# Contents

# 1. Introduction

## A. Purpose

The Defense Laboratories Office in the Office of the Assistant Secretary of Defense for Research and Engineering asked the Institute for Defense Analyses (IDA) to identify (1) exemplar technology transfer practices throughout the Department of Defense (DoD) laboratory enterprise and (2) technology transfer policy and legislative issues that the Office of the Secretary of Defense (OSD) could address to enhance current practices or lead to new practices.

The impetus for the research was twofold. First, the Defense Laboratories Office is interested in technology transfer as it pertains to the DoD's mission "to provide the military forces needed to deter war and to protect the security of our country."[2] To help meet this mission, the DoD laboratory enterprise focuses on transferring technology out of laboratories for commercial development before transitioning it back to the DoD for use by the warfighter. Second, an October 2011 Presidential memorandum identified three actions to be taken by Federal agencies and their associated laboratories: (1) establish goals and measure progress, (2) streamline technology transfer and commercialization processes, and (3) facilitate commercialization through local and regional partnerships (Presidential Memorandum 2011).

This report, one of two resulting from the research, presents policy issues related to these technology transfer objectives as identified by DoD laboratory staff, DoD Offices of Research and Technology Applications (ORTAs), DoD legal staff, and other stakeholders. The purpose of the report is not to provide legal advice but to help OSD policy makers decide whether a given policy issue is worth pursuing. The second report provides exemplar technology transfer practices in use at DoD laboratories and is intended to inform DoD laboratories and technology transfer offices of these exemplar practices and to encourage their widespread adoption.[3]

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[2] From "About the Department of Defense (DOD)," http://www.defense.gov/about/.

[3] S. V. Howieson, S. S. Shipp, G. K. Walejko, et al. *Exemplar Practices for Department of Defense Technology Transfer*, IDA Paper P-4957, January 2013.

## B. Defining Terms

DoD laboratories are operated and managed by the military departments to conduct research and development (R&D) and support acquisition. Each "laboratory" performs one or more of the following functions: science and technology, engineering development, engineering support of deployed materiel and its modernization, and support to acquisition. The term embraces not only laboratories but also research institutes and centers; research, development and engineering centers; and warfare centers of the military departments (adapted from DoD Instruction 3201.01). This includes government-owned, government-operated (GOGO) organizations, Federally Funded Research and Development Centers (FFRDCs), and University Affiliated Research Centers (UARCs). For the purposes of this report, *DoD laboratory* is used to encompass all three of these governance types.

*Technology transfer* is the "process of sharing, transmitting, or conveying technology data and information (intellectual property) between the government agencies, industry, and academia" (Gonsalves 2010). Technology transfer occurs indirectly through transfer of knowledge via conference presentations, journal articles, seminars, teaching, and other ways of communicating findings. It can also occur through the transfer of technology *directly* to the private sector or by way of networks with the goal of commercializing the technology. *Commercial technology transfer* is the transfer of technology from a Federal laboratory or agency to a commercial entity that can improve technologies by undertaking the technical, business, and manufacturing research to bring them to market. This study focuses on technology transfer that occurs directly to the commercial sector.

The direct transfer of technologies occurs by licensing inventions and through agreements, such as Cooperative Research and Development Agreements (CRADAs) and Material Transfer Agreements. Technology transfers to the private sector can also occur through the use of network mechanisms, such as partnership intermediaries. Partnership intermediaries are organizations that are funded by Congress, the DoD, or State and local governments to facilitate laboratory and company interactions with the goal to transfer technologies to the private sector. These and other network mechanisms are listed in Table 1 by their type of pathway—direct, indirect, or network.

Many technologies developed by DoD laboratories are dual use. *Dual-use technologies* refer to technologies, products, or families of products that have both commercial and Federal Government applications.

**Table 1. Technology Transfer Mechanisms by Type of Pathway**

| Indirect Pathway Mechanisms | Direct Pathway Mechanisms | Network Pathway Mechanisms |
|---|---|---|
| Conference Papers | *Invention Protection* | Commercialization Assistance Program |
| Education Partnership Agreements | Invention disclosures | Entrepreneurship-in-residence programs |
| Field Days | Patent applications | Entrepreneurship Training |
| Intramural Research Training Awards | Issued patents | Mentor-Protégé Program |
| Publications | *Transfer of Property* | Personnel Exchange Agreements |
| Seminars | Material Transfer Agreements | Partnership Intermediary Agreements |
| Teaching | Patent licenses | Venture Capital Forums |
| Workshops | Inter-Institutional Agreements | |
| | *Collaborative Research Agreements* | |
| | Cooperative Research and Development Agreements (CRADAs) | |
| | Space Act Agreements | |
| | Collaboration Agreements (other than CRADAs) | |
| | *Resource Use Agreements* | |
| | Commercial Test Agreements | |
| | Test Service Agreements | |
| | User Facility Agreements | |
| | Work for Others | |

*Source:* Hughes et al. (2011), adapted from Ruegg (2000) and Federal Laboratory Consortium for Technology Transfer (2009).

*Notes:* In this report, we use the terms "technology transfer" to mean indirect, direct, and network pathways and "commercial technology transfer" to mean direct and network pathways.

## C. Approach

The IDA study team reviewed the literature as well as findings related to DoD laboratories in previous IDA Science and Technology Policy Institute research on technology transfer (Hughes et al. 2011). The team then interviewed stakeholders that included representatives from DoD ORTAs, legal staff involved in DoD technology transfer, staff at partnership intermediaries, DoD laboratory researchers, and others involved in the technology transfer or acquisition processes at the DoD and other agencies.

The information from the interviews was categorized into exemplar practices (the subject of the second report) or policy issues (the subject of this report). To be included as a policy issue in this report, sufficient information about and a rational basis for the policy action were necessary.

## D. Literature Review

Despite the importance policy makers place on technology transfer at DoD laboratories, the research team found little relevant literature on the topic. The team

reviewed academic literature, government reports, and legal documents. Legal documents reviewed included statutes, legislative history reports, DoD regulations, other Federal regulations, and law review articles from which the research team prepared a list of pertinent DoD policies and legal authorities for technology transfer mechanisms. The literature indicates that effective technology transfer is challenging for DoD laboratories and their associated ORTAs for the following reasons:

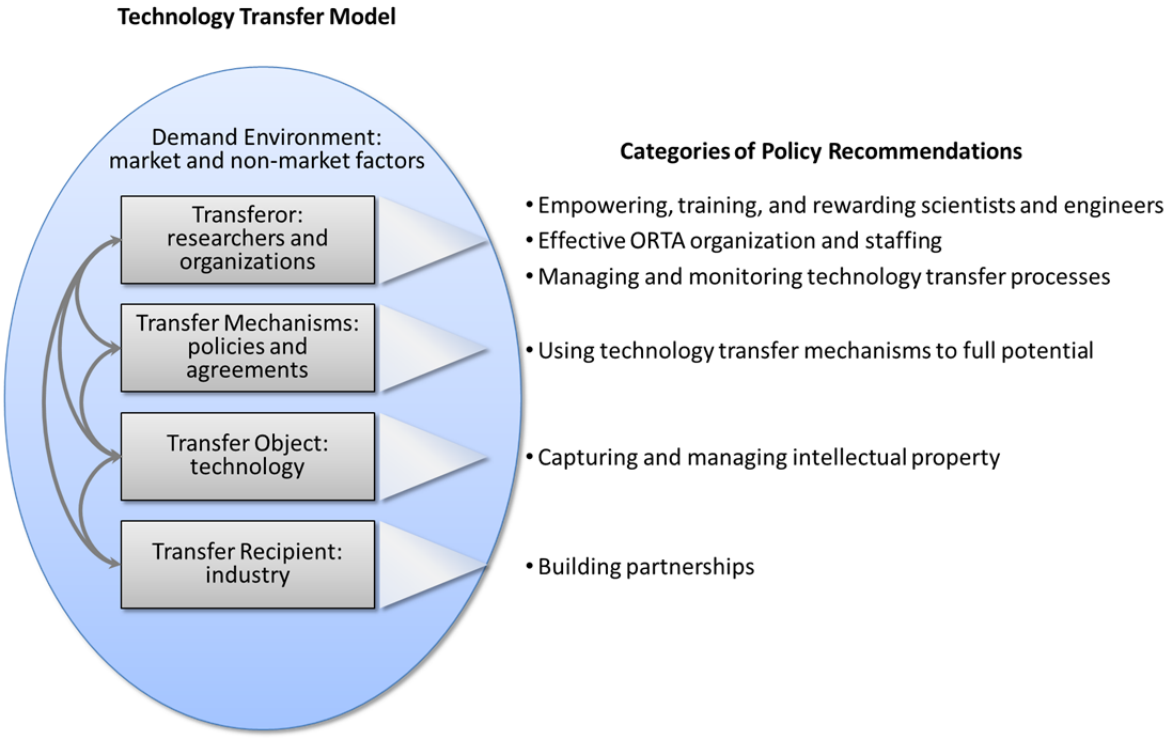
- Defense laboratories primarily focus on technology transition and view transfer for non-military purposes as secondary (Trexler 2006; Swearingen and Dennis 2009).
- Defense R&D may not be commercially relevant or may be classified (Papadakis 1995; Ham and Mowery 1998).
- Defense inventions may be protected via trade secret rather than patents (Bellais and Guichard 2006).
- Defense researchers often work on weapon systems, for which performance is the overriding concern, making it difficult to work with industry partners who also must balance schedule and cost (Ham and Mowery 1998).

Rather than specific practices and policies, the literature provided high-level practices in use at DoD laboratories, including:

- Strategically engaging in technology transfer (Trexler 2006; Reed and Nimmo 2001; Ballato and Stern 1999; Ham and Mowery 1998).
- Creating an effective ORTA (Trexler 2006; Ballato and Stern 1999).
- Encouraging, enabling, and rewarding laboratory scientists and engineers to undertake technology transfer (Trexler 2006; Ballato and Stern 1999; Leuthold 1998; Galbraith, Merrill, and Campbell 1991).
- Facilitating technology transfer agreements (Trexler 2006; Ballato and Stern 1999).
- Leveraging other technology transfer resources (Ballato and Stern 1999).

The literature review highlighted several critical factors for a successful technology transfer program, including an effective ORTA, engaged researchers, well-managed intellectual property, using technology transfer mechanisms to their full potential, efficient technology transfer processes, and meaningful interaction with industry through marketing or partnerships (Hughes et al. 2011). The research team organized exemplar practices and policy recommendations around related categories, which correspond to the technology transfer model in Figure 1, adapted from a model proposed by Bozeman (2000). The intellectual property developed by the researcher or government organization

(called *transferor*), is captured and transferred to the recipient, such as industry, through various mechanisms, including policies and agreements.




Source: Adapted from Bozeman (2000).

**Figure 1. Technology Transfer Model and Categories of Policy Recommendations**

Given the lack of literature in this realm, the research team chose interviews with DoD laboratory ORTA staff and other stakeholders as the primary data-collection method.

## E. Semi-structured, Chain-Referral Interviews

Between June and September 2012, the research team conducted semi-structured interviews with representatives of 21 DoD and DoD-affiliated laboratory ORTAs and DoD technology transfer coordinating offices; lawyers from 7 DoD legal offices; and 14 other stakeholders, including partnership intermediaries, DoD contractors, DoD laboratory researchers, and technology transfer professionals at the Department of Energy (DOE). Interviews with staff from DoD laboratories and legal offices were split across military branches (6 from the Air Force, 11 from the Army, 9 from the Navy, and 2 from DoD headquarters). See Appendix A for a complete list of participating offices and interview dates.

Preliminary interviews with individuals identified by the sponsor and in previous research on technology transfer (Hughes et al. 2011) yielded lists of ORTA and legal

office representatives who potentially use technology transfer exemplar practices. Interviewees also offered policy recommendations. The preliminary interviewee discussion focused on four topics:

1. Current technology transfer exemplar practices
2. Potential technology transfer exemplar practices
3. Potential industry interviewees
4. Policy recommendations affecting technology transfer

The research team then interviewed ORTA and legal office representatives the preliminary interviewees identified and asked them to report exemplar practices and policy recommendations at their laboratories. These discussions focused on six topics:

1. Technology transfer exemplar practices at interviewee's ORTA
2. Technology transfer exemplar practices at other ORTAs
3. General ORTA information, such as number of staff and budget information
4. Potential industry interviewees
5. Potential researcher interviewees
6. Policy recommendations affecting technology transfer

During this second round of discussions, interviewees identified additional ORTA and legal office representatives to interview. Thus, the research team used a chain-referral approach to sampling interviewees (Atkinson and Flint 2001), whereby preliminary interviewees recommended subsequent interviewees.

See Appendix B for the interview guides used for both rounds of discussions.

## F. Technology Transfer Policy Issues

Interviewees recommended changes to existing legislation, DoD regulations, (directives and instructions), and military department regulations or identified where clarifications of existing regulations would improve or streamline technology transfer practices. They also recommended new legislation and regulations that could improve practices. The research team used the following criteria to decide whether to research a policy issue and include it in the policies discussed:

- Enough information to locate the legal basis for the relevant policy and a rational basis for the recommendation?
- Independent assessment as to whether the policy change would be beneficial?
- Different opinions about the policy issue?

If sufficient information was available, including previous assessments, the team conducted legal research on the issue to obtain multiple perspectives on the issue. When there was disagreement on a topic across interviewees, the research team probed for more information to better understand nuances. With respect to the latter point, different opinions help with understanding the advantages and disadvantages of a proposed policy change.

Using these criteria, the research team identified 15 policy issues, which were grouped into the six themes that roughly coincide with the technology transfer model depicted in Figure 1. Table 2 describes each policy issue by theme and provides potential actions that interviewees suggested be taken by the Office of the Secretary of Defense (OSD) or other organizations.

## G. Report Structure

The remainder of this report presents details about the policy issues identified, which are organized around the six technology transfer life cycle themes in Table 2:

- Ensuring effective ORTA organization and staffing (Chapter 2)
- Empowering, training, and rewarding researchers (Chapter 3)
- Capturing and managing intellectual property (Chapter 4)
- Using technology transfer mechanisms to their full potential (Chapter 5)
- Managing and monitoring technology transfer processes (Chapter 6)
- Building partnerships (Chapter 7)

Chapters 2 through 7 provide details about each policy issue, including background information and potential actions that could be taken. Chapter 8 summarizes the results and presents conclusions.

Appendix A presents the list of participating offices and interview dates, Appendix B provides the interview discussion guides, and Appendix C provides a list of interested stakeholders for each policy issue. Appendix D provides additional information about policy issues, including policy ideas that were not specific enough to be included in the main report. Ancillary information is provided in the following appendixes:

- Appendix E summarizes key technology transfer legal authorities.
- Appendix F lists the high-level recommendations, concerns and proposed policy actions expressed by the interviewees.
- Appendix G presents interviewee comments related to the impending change in U.S. patent law.
- Appendix H summarizes interviewee comments related to the implications of reduced funding for partnership intermediaries.

- Appendix I presents two practices “to watch.” The research team identified two practices that the DoD could monitor to assess their emergence as recommended practices in the future.

**Table 2. Policy Issues Raised by Interviewees**

| Theme | Policy Issue | Potential Action by OSD (or relevant organization) |
|---|---|---|
| Ensuring effective Office of Research and Technology Application (ORTA) organization and staffing | Air Force instruction regarding technology transfer is confusing as to whether the Technology Executive Officer (TEO) or Air Force Research Laboratory (AFRL) Commander has responsibility for technology transfer program management | Encourage the Air Force to amend the instruction to clarify who has technology transfer program management responsibility, the TEO or the Commander of AFRL |
| Empowering, training, and rewarding researchers | Inconsistent treatment of royalties in case of an inventor's death or disappearance across DoD laboratories | Clarify DoD instruction regarding the proper treatment of royalties in the event of an inventor's death or in the event he or she cannot be located after leaving the laboratory |
| | Trademark royalties are not distributed to inventors when the trademark is directly associated with a licensed invention or patent by law | Issue a legislative amendment such that trademark royalties related to technology developed at a laboratory are distributed to the inventor under the same guidelines as patent royalties |
| | Technology transfer policies of DoD Federally-Funded Research and Development Centers (FFRDCs) and University-Affiliated Research Centers (UARCs) are inconsistent, including those related to researcher consulting and limitations on company partners | Review DoD FFRDC and UARC policies and issue guidance to ensure they are utilizing the full extent of their authority |
| Capturing and managing intellectual property (IP) | Service policies are inconsistent regarding permissibility of licensing inventions or "other IP" | Clarify full scope of licensing authority available to DoD laboratories through policy guidance, while concurrently exercising care to avoid patent misuse and the improper extension of patent royalty payments beyond the patent term |
| | Inability to copyright government works, particularly software and other technical material created at the laboratories | Evaluate and seek an amendment to the Copyright Act to allow limited ability to copyright technical works created by researchers at DoD laboratories |
| | Government data rights and other considerations in technology transfer agreements are not given adequate consideration such that future acquisition needs may be limited or restricted | Encourage communication between the technology transfer and acquisition communities |
| Using technology transfer mechanisms to their full potential | Congress overruled a decade-long Small Business Administration (SBA) policy directive prohibiting the use of Small Business Innovative Research (SBIR) or Small Business Technology Transfer (STTR) funds for collaborations with Federal laboratories | Publicize the reversal of the previous SBA policy to facilitate changing the practice and culture of DoD technology transfer personnel and researchers |
| | A variety of methods for delayed compensation from start-ups are used across DoD labs, including using a third party to hold equity on their behalf or an agreement with deferred compensation | Provide guidance on methods for delayed compensation from start-ups |

| | | |
|---|---|---|
| | Some DoD laboratories use shortened and expedited CRADA material transfer agreements (MTAs), since they do not have the authority to enter into MTAs | Support legislation to allow DoD laboratories the authority to enter into MTAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA MTA |
| | Laboratory researchers do not have signature authority for non-disclosure agreements (NDAs), but some laboratories use an acknowledgement of criminal liability or shortened and expedited CRADA non-disclosure agreements. | Support legislation to allow someone other than contracting officers or the secretaries' designees (most likely the laboratory commanders) to have authority to sign NDAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA NDA |
| Managing and monitoring technology transfer processes | Military services have not yet finalized their implementation policies for providing engineering services to delegate authority for engineering services agreements to the laboratory directors who will be able to contract out laboratory facilities, services, and equipment | Encourage the services to finalize their implementation policies for engineering services which would delegate authority to the local laboratory commander |
| | Signature authority for trademark license agreements resides at headquarters level instead of with laboratory commanders/directors, who have signature authority for CRADAs (with headquarters notification and a review period) | Encourage the services to issue policies allowing laboratory commanders to sign trademark licensing agreements with headquarters notification and a period of review |
| Building partnerships | The partnership intermediary agreement (PIA) legislation is unclear regarding allowable PIA activities and limits the definition of assisted partners to include to only small businesses | Seek to amend the PIA legislation to clarify which definition is preferable—the broad definition of 15 USC § 3715 (a)(1) or the narrower definition of 15 USC § 3715 (b)<br>Also consider seeking an amendment to expand allowable partnership intermediary activities to all businesses, not just small ones |
| | The Manufacturing Extension Partnership (MEP) is an underutilized commercialization resource for the DoD's technology transfer efforts | Interact with the National Institute of Standards and Technology (NIST) to formalize a relationship<br>DoD guidance could also be issued that calls out MEP as a commercialization partner resource for DoD laboratories |

# 2. Ensuring Effective Office of Research and Technology Applications (ORTA) Organization and Staffing

DoD technology transfer stakeholders raised a single policy issue related to effective ORTA organization and staffing: Air Force Instruction wording.

## A. Air Force Instruction Wording

### 1. Background

Air Force Instruction (AFI) 61-301 issued May 30, 2001, establishes policies and procedures for Air Force technology transfer and delineates the responsibilities and authorities of various offices.

### 2. Policy Issue

AFI 61-301 assigns program management responsibility to "The Technology Executive Officer (TEO), Commander, Air Force Research Laboratory…" When this instruction was written, a single individual was the TEO and Commander of AFRL. The positions are now assigned to two different people, however, making it unclear who has technology transfer program management responsibility. This is also the case for CRADA reviewing authority.

### 3. Potential Action

OSD could encourage the Air Force to amend the instruction to clarify who has technology transfer program management responsibility, the TEO or the Commander of AFRL.

# 3. Empowering, Training, and Rewarding Researchers

DoD technology transfer stakeholders raised a number of issues related to empowering, training, and rewarding researchers for participating in technology transfer activities:

- Royalties in the case of death or disappearance
- Trademark royalty distribution
- FFRDC and UARC authorities

## A. Royalties in Case of Death or Disappearance

### 1. Background

Through a patent license, the government can transfer exclusive or non-exclusive rights for the subject invention to a third party in exchange for royalties or other payments. As required by statute, the government inventor or inventors are given a portion of the royalty payments. The minimum required distribution to the inventor(s) is the first $2,000 plus 15 percent each year (15 USC § 3710c). DoD Instruction 5535.8 sets the minimum distribution as $2,000 plus 20 percent each year (Department of Defense Instruction (DoDI) 5535.8 1999).

### 2. Policy Issue

According to an interviewee, there is currently no consistent policy across DoD regarding the distribution of an inventor's share of royalties if he or she has left the laboratory and cannot be located or has died. In the event of the inventor's death, the royalty payments should be paid to the estate or to his or her heirs. The inventor's estate or heirs are entitled to the royalty share, and the monies should not be given to another inventor instead (or kept by the laboratory). By law, if the inventor leaves the laboratory or organization, the agency is still required to pay the inventor his or her share of royalties (5 USC § 3710c(a)(3)). However, DoD's policy currently reads, "Each DoD Component shall prescribe its own regulations as to whether inventors or co-inventors, whose whereabouts are unknown for 1 year, or more, are entitled to further royalty payments" (DODI 5535.8, Para. 6.9.5.3).

According to an interviewee, laboratory practices are not necessarily consistent with the legal requirements in these situations.

### 3. Potential Action

An amendment to DoD policy could clarify the proper treatment of royalties in the event of an inventor's death or in the event he or she cannot be located after leaving the laboratory. Possible language to replace the current version of paragraph 6.9.5.3 of DoD Instruction 5535.8 reads:

> Royalty payments that have not been distributed to an inventor or co-inventors by the end of the fiscal year following receipt due to the whereabouts of the inventor or co-inventor being unknown will be transferred to a Department of the Treasury Trust Account for retention until the funds can be disbursed to the inventor or co-inventor or until such time as the funds are transferred to the Department of the Treasury Trust fund for Unclaimed Monies.

## B. Trademark Royalty Distribution

### 1. Background

Under the National Defense Authorization Act (NDAA) FY 2005 (codified at 10 USC § 2260), trademark royalties may be used for the trademark fees; operating the licensing program; or morale, welfare, and recreation:

> (d) Use of Fees—The Secretary concerned shall use fees retained under this section for the following purposes:
>
> (1) For payment of the following costs incurred by the Secretary:
>
> (A) Costs of securing trademark registrations.
>
> (B) Costs of operating the licensing program under this section.
>
> (2) For morale, welfare, and recreation activities under the jurisdiction of the Secretary, to the extent (if any) that the total amount of the licensing fees available under this section for a fiscal year exceed the total amount needed for such fiscal year under paragraph (1) (10 USC § 2260(d)).

At times, there is a trademark associated with technology developed at a laboratory.

### 2. Policy Issue

An interviewee felt it would be preferable if a portion of the trademark royalties associated with technology developed at a laboratory could be distributed to the inventor rather than be devoted to morale, welfare, and recreational activities.

### 3. Potential Action

OSD could consider pursuing a legislative amendment such that trademark royalties related to technology developed at a laboratory are distributed to the inventor under the same guidelines as patent royalties. By statute, the first $2,000 plus a minimum of 15 percent of patent royalties are distributed to inventors; by DoD Instruction, the first $2,000 plus a minimum of 20 percent of patent royalties is distributed.

## C. FFRDC/UARC Authorities

### 1. Background

Table 7 lists the 10 current DoD FFRDCs (3 research and development laboratories, 2 systems engineering and integration centers, and 5 study and analysis centers). Table 8 lists the 13 current UARCs operated for the DoD.[4]

FFRDCs are independent private-sector organizations sponsored and funded by the Federal Government to meet special long-term research or development needs that cannot be met as effectively by existing government or contractor resources. Parent organizations that run FFRDCs may be individual universities, university consortia, nonprofit corporations, industrial firms, or hybrid organizations.

The FFRDC concept grew out of World War II experiences, where private-sector scientific, engineering, and analytic talent was brought to bear to an unprecedented extent—and in new organizational ways—in support of U.S. wartime efforts. After the war, the Federal Government sought to retain close ties to the nation's technical expertise. Over several decades, the FFRDC concept was refined to meet continuing government needs in evolving security and regulatory environments. Today, the key characteristics of FFRDCs are broadly defined in Federal Acquisition Regulation provisions, although sponsoring agencies vary somewhat in the specific governance mechanisms and policies applied to their FFRDCs (see, e.g. (Department of Defense (DoD) 2011)).

According to the relevant section of the Federal Acquisition Regulation (48 CFR 35.017), FFRDCs must (1) meet a special long-term government R&D need that cannot be met as effectively by the government or the private sector; (2) work in the public interest with objectivity and independence and with full disclosure to the sponsoring agency; (3) operate as an autonomous organization or identifiable operating unit of a parent organization; (4) preserve familiarity with the needs of its sponsor(s) and retain a long-term relationship that

[4] In October 2012, the University of Nebraska and United States Strategic Command entered into a partnership to create a new UARC. See http://nebraska.edu/docs/releases/UARCbackground.pdf.

attracts high-quality personnel; and (5) maintain currency in field(s) of expertise and provide a quick response.

**Table 7. DoD Federally Funded Research and Development Centers**

| Name | Year Founded | Sponsor | Type | Management Organization | Location |
|---|---|---|---|---|---|
| Center for Communication and Computing | 1956 | NSA/CSS | R&D Lab | Institute for Defense Analyses | Bowie, MD; La Jolla, CA; and Princeton, NJ |
| MIT Lincoln Laboratory | 1951 | USAF | R&D Lab | Massachusetts Institute of Technology | Lexington, MA |
| Software Engineering Institute | 1984 | OSD | R&D Lab | Carnegie Mellon University | Pittsburgh, PA |
| Arroyo Center | 1984 | Army | S&AC | RAND Corp. | Santa Monica, CA |
| Center for Naval Analyses | 1942 | Navy | S&AC | The CNA Corp. | Alexandria, VA |
| National Defense Research Institute | 1984 | OSD | S&AC | RAND Corp. | Santa Monica, CA |
| Project Air Force | 1946 | USAF | S&AC | RAND Corp. | Santa Monica, CA |
| Studies and Analyses Center | 1956 | OSD | S&AC | Institute for Defense Analyses | Alexandria, VA |
| Aerospace FFRDC | 1960 | USAF | SEIC | Aerospace Corp. | El Segundo, CA |
| National Security Engineering Center (formerly C3I) | 1958 | OSD | SEIC | MITRE Corp. | Bedford, MA, and McLean, VA |

Notes:

NSA/CSS = National Security Agency/Central Security Service

R&D Lab = Research and Development Laboratory

S&AC = Study and Analysis Center

SEIC = Systems Engineering and Integration Center

**Table 8. DoD University-Affiliated Research Centers**

| Name | Year Founded | Sponsor | Affiliated University | Location |
|---|---|---|---|---|
| Center for Advanced Study of Language | 2003 | NSA | University of Maryland, College Park | College Park, MD |
| Georgia Tech Research Institute | 1934 | Army | Georgia Institute of Technology | Atlanta, GA |
| Institute for Advanced Technology | 1990 | Army | University of Texas at Austin | Austin, TX |
| Institute for Collaborative Biotechnologies | 2003 | Army | University of California at Santa Barbara | Santa Barbara, CA |
| Institute for Creative Technologies | 1999 | Army | University of Southern California | Playa Vista, CA |
| Institute for Soldier Nanotechnologies | 2002 | Army | Massachusetts Institute of Technology | Cambridge, MA |
| Johns Hopkins University: Applied Physics Laboratory | 1942 | Navy | Johns Hopkins University | Laurel, MD |
| Pennsylvania State University: Applied Research Laboratory | 1945 | Navy | Pennsylvania State University | State College, PA |
| Systems Engineering Research Center | 2008 | NSA | Stevens Institute of Technology | Hoboken, NJ |
| University of Hawaii at Manoa: Applied Research Laboratory | 2007 | Navy | University of Hawaii at Manoa | Honolulu, HI |
| University of Texas at Austin: Applied Research Laboratories | 1945 | Navy | University of Texas at Austin | Austin, TX |
| University of Washington: Applied Physics Laboratory | 1943 | Navy | University of Washington | Seattle, WA |
| Utah State University: Space Dynamics Laboratory | 1959† | MDA | Utah State University | Logan, UT |

Notes:

NSA = National Security Agency

MDA = Missile Defense Agency

† Space Dynamics Laboratory was originally founded in 1959. Two UARCs relocated to Utah State University in 1970; they were merged and the name changed in 1982.

UARCs are research organizations within a university or college that receive sole-source (noncompetitive) funds in excess of $6 million annually (Department of Defense (DoD) 2010). In 2012, there were 14 UARCs; 13 were sponsored by DoD and 1 by the

National Aeronautics and Space Administration (NASA).[5] Although some of these institutions were formed much earlier (e.g., Johns Hopkins University Applied Physics Laboratory [JHU-APL] in 1942), the UARC concept was formally established in 1996. UARCs share some of the same core characteristics as FFRDCs, such as the requirement to maintain a long-term strategic relationship with their sponsor agencies and to operate free from conflicts of interest (Director of Defense Research and Engineering (DDR&E) 1996). FFRDCs tend to be more highly regulated than UARCs, however. For example, DoD's FFRDCs have limits on the annual levels of research effort at each institution.

UARCs must be affiliated with a university, have education as part of their overall mission, and have more flexibility in the types of contracts and research they are able to pursue (Hruby et al. 2011). Since FFRDC and UARC researchers are not Federal Government employees, they are subject to fewer restrictions than GOGO scientists. In theory, this means they should be subject to fewer restrictions than GOGO scientists. Depending on the specifics of their sponsoring agreements, contracts with the government, and internal practices, some FFRDC and UARC employees can assert copyrights and may be able to consult with industry and participate in start-ups based on technology developed at the laboratory.

## 2. Policy Issue

According to our interviewees, in practice, DoD FFRDCs and UARCs follow DoD GOGO policies more closely than necessary. For example, relative to other FFRDCs Massachusetts Institute of Technology Lincoln Laboratory (MIT-LL) has a very strict consulting policy that prohibits time away, leave of absence, or equity sharing for employees. Founder employees may work as a consultant for a start-up until the company starts, and then he or she must leave the laboratory (or give up equity or ownership of the company). In other cases, FFRDC and UARC policies are actually more stringent than GOGO policies. For example, JHU-APL has a policy not to license to companies that are also the subject of source selection studies or test and evaluation work. JHU-APL leadership is concerned that one of their inventions could end up on a technology that they are responsible for evaluating, leading to the appearance of a conflict of interest. The current list of excluded companies is close to 500. If they do license a technology to a company, they will not accept royalty payments. Finally, policies vary across the DoD FFRDCs and UARCs. Aerospace Corp, an FFRDC, does not follow this policy of not licensing to particular companies and allows its employees to work outside up to 50 percent of their time without losing their benefits.

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[5] In October 2012, the University of Nebraska and U.S. Strategic Command entered into a partnership to create a new UARC. See http://nebraska.edu/docs/releases/UARCbackground.pdf.

### 3. Potential Action

Policies across non-DoD FFRDCs with respect to employees taking leaves of absence, receiving equity shares, and engaging in consulting and contracting vary widely. For example, Sandia National Laboratories has the Entrepreneur Separation to Transfer Technology program, which allows Sandia employees to leave the laboratory temporarily to start a company and return to the laboratory within 3 years. As of 2010, there had been 44 Entrepreneur Separation to Transfer Technology start-up companies since the program's inception in 1994. Lawrence Berkeley National Laboratory does not allow leaves of absence, but staff can work up to 50 percent of their time to consult, partner with a company, or start a company. They cannot use laboratory resources to conduct R&D for the start-up.

OSD could review DoD FFRDC and UARC policies and issue guidance to ensure that FFRDCs and UARCs are utilizing the full extent of their authority.

# 4. Capturing and Managing Intellectual Property

DoD technology transfer stakeholders raised various issues related to capturing and managing intellectual property (IP):

- Authority to license inventions or "other IP."
- Software copyright.
- Technology transfer and acquisition guidance.

## A. Authority to License Inventions or "Other IP"

### 1. Background

Current law can be interpreted to allow Federal laboratories to license inventions, whether or not they are covered by a patent or a patent application, as well as "other IP."

#### a. Inventions

According to the Department of Commerce (DOC), an "invention" for the purposes of licensing is defined in 35 USC § 201(d) as "any invention or discovery which is or may be patentable or otherwise protectable under this title or a novel plant variety which is or may be protectable under the Plant Variety Protection Act" (71 FR 11510, embedded quotation marks omitted). DOC interprets this to mean that "the invention must have the potential of being protected and so could include computer software and biological materials or any other subject matter that qualifies under 35 USC § 101" (71 FR 11510, embedded quotation marks omitted). In other words, DOC takes the position that a government invention need not satisfy 35 USC § 102 or 35 USC § 103 novelty and nonobvious requirements, respectively, in order to be licensed by a Federal laboratory. One limitation of licensing an invention without the prospect of patent protection is that it lacks the enforcement power against third parties that an issued patent or a copyright protected work provides.

#### b. Other Intellectual Property

A 1988 Amendment (Pub. Law 100-519) to the Federal Technology Transfer Act of 1986 (FTTA, Pub. Law 99-502) expanded the authority of laboratory directors to license, "inventions made or other intellectual property developed at the laboratory and other

inventions or other intellectual property that may be voluntarily assigned to the Government" (15 USC § 3710a(a)(2)). Before this amendment, laboratory directors were authorized to license only inventions under the original FTTA language enacted 2 years earlier. A search of the legislative history of Pub. Law 100-519 found no explanation for the rationale behind this particular amendment. It is clear from the plain language of the amendment that inventions, however expansively that term is defined, are not the only items of intellectual property that laboratory directors can license.

Some DoD laboratories are using one or both of the above interpretations to license government software, engineering drawings, other works of technology-related authorship, biological materials, prototypes, know-how, and the like (i.e., intellectual assets) in the absence of patent and copyright protection or with only limited patent coverage.

### 2. Policy Issues

DOC issued a Federal Register notice of changes to the Code of Federal Regulation supporting this interpretation of "invention":

> Government owned invention means an invention, whether or not covered by a patent or patent application, or discovery which is or may be patentable or otherwise protectable under Title 35, the Plant Variety Protection Act (7 USC § 2321 et seq.) or foreign patent law, owned in whole or in part by the United States Government (37 CFR § 404.3).

The term "other intellectual property" is not defined in 15 USC § 3710a, and as noted before, no legislative history was found explaining this aspect of the 1988 Amendment. An interviewee suggested that the term could be defined in a license as "intellectual assets owned or controlled by Licensor that are not in the public domain and as specifically identified in this agreement as separate and distinct assets from any intellectual property claimed in invention disclosures, patent applications, or issued patents."

According to our interviewees, care must be taken to avoid patent misuse and the improper extension of a patent license beyond the patent term (e.g., in a hybrid license, differentiate between patent and other IP royalties, with patent royalties terminating upon patent expiration, abandonment, or invalidity).

### 3. Potential Action

OSD could encourage all DoD laboratories to utilize the full scope of licensing authority available to them through policy guidance, consistent with DOC's interpretation of "invention" as codified in 37 CFR § 404.3, as well as in the 1988 Amendment to the FTTA adding "other intellectual property" to the subject matter that can be licensed, while concurrently exercising care to avoid patent misuse and the improper extension of

patent royalty payments beyond the patent term. It was suggested that OSD policy guidance could read:

> Under the authority of 35 USC §§ 101, 201(d), 207(a)(2) and 15 USC § 3710a(a)(2), "DoD laboratories and/or technical activities," as such term is defined in DODI 5535.8 (hereafter referred to as "activity" or "activities"), and with such activity designation from the appropriate military service or agency, may license inventions made or other intellectual property developed at the activity and other inventions or other intellectual property that may be voluntarily assigned to the Government and in the custody of activity. The term "invention" means an invention, whether or not covered by a patent or patent application, or discovery which is or may be patentable or otherwise protectable under U.S. or foreign patent law, owned in whole or in part by the Government. The term "other intellectual property" shall be interpreted by activities as intellectual assets owned or controlled by the Government, in whole or in part, that are not in the public domain and are separate and distinct assets from inventions. Examples of other intellectual property include Government software, engineering drawings, and other works of technology-related authorship, biological materials, prototypes, and specialized technical know-how. Any royalties or other payments received by activities from licensing inventions and other intellectual property shall be shared with inventors or developers in accordance with 15 USC § 3710c and DODI 5535.8. In using this authority, activities shall appropriately distinguish inventions from other intellectual property to avoid patent misuse or the improper extension of patent royalties or other patent-related payments beyond the corresponding patent term.

## B. Software Copyright

### 1. Background

Under U.S. copyright law, creators of "original works of authorship" are given the exclusive right to reproduce their work, prepare derivative works, and display and perform the work. There are limited statutory exceptions, including for "fair use." Copyright protection is available to literary, dramatic, musical, choreographic, graphic, audiovisual, and architectural works. Computer programs, video games, other machine-readable audiovisual works, and automated databases all qualify for copyright protection. Copyright automatically attaches upon creation of the work and extends for 70 years beyond the life of the author.[6] While registration of the work with the U.S. Copyright Office is not a condition of protection, it provides several advantages, including prima

[6] For works created on or after January 1, 1978. For those created prior to January 1, 1978, the protection lasts for 95 years.

facie evidence of the validity of the copyright in court. Use of copyrighted materials may be licensed via contract, the same as patents.

Works created by government employees are not eligible for copyright protection:

> Copyright protection under this title is not available for any work of the United States Government, but the United States Government is not precluded from receiving and holding copyrights transferred to it by assignment, bequest, or otherwise (17 USC § 105).

The effect of § 105 is that all government works, including written materials and software code, enter the public domain whether published or unpublished.

## 2. Policy Issue

Interviewees discussed the lack of copyright protection for government works more often than any other policy issue. They made several arguments that protection should be obtained for technical government work: revenue is lost by freely disseminating software; there is a lack of control over potentially sensitive code; the commercial potential for partners seeking to further develop government work is diminished due to its lack of exclusivity; and in some situations, third parties subsequently assert copyright, and as a result, the government must buy back its own creations.

In addition, there are other more subtle policy ramifications to the government copyright prohibition. DoD has been supporting the use of Open Source Software (OSS) (DoD CIO 2009), but the use of some types of OSS actually requires the user to assert a copyright.[7] For example, the GNU project's General Public License and others found in the "copyleft" movement seek to ensure that open-source software remains open and is not coopted for commercial gain:

> To copyleft a program, we first state that it is copyrighted; then we add distribution terms, which are a legal instrument that gives everyone the rights to use, modify, and redistribute the program's code, or any program derived from it, but only if the distribution terms are unchanged. Thus, the code and the freedoms become legally inseparable.[8]

This poses a quandary for DoD employees. To use OSS as directed by Department policy, they must actually violate the terms of the license because they are unable to create a copyright.

Other intellectual property protection is available for software. Software may also be patented or, in some situations, protected as a trade secret. But according to our

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[7] See http://dodcio.defense.gov/Portals/0/Documents/FOSS/2009OSS.pdf.

[8] See http://www.gnu.org/copyleft/.

interviewees, the multiple-year process of securing patent protection is too long for the quick pace of software development. By the time a patent is issued, potential licensees have moved on the next phase of development. "Trade secret-like" technologies developed under CRADAs are protected from release under the Freedom of Information Act, but only for 5 years (15 USC § 3710a(c)(7)(B)).

There are ways to work around the copyright prohibition, several of which are discussed in the recommended practices report (see Chapter 5 of Howieson et al. 2013), but these are not without their drawbacks. Contractors are capable of asserting copyright.

Another option for laboratories is to have a third party assert copyright and then assign it back to the government. government entities can hold copyrights, they just cannot create them. According to the interviews, however, this is inefficient and a waste of resources. This scenario was specifically discussed in the House report accompanying the 1976 Copyright Law revision. Some argued that the copyright prohibition on government materials should extend to works prepared under U.S. Government contracts or grants. The lawmakers determined, however, that a blanket prohibition was not appropriate:

> The bill deliberately avoids making any sort of outright, unqualified prohibition against copyright in works prepared under Government contract or grant. There may well be cases where it would be in the public interest to deny copyright in the writings generated by Government research contracts and the like; it can be assumed that, where a Government agency commissions a work for its own use merely as an alternative to having one of its own employees prepare the work, the right to secure a private copyright would be withheld. However, there are almost certainly many other cases where the denial of copyright protection would be unfair or would hamper the production and publication of important works. Where, under the particular circumstances, Congress or the agency involved finds that the need to have a work freely available outweighs the need of the private author to secure copyright, the problem can be dealt with by specific legislation, agency regulations, or contractual restrictions (House of Representatives 1976).

### 3. Potential Action

Providing the ability to copyright software and other technical material was the policy recommendation suggested the most by interviewees. OSD could consider seeking an amendment to the Copyright Act to allow limited ability to copyright technical works created by researchers at DoD laboratories.

Commonwealth countries—Australia, Canada, New Zealand, and the United Kingdom—use the "Crown copyright" for government works. Under the law of each

country, there are waivers for certain classes of documents such as regulations and court judgments.

In the past, there has been at least one successful amendment to U.S. copyright law dealing with government works of authorship. The Standard Reference Data Act of 1968 (Pub. Law 90-396) provides for the collection, compilation, critical evaluation, publication, and sale of standard reference data by the U.S. Secretary of Commerce on behalf of the United States of America. The data sets are managed by the National Institute of Standards and Technology (NIST). This exception appears at 17 USC § 209e:

> § 290e. United States copyright and renewal rights
>
> (a) Notwithstanding the limitations under section 105 of title 17, the Secretary may secure copyright and renewal thereof on behalf of the United States as author or proprietor in all or any part of any standard reference data which he prepares or makes available under this chapter, and may authorize the reproduction and publication thereof by others.
>
> (b) The publication or republication by the Government under this chapter, either separately or in a public document, of any material in which copyright is subsisting shall not be taken to cause any abridgment or annulment of the copyright or to authorize any use or appropriation of such material without the consent of the copyright proprietor.

This example could be used as a model for creating a similar narrow exception for works of technical subject matter (e.g., software, design drawings, and the like) created at all Federal laboratories or only at DoD laboratories. According to our interviewees, however, on at least four occasions over the last 10 years, this request has been formally and officially sent to Congress by the Office of Management and Budget on behalf of the Office of the President: twice by initiation of the Commerce Department with coordination across the Federal R&D Agencies; next by NASA; and last, about 3 years ago, by DoD (i.e., the Office of Technology Transfer). The Office of Technology Transfer attempt was to try to work it through the Armed Services Committees as a pilot project. None of these efforts sparked enough interest for Congress to ask for more information on the benefits, and a draft bill was never introduced. Based on his previous experience, on interviewee said it was unlikely that the DoD General Counsel would support such an amendment.

One argument for retaining the copyright prohibition on all government works is that the public should not have to pay a "double subsidy" for materials produced by the U.S. Government (House of Representatives 1976). The public has paid for the creation of government works through taxes and should not have to pay a second time for a copyright license. A second argument is that lawmakers wanted to ensure that

government materials, such as legislation and regulations, were always freely available to the public.

## C. Technology Transfer and Acquisition

### 1. Background

Technology jointly developed under a CRADA or other technology transfer mechanism may ultimately surface in an acquisition. Aspects of the technology transfer agreement, such as data rights, may prove critical later on. Data rights refer to the government's license rights to technical data, computer software, and computer software documentation. Care must also be taken to ensure that no unfair advantage has been bestowed upon the technology transfer partner that carries over to the acquisition process. In the FY 2009 NDAA, Congress directed the Secretary of Defense to issue policy guidance with respect to rights in technical data under a non-Federal Acquisition Regulation (FAR) agreement, including CRADAs (Pub. Law 110-417 § 822). According to our interviewees, DoD has not properly responded to this directive.

Table 9 explains the different scenarios.

**Table 9. Types of Data Rights**

| Right | Within Government | Outside Government (Third Parties) |
|---|---|---|
| **Unlimited rights**<br>Technical data and computer software can be released when government has Unlimited Rights or Government Purpose Rights | Government can disclose to anyone in the government<br>Government can modify use, reproduce, display, and perform calculations using the data | Government can disclose to anyone within the government<br>Others can modify use, reproduce, display, and perform calculations using the data |
| **Government Purpose Rights**<br>Technical data and computer software can be released when government has Unlimited Rights or Government Purpose Rights | Government can disclose to anyone in the Government<br>Government can modify use, reproduce, display, and perform calculations using the data | Okay for the government to release outside government for government purposes<br>The outside user must sign a non-disclosure agreement. Industry cannot commercialize a product using the data or computer software |
| **Limited/Restricted rights**<br>Technical data and computer software *cannot* be released when government has limited/restricted rights | The technical data and computer software can be used only within the government | Government cannot release to a third party |

## 2. Policy Issue

DoD lawyers are concerned that CRADAs are competed and set up without anticipating future testing and possible spin-in of the technology. This can lead to the DoD only having limited or restricted rights in the future on technical data or computer software developed by a CRADA partner. According to interviewees, if the Government starts with a CRADA and does not think about acquisition, it can create a sole source since the Government may not have the necessary data rights to provide the technology to other companies. This is true regardless of the primary purpose of the CRADA, whether it is the creation of software or data or if this is tangential to the research project. There is currently no guidance on what to do to prevent the CRADA partner from having an advantage over possible competition. The DoD Instruction is not adequate (it was last revised in 1999), which Congress recognized in the FY 2009 NDAA. To avoid any future potential unfair advantage, some laboratories have elected not to use CRADAs with companies that have Government contracts.

In many cases, CRADAs are put in place by patent lawyers who do not have an acquisition background. Technology transfer professionals also do not have experience with acquisition. This issue spans the two worlds of acquisition and technology transfer, which in many cases operate very separately. By anticipating the Government's data rights up front when competing and setting up a CRADA, the Government is protected when it wants to use the technical data, computer software, or product, as long as the level of access is clearly defined. Clarifying rights up front ensures that less time and effort are required in the event DoD wishes to use jointly developed outputs. A lack of data rights knowledge may create problems because the data rights are not correctly detailed when the CRADA is initially created.

Certain technology transfer practitioners have developed mechanisms for ensuring that future acquisition consequences are incorporated in technology transfer agreements and decision-making. One individual has created a checklist of data rights and CRADAs that consists of the following questions:

1. Is the technology for noncommercial or commercial use?
2. Is the technology a widget or computer software?
3. What is being delivered?
4. What are the life-cycle events (maintenance, sustainment, refresh, competition)?
5. What data rights will be needed over the life cycle?
6. What is the nature of the technical data?
    a. Form, fit, or function data
    b. Date for operations, maintenance, installation, and training

c. Or computer software documentation (Government automatically gets unlimited license)

7. What is the funding flow in the development of the widget/computer software?
8. Negotiate limited rights/restricted rights for technical data or computer software.
9. Determine whether the Government has license rights in any patents either owned by the contractor (patent rights clause in R&D contract) or through technology transfer agreements or license.

The Defense Acquisition University (DAU) also recently developed a 4-hour training module on data rights called "Intellectual Property and Data Rights." The course provides information about the Defense Federal Acquisition Regulation Supplement regulations and the importance of establishing data rights up front when working with industry.[9] The training module was edited by lawyers who are experts on this topic, and the class was released in June 2012:

> This (new) module provides fundamental information about intellectual property and the effective management of rights in technical data and computer software and their contribution to programmatic success. The module addresses concepts and legal guidance related to intellectual property, focusing on the rights in technical data and computer software that are the concerns of the Government and of our defense contractors. This module is primarily intended for technology managers and other acquisition professionals who are charged with ensuring that the DoD has the legal rights to the intellectual property necessary to provide the best technology to our warfighters.[10]

There is no tuition cost for government personnel or industry personnel directly supporting the DoD. All DoD staff with needs to understand data rights and acquisition has access to the training on the DAU website.

Another interviewee developed a process for "Competing the CRADA" for situations where it is anticipated that the CRADA project is likely to be a material step toward an eventual procurement of significance to potential offerors. Here, there is a risk of a possible bid protest alleging that a CRADA collaborator has inside procurement information or an unfair advantage that could potentially delay work or disqualify the

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[9] CLE 068 Intellectual Property and Data Rights: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=1911.

[10] New Intellectual Property and Data Rights Training: https://dap.dau.mil/career/log/blogs/archive/2012/06/18/new-intellectual-property-and-data-rights-training.aspx

CRADA collaborator. There is also a risk of bid protest alleging that the government requirements, or the government's proposal evaluators, are biased in favor of a CRADA collaborator. In addition, by starting out with only one company in pursuit of a requirement, the government misses out on better solutions that may be available in the broader marketplace. Care must also be taken when a CRADA activity is likely to result in the CRADA partner being the sole source, or potential sole source, for future acquisition efforts.

In addition to recommending that the specific objectives of a proposed CRADA project be discussed with the ORTA, acquisition office, and legal office before proceeding, the Legal Counsel of the Chairman of the Joint Chiefs of Staff recommends using some form of broad public announcement to communicate agency interest in entering into a CRADA for a specific objective or entering into multiple CRADAs. But doing so requires resources, which may be constrained. In addition, other interviewees pointed out that competing the CRADA undermines one of the inherent benefits of using a CRADA rather than a procurement vehicle, which is that many of the FAR tenets are not required, including the need for an open competition.

### 3. Potential Action

The DoD technology transfer and acquisition communities generally work separately. Changing this culture and ensuring that the processes of both communities take each other into account could be facilitated by DoD guidance. This guidance could also serve as a response to the FY 2009 NDAA directive to issue policy guidance with respect to rights in technical data under a non-FAR agreement. The guidance could include the following provisions:

- Provide training to technology transfer professionals and lawyers on data rights and other acquisitions issues. Encourage all technology transfer staff (and perhaps researchers) to take the DAU training.
- Include the acquisition office in the review of major technology transfer agreements or provide periodic briefings on upcoming agreements.
- Establish Defense Federal Acquisition Regulation (DFAR)-like rules for data rights for CRADAs. The DFAR contract rules for data rights are based on who paid for the technology. With CRADAs, the government needs to negotiate its data rights, taking into account the government contribution to the project, including labor hours, equipment, and other resources.
- Construct CRADAs so as to mitigate risks with contractors by (1) creating awareness of the IP concerns for procurement, (2) reaching out to the user community to develop technologies with multiple companies to avoid sole

source,[11] or (3) issuing a request for proposal for a CRADA requesting partners for a certain technology (i.e., "Compete the CRADA").

Another aspect of the link between technology transfer and acquisition is that tracking products through their entire life cycle will serve as a valuable source of evidence of effective progression from Defense R&D to procurement. Currently, researchers cannot say where and how their technology was ultimately used because they have lost touch with the acquisition process. Connecting technology transfer to an ultimate product was recommended as a concrete method for evaluating the success of the technology transfer program. This could also be addressed by the policy guidance.

[11] This may take significant extra work and resources to arrange firewalls and work with multiple companies.

# 5. Using Technology Transfer Mechanisms to Their Full Potential

Several policy issues were raised relating to using technology transfer mechanisms to their full potential:

- Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) legislation change.
- Delayed compensation from start-ups.
- Material transfer agreements.
- Non-disclosure agreements.

## A. SBIR/STTR Legislation Change

### 1. Background

The Small Business Innovation Research program, established in 1982 by the Small Business Innovation Development Act (Pub. Law 97-219), has been repeatedly extended, most recently through 2017 by the SBIR/STTR Reauthorization Act of 2011. SBIR is a competitive award program for small businesses to engage in Federal R&D with a potential for commercialization. A small business is defined as a for-profit business based in the United States with 500 or fewer employees, including affiliates. There are additional restrictions associated with the ownership of the small business.

Agencies with R&D budgets over $100 million are required to allocate 2.6 percent of their R&D budget to SBIR (Greene 2012).[12] This includes DoD and 10 other agencies. In FY 2009, the DoD SBIR budget was roughly $1.1 billion (Small Business Administration n.d.). The Small Business Administration (SBA) coordinates and directs agency implementation of the SBIR program.

The Small Business Technology Transfer program is similar to SBIR except that it involves collaborations between small businesses and research institutions. Agencies with

[12] The share will increase 0.1 percentage point each fiscal year until it reaches 3.2 percent in FY 2017 (Greene 2012).

R&D budgets over $1 billion, which includes DoD and four other agencies, are obligated to provide 0.35 percent of their R&D budget to STTR.

### 2. Policy Issue

In 2002, SBA issued a policy directive prohibiting the use of SBIR or STTR funds for collaborations with Federal laboratories except with special permission from SBA (Small Business Administration 2002). This made it difficult, but not impossible, for SBIR/STTR awardees to develop technologies with DoD laboratories and FFRDCs. Supporters of the 2002 policy directive asserted that it mitigated the risk of conflict of interest that could result if the same Federal players who benefited from SBIR awards were selecting them.[13]

After close to a decade, Congress reversed this policy in Title L of the National Defense Authorization Act for FY 2012, known as the SBIR/STTR Reauthorization Act of 2011. Section 5109 specifically allows small businesses to use SBIR and STTR awards to enter into CRADAs or other subcontracts with Federal laboratories.

The legislation added the following language to SBIR/STTR policy codified at 15 USC § 638:

> Sec. 5109. Collaborating with Federal laboratories and research and development centers. Subject to the limitations under this section, the head of each participating Federal agency may make SBIR and STTR awards to any eligible small business concern that— (A) intends to enter into an agreement with a Federal laboratory or federally funded research and development center for portions of the activities to be performed under that award; or (B) has entered into a cooperative research and development agreement (as defined in section 3710a (d) of this title) with a Federal laboratory.

The new policy attempts to mollify concerns over conflict of interest by explicitly prohibiting Federal agencies from conditioning an award on entering an agreement with any Federal laboratory or FFRDC.

SBA is responsible for implementing the changes in SBIR/STTR policy found in the latest reauthorization bill. SBA issued an updated SBIR/SSTR policy directive and opened it up for public comment from August 1, 2012, to October 5, 2012. Once SBA issues the final updated policy directive, the DoD Office of Small Business Programs will develop policy to implement the changes. Until that point, all DoD SBIR/STTR programs will continue to follow the current SBIR and STTR policy directives.

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[13] See http://www.zyn.com/sbir/sba-policy1.htm.

### 3. Potential Action

Our interviewees supported publicizing the reversal in SBIR policy to facilitate changing the practice and culture of DoD technology transfer personnel and researchers. For example, Naval Research Laboratory's CRADA Frequently Asked Questions" shows restrictions on SBIR and STTR funding:

> In general, the Small Business Administration (SBA) prohibits SBIR or STTR funding from being used by other Federal government agencies. A non-Federal partner planning to use this type of funding for a CRADA must obtain a waiver from the appropriate SBIR program manager.[14]

This would need to be changed to reflect a new policy, once finalized. Increasing awareness of the change would require multiple communications to reinforce and encourage DoD laboratories to collaborate with SBIR awardees to further develop laboratory technologies.

## B. Delayed Compensation from Start-ups

### 1. Background

It is common for universities to take an equity interest in a company in lieu of cash royalty payments on a patent license. Such equity licensing transactions provide a future financial benefit if the company is successful, enable commercialization of technology by a company that would otherwise be unable to afford a license, and signal third parties that the technology is valuable (Feldman et al. 2002). DOE FFRDCs often take equity partly or fully in place of licensing fees (Reeves 2012).

### 2. Policy Issue

The U.S. Government has seldom taken an equity interest in private companies, although this has been proposed sometimes, particularly as a way to get higher returns on Social Security assets.[15]

According to our interviewees, DoD laboratories have used two methods for obtaining delayed compensation from start-ups as payment for patent licenses; neither involves taking equity directly. The first mechanism involves a contract with a third party, either a university or state or regional economic development group, which actually holds the equity interest in the start-up. Under the contract agreement, the third party handles the interest slated for the government as if it were its own. In addition, the

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[14] See http://www.nrl.navy.mil/techtransfer/crada_faq.php.

[15] See http://www.becker-posner-blog.com/2008/10/government-equity-in-private-companies-a-bad-idea-becker.html.

government holds no voting rights or board seats. This precludes the government from exerting inappropriate influence over a public company. The Army Medical Research and Materiel Command has used this method approximately 10 times.

The second method is known as "Deferred Compensation." After working closely with a consultant from MIT, the Naval Research Laboratory (NRL) developed a deferred compensation agreement to obtain compensation from start-ups. Under this agreement, the company provides NRL a certain percentage of the market value of the company. The government will receive this compensation when a company goes public or is acquired by a larger company. Thus, the value of the deferred compensation is determined by the purchase price of the company. NRL has executed only a few deferred compensation agreements.

Some Federal organizations, including those within the DoD, have determined that they will not use a third party to hold equity on their behalf, nor will they partake in an agreement with deferred compensation. Not all the service laboratories are in agreement on either practice.

### 3. Potential Action

OSD could provide guidance on methods for accepting delayed compensation from start-ups. It was suggested that the DoD examine National Institutes of Health practice. The National Institutes of Health use a "Start-Up Patent License Agreement," which delays payment for the patent license for several years. In exchange for a patent license, the start-up pays a combination of a percentage of the fair market value at the time of a liquidity event (initial public offering, merger, or sale of the company); stepped-up annual royalty payments beginning after 3 years; and a percentage of sales or sublicenses.

OSD policy guidance could read:

> DoD Components shall develop and implement policies to license patents to start-ups in exchange for delayed compensation. Start-ups are defined as companies less than 5 years old, with less than $5 million in capital raised, and fewer than 50 employees. The start-up company must license at least one U.S. patent and commit to developing a product or service for the U.S. market. These new start-up licenses minimize the barriers to entry faced by start-up companies under exclusive licenses and provide a structure that encourages and supports the commercial development of early stage DoD technologies. Key features of the agreements are:
>
> Submission of a business plan by a start-up company that is tailored to the initial stages of product development and can be revised as the company progresses along the development pipeline toward the commercial product or service.

A 15-day public notice in the Federal Register, the minimum required by statute, of DoD's intent to grant an exclusive license to the applicant company

An exclusive commercialization license which includes:

A delayed, tiered, up-front execution royalty that would be due to the DoD upon a liquidity event such as an initial public offering, a merger, a sublicense, an assignment, acquisition by another firm, or first commercial sale;

A delayed minimum annual royalty (MAR) or a MAR that is waived if there is a Cooperative Research and Development Agreement with the DoD that supports the development of the licensed technology and provides value comparable to the MAR. In addition, the MAR will be waived for up to 5 years during the term of a SBIR or STTR that supports the development of the licensed technology;

An initial lower reimbursement rate of patent expenses, which increases over time to full reimbursement of expenses tied to the earlier of a liquidity event, an initial public offering, the grant of a sublicense, first commercial sale, or upon the third anniversary of the effective date of the agreement;

DoD will consider all requests from a start-up company to file new or continuing patent applications as long as the company is actively and timely reimbursing patent prosecution expenses;

A set earned royalty rate;

A set sublicensing royalty rate;

Anti-stacking royalty payment license provision can be negotiated by the company if it encounters a stacking royalty challenge;

Mutually agreed-upon specific benchmarks and performance milestones, which do not require a royalty payment, but rather ensure that the start-up licensee is taking concrete steps toward practical application of the licensed product or process.

## C. Material Transfer Agreement

### 1. Background

Material transfer agreements (MTAs) are written agreements to facilitate the free transfer of research materials between researchers at different institutions. These agreements delineate the proper use of the materials, either involving or not involving human subjects, and provide intellectual property protection.

### 2. Policy Issue

Interviewees noted that DoD laboratories do not have authority to enter into MTAs. Instead, they use limited-purpose CRADAs. According to our interviewees, these work fairly well, but they are a modification of a different instrument, rather than an organic authority.

### 3. Potential Action

OSD could support legislation to give DoD laboratories the authority to enter into MTAs.

## D. Non-Disclosure Agreement

### 1. Background

Non-disclosure agreements (NDAs) are legal contracts between at least two parties that describe confidential information that will be shared between the parties but will go no further. These contracts are very common in the commercial and university technology transfer worlds. They protect (1) the confidentiality of an invention while it is being evaluated by potential licensees or (2) the third-party proprietary information that Federal laboratory researchers must review to conduct research or evaluate opportunities for cooperative agreements. NDAs may be one-sided or mutual, meaning both parties are restricted in their use or dissemination of the confidential information.

### 2. Policy Issue

Individual Federal employees generally lack the authority to bind the U.S. Government under a non-disclosure agreement. For example, in the Army, only the contracting officer on a specific contract and the Secretary of the Army (or a designee) has the authority to execute an NDA binding the Army (Winborne 2012). But a laboratory employee could incur personal liability if an NDA contract is violated. One interviewee asserted that it was inappropriate for government employees to have to bind only themselves through an NDA to get information for their official duties.

According to our interviewees, DoD Federal laboratories currently use several methods to satisfy industry and university requests for executed NDAs. Instead of an NDA, Federal employees may sign a document acknowledging their legal obligations under the Trade Secret Act (18 USC § 1905) and the Federal Economic Espionage Act (18 USC §§ 1831 and 1832). Under threat of criminal penalty, Federal employees are prohibited from disclosing trade secrets learned through work. This is not sufficient for all industrial partners, however, because it provides no pecuniary damages or injunctive relief. If a laboratory employee reveals confidential information, the company cannot prevent the information from being spread further, nor can it claim lost profits.

Another option is to use a limited-purpose CRADA signed by the laboratory commander that acts as an NDA. Such a CRADA NDA has a maximum lifespan of 1 year (although this should be sufficient for preliminary evaluation), and it must fit the definition of a CRADA (i.e., be for the conduct of specified R&D activities). The CRADA signature process can be lengthy, and NDAs are often needed on short notice. To overcome this hurdle, the Air Force created a shortened Limited Purpose CRADA NDA memorandum allowing for expedited signing if no substantial changes were made to the agreement.

According to five of our interviewees, because Federal laboratory employees lack the authority to sign NDAs, technology transfer is hindered. But personnel from one laboratory asserted that granting this authority to Federal employees would not be beneficial because of potential pitfalls associated with their (initial) unfamiliarity with these types of agreements. For example, the agreements would not necessarily cover every conversation among parties or they might expire without the laboratory realizing it.

### 3. Potential Action

OSD could consider supporting legislation to allow someone other than contracting officers or the Secretaries' designees (most likely the laboratory commanders) to have authority the sign NDAs. Alternatively, OSD could issue policy encouraging the use of the shortened and expedited Limited Purpose CRADA NDA.

# 6. Managing and Monitoring Technology Transfer Processes

DoD technology transfer stakeholders raised several issues related to managing and monitoring technology transfer processes:

- Engineering services implementing policy.
- Trademark signature authority.

## A. Engineering Services Implementing Policy

### 1. Background

Since the mid-1990s, DoD laboratories have had the authority to make their services available for a fee for the testing of materials, equipment, models, computer software and other items under a Commercial Test Agreement (Under Secretary of Defense for Acquisition and Technology 1997). This authority is limited to testing, however, and the laboratory is prohibited from modifying the test subject material or providing engineering services.

NDAA FY 2008 established "engineering services" authority codified at 10 USC § 2539b(4)) that allows laboratories to more broadly contract out their R&D facilities, services, and equipment as long as they will not be in direct competition with the domestic private sector. The legislation provided the authority to the Secretary of Defense and secretaries of the military departments, under regulations prescribed by the Secretary of Defense.

### 2. Policy Issue

In March 2012, 4 years after the authority was granted, Acting Under Secretary of Defense for Acquisition, Technology and Logistics, Frank Kendall, issued DoD Instruction 5535.11. This instruction directed the department secretaries, directors of the defense agencies and DoD field activities, and the commanders of the combatant commands to execute the authorities and allowed them to delegate the authority to laboratory directors or commanders. But according to the interviewees, laboratories are still unable to use the authority because they are waiting for each Department to issue its implementing policy. In practical terms, no "engineering services" agreements will be signed until this authority is fully delegated down to the laboratory level.

### 3. Potential Action

The Services could be encouraged to finalize their implementing policies for engineering services, which would delegate authority to the local laboratory commander.

## B. Trademark Signature Authority

### 1. Background

According to the U.S. Patent and Trademark Office, "A trademark or service mark includes any word, name, symbol, device, or any combination, used or intended to be used to identify and distinguish the goods/services of one seller or provider from those of others, and to indicate the source of the goods/services."[16] This definition may relate to technology transfer because at times there is a mark associated with a scientific or technological invention.

Under NDAA FY 2005 (codified at 10 USC § 2260), Congress authorized the Secretary of Defense to license trademarks, service marks, certification marks, and collective marks and retain fees to be expended for specified activities (discussed in Section E.2 below on Trademark Royalty Distribution). The authority to manage and coordinate a DoD-wide mark program was given to the Assistant Secretary of Defense for Public Affairs, and each Department Secretary was to issue guidance for the operation of its program (Deputy Secretary of Defense 2005; Department of Defense Directive (DoDD) 5535.09 2007).

### 2. Policy Issue

In each of the services, the trademark licensing authority has been retained at the headquarters level. For example, the Air Force trademark licensing program authority was delegated from the Secretary of the Air Force to the Chief, Integrated Marketing Branch (Chief Integrated Marketing Branch 2009). One interviewee asserted that it would be more efficient to designate the laboratory commander as the signatory authority for trademark licensing agreements with a notification requirement of the delegated headquarters official. This is the authorization system generally used for CRADAs and other technology transfer agreements.

[16] See http://www.uspto.gov/trademarks/index.jsp.

### 3. Potential Action

OSD could encourage the services to issue policies allowing laboratory commanders to sign trademark licensing agreements with headquarters notification and a period of review. The policy could be similar to that used for CRADAs:

> **1.1 Signature Authority of CRADAs.** Commanders and directors of Air Force laboratories and/or technical activities may negotiate and enter into CRADAs on behalf of the Air Force with various organizations in the public and private sector subject to the review process outlined in section 2…**2.1. Review Authority for CRADAs.** The Air Force Technology Executive Officer (TEO), Commander, Air Force Research Laboratory, has been delegated the CRADA reviewing authority for all Air Force activities (Air Force Instruction (AFI) 61-302 2001).

# 7. Building Partnerships

Several issues were raised relating to building partnerships for technology transfer:

- Partnership Intermediary Agreement (PIA) legislation.
- Leveraging the Manufacturing Extension Partnership (MEP).

## A. Partnership Intermediary Agreement Legislation

### 1. Background

The National Defense Authorization Act for FY 1991 (Pub. Law 101-510) authorized the director of a Federal laboratory or the contracting officer of a federally funded R&D center to enter into a contract or memorandum of understanding for a partnership intermediary to perform services that increase the likelihood of success in conducting cooperative or joint activities of such laboratories or R&D centers with small business firms (codified at 15 USC § 3715). This was later amended by the Technology Transfer Commercialization Act of 2000 (Pub. Law 106-404) to include institutions of higher education or educational institutions, in addition to small business firms.

> A partnership intermediary is defined as an agency of a State or local government, or a nonprofit entity…that assists, counsels, advises, evaluates, or otherwise cooperates with small business firms, institutions of higher education…or educational institutions… that need or can make demonstrably productive use of technology-related assistance from a Federal laboratory, including State programs receiving funds under cooperative agreements. (15 USC § 3715(c.))

### 2. Policy Issue

Interviewees discussed two issues related to the PIA legislation. First, one interviewee pointed out that the legislation is confusing because the definition section appears to add limitations on the use of partnership intermediaries. Under 15 USC § 3715(a)(1), a partnership intermediary may "perform services for the Federal laboratory that increase the likelihood of success in the conduct of cooperative or joint activities of such Federal laboratory" with certain partners. However, under 15 USC § 3715(b), a partnership intermediary "assists, counsels, advises, evaluates, or otherwise cooperates" with certain partners, which is a somewhat more limited role than "services…that increase the likelihood of success." The interviewee asserted that it was unclear whether

laboratories should follow the broad statement of (a)(1) or the more limited statement of (b).

Second, another interviewee felt it was inadvisable to define partnership intermediaries as those assisting "small businesses," rather than simply "businesses." The individual maintained that this was an unnecessary limitation on organizations that could serve as partnership intermediaries and made it especially difficult to set up a network of partnership intermediaries.

### 3. Potential Action

OSD could seek to amend the PIA legislation to clarify which definition is preferable—the broad definition of 15 USC § 3715 (a)(1) or the narrower definition of 15 USC § 3715 (b). OSD could also consider seeking an amendment to expand allowable partnership intermediary activities to all businesses, not just small ones.

## B. Leveraging the Manufacturing Extension Partnership

### 1. Background

The National Institute of Standards and Technology (NIST) Hollings Manufacturing Extension Partnership (MEP) works with small and mid-sized U.S. manufacturers to provide a variety of services, from innovation strategies to process improvements to green manufacturing.[17] The MEP also works with partners at the State and Federal levels on programs that help manufacturers to develop new customers, expand into new markets, and create new products.

The MEP field staff includes over 1,400 technical experts located in every State who advise on business issues, help solve manufacturers' challenges, and identify opportunities for growth. An interviewee noted that these experts have worked with the DoD MilTech program.[18]

MEP Centers also currently work with some DOE laboratories and NASA centers, such as Los Alamos National Laboratory, Sandia National Laboratories, Lawrence Livermore National Laboratory (LLNL), Lawrence Berkeley National Laboratory, Argonne National Laboratory, NASA Langley Research Center, and NASA Glenn Research Center. For example, an Ohio MEP center called MAGNET collaborated with NASA Glenn recently on an automobile technology showcase. And California MEP centers MANEX and CMTC are planning an additive manufacturing forum with LLNL.

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[17] For more information about the NIST Hollings MEP, see http://www.nist.gov/mep/about.cfm.

[18] MilTech is a partnership between TechLink and the Montana Manufacturing Extension Center.

This forum, to be located at LLNL, will show manufacturers new developments from LLNL in additive manufacturing, its uses, and its benefits.

In addition, the NIST MEP has worked with RTI, Inc. to develop a "technology scouting" system.[19] This provides a systematic approach to seeking out technologies from Federal laboratories to address specific company problems.

## 2. Policy Issue

MEP can be a commercialization resource for the DoD laboratories' technology transfer efforts. This would leverage existing Federal resources and support assistance to companies in using lab-developed technologies. MEP centers are in every state but not always recognizable as Federal centers.

## 3. Potential Action

DoD could interact with NIST to formalize a relationship, with the goal of increasing awareness among the DoD laboratories about the locations of MEP centers and the benefits of partnering with them to take advantage of their services such as technology scouting. DoD guidance that calls out MEP as a commercialization partner resource for the DoD laboratory's technology transfer efforts could also be issued.

[19] NIST MEP technology scouting led to a half million dollars of completed or potential technology projects: http://www.nist.gov/mep/upload/Technology-Scouting-One-Pager_v3.pdf.

# Appendix A
# Interview Participants

A broad range of stakeholders in Department of Defense (DoD) technology transfer participated in interviews for this assessment, including laboratory management and staff, legal counsel, private contractors, and partnership intermediaries. The tables in this appendix provide the names of the offices and organizations that participated and the types (phone or in-person) and dates of interviews.

- Table A-1 lists 21 Office of Research and Technology Applications (ORTAs) and technology transfer coordinating offices throughout the DoD laboratories and research centers (5 from the Air Force, 8 from the Army, 7 from the Navy, and 1 from DoD headquarters).
- Table A-2 names 7 legal offices, including General Counsel offices, throughout DoD (1 legal office in the Air Force, 3 in the Army, 2 in the Navy, and 1 in DoD headquarters).
- Table A-3 provides 2 Department of Energy technology transfer offices that were recommended by interviewees.
- Table A-4 lists 12 other technology transfer stakeholders, including 2 partnership intermediaries, 6 DoD private contractors, and researchers from 4 Federal laboratories and research centers (2 laboratories in the Army and 2 laboratories in the Air Force).

**Table A-1. Offices of Research and Technology Applications (ORTAs) and Technology Transfer Coordinating Offices**

| Organization | Abbreviation | Interview Type | Dates of Interview |
|---|---|---|---|
| Air Force | | | |
| Air Force Materiel Command | AFMC | Phone | August 8, 2012 |
| Air Force Medical Service | AFMS | Phone | July 31, 2012; August 8, 2012 |
| Air Force Research Laboratory | AFRL | Phone | June 20, 2012; June 28, 2012; July 2, 2012; August 9, 2012 |
| The Aerospace Corporation[a] | — | In-Person, Phone | July 31, 2012; August 7, 2012 |
| MIT-Lincoln Laboratory/MIT Technology Licensing Office | MIT-LL/MIT TLO | Phone | August 14, 2012 |
| Army | | | |
| Army Materiel Command | AMC | Phone | August 10, 2012 |
| Army Research Laboratory | ARL | Phone | August 9, 2012 |
| Aviation and Missile Research Development and Engineering Center | AMRDEC | Phone | August 13, 2012 |
| Edgewood Chemical Biological Center | ECBC | Phone | July 12, 2012 |
| Army Medical Research and Materiel Command | AMRMC | Phone | July 12, 2012; September 6, 2012 |
| Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology | OASA/ALT | Phone | August 2, 2012 |
| Armament Research, Development and Engineering Center, Picatinny Arsenal | ARDEC | Phone | August 2, 2012 |
| Walter Reed Army Institute of Research | WRAIR | Phone | August 7, 2012 |
| Navy | | | |
| Johns Hopkins University Applied Research Laboratory[b] | JHU-APL | Phone | August 15, 2012 |
| Naval Research Laboratory | NRL | Phone | September 20, 2012 |
| Naval Surface Warfare Center, Indian Head Division | NSWC Indian Head | Phone | July 26, 2012 |
| Naval Surface Warfare Center, Crane Division | NSWC Crane | Phone | July 11, 2012 |
| Office of Naval Research | ONR | Phone | July 19, 2012; August 9, 2012; August 15, 2012 |
| Space and Naval Warfare Systems Command Systems Center Pacific | SPAWAR Systems Center Pacific | In-Person | August 27, 2012 |
| DoD Headquarters | | | |
| Office of the Secretary of Defense | OSD | Phone | June 19, 2012 |

[a] MIT-LL is a Federally Funded Research and Development Center (FFRDC) of the Air Force.

[b] JHU-APL is a University Affiliated Research Center (UARC) for the Navy.

**Table A-2. Legal Offices**

| Organization | Abbreviation | Interview Type | Date of Interview |
|---|---|---|---|
| Air Force | | | |
| Intellectual Property Office, Office of the General Counsel of the Air Force | SAF/GCQ | Phone | June 20, 2012 |
| Army | | | |
| Associate Deputy General Counsel (Acquisition) | — | Phone | July 24, 2012 |
| Legal Office, Armament Research, Development and Engineering Center | ARDEC | Phone | August 20, 2012 |
| Office of the Staff Judge Advocate, Army Medical Research and Materiel Command | ASJA/MRMC | Phone | July 9, 2012 |
| Navy | | | |
| Intellectual Property Counsel, Naval Surface Warfare Center | NSWC | Phone | July 17, 2012; July 27, 2012 |
| Office of Counsel, Naval Research Laboratory | — | In-Person | August 13, 2012 |
| DoD Headquarters | | | |
| Chairman of the Joint Chiefs of Staff Legal Counsel | CJCS Legal Counsel | Phone | September 19, 2012 |

**Table A-3. Department of Energy**

| Organization | Abbreviation | Interview Type | Date of Interview |
|---|---|---|---|
| Technology Transfer Coordinator, Department of Energy | — | Phone | August 14, 2012 |
| Technology Transfer Division, Los Alamos National Laboratory | LANL | Phone | August 17, 2012 |

**Table A-4. Partnership Intermediaries, Private Contractors and Researchers.**

| Organization | Abbreviation | Interview Type | Date of Interview |
|---|---|---|---|
| Partnership Intermediaries | | | |
| TechComm | — | Phone | August 17, 2012 |
| TechLink | — | Phone | June 22, 2012;<br>August 7, 2012;<br>August 14, 2012;<br>August 20, 2012 |
| Private Contractors | | | |
| Allied Minds Federal Innovations, Inc. | AMFI | Phone | June 14, 2012;<br>June 25, 2012 |
| Boeing (former) | — | Phone | July 20, 2012 |
| Gonsalves Strategies & Solutions, LLC | — | Phone | June 20, 2012 |
| Lockheed Martin | — | Phone | July 9, 2012 |
| Northrop Grumman | — | Phone | June 28, 2012 |
| SAIC | — | Phone | July 10, 2012 |
| Researchers—Air Force | | | |
| Air Force Medical Service | AFMS | Phone | August 8, 2012 |
| Air Force Research Laboratory | AFRL | Phone | July 16, 2012 |
| Researchers—Army | | | |
| U.S. Army Corps of Engineers | USACE | Phone | August 2, 2012 |
| Natick Soldier Research, Development and Engineering Center | — | Phone | August 27, 2012 |

# Appendix B
# Interview Guides

## Preliminary Interviewee Guide

The Department of Defense (DoD) asked the Institute for Defense Analyses to conduct an assessment of potential DoD laboratory technology transfer (T2) exemplar practices. You have been identified as someone who is knowledgeable about DoD T2 in general, and we would like to ask you some questions about exemplar practices that laboratories are currently implementing. Your participation is completely voluntary, and our conversation will be audio-recorded, but if you'd like to tell us something that is off the record, feel free to do so. We will stop recording and writing until you tell us that we can start again.

### Introduction

1. Please tell us about yourself.
   a. What do you do in your current position?
   b. What is your experience with DoD laboratories?

### Exemplar practice

1. Do you know any DoD laboratories that are instituting exemplar practices that could be applied to other DoD laboratories?
   a. Why do you consider them to be exemplar practices?
   b. What issues do these exemplar practices address?
   c. Tell us a little about these practices.
   d. Do you have contact information for each practice?

### Potential Laboratory Exemplar practices

1. In your opinion, are there potential practices that DoD laboratories could implement to better T2?
   a. Why do you think that this would be a good practice?
   b. What issues would it address?
   c. Why hasn't it been implemented, yet?

d. What barriers are there to implementing such a practice?

**Industry**

1. Are you familiar with any companies that work particularly well with transferring technology from DoD laboratories to the public sector?
   a. Why do you consider these companies to work well with laboratories?
   b. Are any of them using T2 practices that would be useful to other laboratories or researchers?
   c. Can you provide contact information for these companies?

**Policy Changes**

1. Are there policy changes including clarifications, or additional legislation or policies that would improve your ability to perform technology transfer?

**Misc.**

1. Do you know of anyone else that is knowledgeable about DoD laboratories T2 and would be good to interview as an external stakeholder?

## ORTA and Legal Representative Interviewee Guide

The Department of Defense (DoD) asked the Institute for Defense Analyses to conduct an assessment of potential DoD laboratory technology transfer (T2) exemplar practices. You have been identified as someone who is instituting unique T2 practices, and we would like to ask you some questions about this exemplar practice. Your participation is completely voluntary, and our conversation will be audio-recorded, but if you'd like to tell us something that is off the record, feel free to do so. We will stop recording and writing until you tell us that we can start again.

**Exemplar practice**

1. Please list your T2 exemplar practices.
   a. Which one is most successful and could be applied to other DoD laboratories?
   b. What issue did this exemplar practice address?
   c. Why do you consider it an exemplar practice?
2. Tell us about the history of this practice.
   a. What did you do before you instituted this practice?

1) What practice did it replace?

b. Where did you get the idea?

c. Did it have a champion?

d. When did you first implement the practice?

1) How long has the practice been in place?

e. What were the costs of implementing the practice?

2) How much planning did it take?

3) How much time did it take, and who worked on it?

4) How much money did it cost?

3. Tell us how you <u>implemented</u> the practice.

a. Did you use a specific authority?

5) How did you know you had this authority?

b. What specific people or offices needed to agree to or support this practice?

c. Would it have been easier to implement if something had been different?

4. Tell us about the <u>effects</u> of this practice on T2.

a. What have been the outcomes of this practice? (e.g., reduction in number of days to execute; increase in number of agreements)

6) Do you actively track the effects of this practice?

7) How have you tracked the effects of this practice in the past?

8) Has this practices resulted in other related benefits?

9) Have you presented this exemplar practice or written about it? If so, may we have a copy of the slides, documentation, or report?

b. Have other laboratories expressed interest in adopting this practice? If so, which ones? Do you recommend that we talk to these laboratories?

10) Would any policy changes need to occur for this practice to be implemented in other DoD laboratories?

c. Will you continue to implement this practice?

11) How will you continue to implement this practice?

12) Do you foresee any changes?

**Other Exemplar practices**

1. Tell us about other people (e.g., researchers, T2 professionals, external organizations) who are instituting T2 exemplar practices.
    a. Why do you consider this an exemplar practice?
    b. Do you have contact information for this person or organization?
    c. Do you work with external organizations, like partnership intermediaries?
    d. Do any of them use T2 exemplar practices that would be useful to other partners?
    e. Do you have contact information for these organizations?

**General ORTA Information**

1. Tell us about ORTA funding
    a. From what account(s) is your ORTA funded?
    b. How does it get decided how much the ORTA will be funded at?
    c. What account(s) does licensing revenue get put into?
    d. How is any licensing revenue used?
2. Tell us about how the ORTA is involved in other operations.
    a. Is the ORTA involved in the budgeting process?
    b. Is the ORTA involved in the strategic planning for the laboratory?
    c. How is the ORTA involved in the acquisitions process?
3. Tell us about ORTA performance evaluations.
    a. What metrics is your ORTA evaluated on?
    b. To whom do you report any T2 successes?
    c. If you are the only ORTA employees, is T2 success considered in your performance review?
4. Tell us about a little T2 as it relates to scientists and engineers at your laboratory.
    a. Who determines what amount or percentage researches receive in royalties?
    b. Do you have access to researchers' performance rating system? Is T2 included in scientists' performance reviews?

**Companies**

1. Tell us about companies that you work with.
    a. Do any of them use T2 exemplar practices in their interactions with laboratories, for example novel agreements with laboratories, novel communication with laboratories, or partnership intermediaries?
    b. Are any of them using innovative T2 practices that would benefit other laboratories or companies?
    c. Do you have contact information for these companies?

**Researchers**

1. Tell us about DoD laboratory exemplar practices that relate to researchers, for example training programs, researcher-led activities, or technology evaluation boards.
    a. Are any of them using T2 exemplar practices that would be useful to other laboratories or researchers?
    b. Can you provide contact information for these researchers?

**Policy Changes**

1. Are there other policy changes that would improve your ability to perform technology transfer?

# Appendix C
# Policy Issues and Interested Stakeholders

**Table C-1. Policy Issues and Interested Stakeholders**

| Theme | Policy Issue | Potential Action by OSD (or relevant organization) | Interested Stakeholder(s)* |
|---|---|---|---|
| Effective ORTA organization and staffing | Air Force instruction regarding technology transfer is confusing as to whether the Technology Executive Officer (TEO) or Air Force Research Laboratory (AFRL) Commander has responsibility for technology transfer program management | Encourage the Air Force to amend the instruction to clarify who has technology transfer program management responsibility, the TEO or the Commander of AFR | Frank Hoke |
| Empowering, training, and rewarding scientists and engineers | Inconsistent treatment of royalties in case of an inventor's death or disappearance across DoD laboratories | Clarify DoD instruction regarding the proper treatment of royalties in the event of an inventor's death or in the event he or she cannot be located after leaving the laboratory | William Adams |
| | Trademark royalties are not distributed to inventors when the trademark is directly associated with a licensed invention or patent by law. | Issue a legislative amendment such that trademark royalties related to technology developed at a laboratory are distributed to the inventor under the same guidelines as patent royalties | William Adams<br>Barry Datlof<br>Paul Mele |
| | Technology transfer policies of DoD Federally Funded Research and Development Centers (FFRDCs) and University-Affiliated Research Centers (UARCs) are inconsistent, including those related to researcher consulting and limitations on company partners. | Review DoD FFRDC and UARC policies and issue guidance to ensure they are utilizing the full extent of their authority | |

| Theme | Policy Issue | Potential Action by OSD (or relevant organization) | Interested Stakeholder(s)* |
|---|---|---|---|
| Capturing and managing intellectual property (IP) | Service policies are inconsistent regarding permissibility of licensing inventions or "other IP." | Clarify full scope of licensing authority available to DoD laboratories through policy guidance, while concurrently exercising care to avoid patent misuse and the improper extension of patent royalty payments beyond the patent term | Paul Mele<br>C. Blake Sajonia |
| | Inability to copyright government works, particularly software and other technical material created at the laboratories. | Evaluate and seek an amendment to the Copyright Act to allow limited ability to copyright technical works created by researchers at DoD laboratories | William Adams<br>Russell Alexander<br>Barry Datlof<br>John Karasek<br>Paul Mele<br>J. Scott Deiter<br>George Winborne |
| | Government data rights and other considerations in technology transfer agreements are not given adequate consideration such that future acquisition needs may be limited or restricted. | Encourage communication between the technology transfer and acquisition communities | Jane Barrow<br>Christopher Monsey<br>Timothy Ryan<br>George Winborne |
| Using technology transfer mechanisms to their full potential | Congress overruled a decade-long Small Business Administration (SBA) policy directive prohibiting the use of Small Business Innovative Research (SBIR) or Small Business Technology Transfer (STTR) funds for collaborations with Federal laboratories. | Publicize the reversal of the previous SBA policy to facilitate changing the practice and culture of DoD technology transfer personnel and researchers | Robert Baker |
| | A variety of methods for delayed compensation from start-ups are used across DoD labs, including using a third party to hold equity on their behalf or an agreement with deferred compensation. | Provide guidance on methods for delayed compensation from start-ups | Paul Mele |
| | Some DoD laboratories use shortened and expedited CRADA material transfer agreements (MTAs), since they do not have the authority to enter into MTAs. | Support legislation to allow DoD laboratories the authority to enter into MTAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA MTA | John Karasek |
| | Laboratory researchers do not have signature authority for non-disclosure agreements (NDAs), but some laboratories use an acknowledgement of criminal liability or shortened and expedited CRADA non-disclosure agreements. | Support legislation to allow someone other than contracting officers or the secretaries' designees (most likely the laboratory commanders) to have authority to sign NDAs<br>Alternatively, encourage the use of the shortened and expedited Limited Purpose CRADA NDA | Charles Harris<br>John Karasek |

| Theme | Policy Issue | Potential Action by OSD (or relevant organization) | Interested Stakeholder(s)* |
|---|---|---|---|
| Managing and monitoring technology transfer processes | Military services have not yet finalized their implementation policies for providing engineering services to delegate authority for engineering services agreements to the laboratory directors who will be able to contract out laboratory facilities, services, and equipment. | Encourage the services to finalize their implementation policies for engineering services which would delegate authority to the local laboratory commander | Russell Alexander<br>Timothy Ryan<br>Denise Scott |
| | Signature authority for trademark license agreements resides at headquarters level instead of with laboratory commanders/directors, who have signature authority for CRADAs (with headquarters notification and a review period). | Encourage the services to issue policies allowing laboratory commanders to sign trademark licensing agreements with headquarters notification and a period of review | Barry Datlof |
| Building partnerships | The partnership intermediary agreement (PIA) legislation is unclear regarding allowable PIA activities and limits the definition of assisted partners to include to only small businesses. | Seek to amend the PIA legislation to clarify which definition is preferable—the broad definition of 15 USC § 3715 (a)(1) or the narrower definition of 15 USC § 3715 (b).<br>Also consider seeking an amendment to expand allowable partnership intermediary activities to all businesses, not just small ones. | John Dement<br>Charles Harris |
| | The Manufacturing Extension Partnership (MEP) is an underutilized commercialization resource for the DoD's technology transfer efforts. | Interact with the National Institute of Standards and Technology (NIST) to formalize a relationship. DoD guidance could also be issued that calls out MEP as a commercialization partner resource for DoD laboratories. | |

* Stakeholders listed are interested in the topic overall; they do not necessarily support the potential action.

**Table C-2. Interested Stakeholder Contact Information**

| Name | Organization | Email |
|---|---|---|
| William Adams | Office of the Army General Counsel | bill.adams@us.army.mil |
| Russell Alexander | AMRDEC ORTA | russ.alexander@us.army.mil |
| Robert Baker | Department of Navy SBIR/STTR Program (Contractor) | bakerr@onr.navy.mil |
| Jane Barrow | Department of Navy, Office of General Counsel | Jane.barrow@navy.mil |
| Barry Datlof | AMRMC ORTA | barry.datlof@amedd.army.mil |
| J. Scott Deiter | NSWC Indian Head ORTA | john.deiter@navy.mil |
| John Dement | NSWC Crane ORTA | John.dement@navy.mil |
| Charles Harris | Department of the Air Force General Counsel | charles1.harris@pentagon.af.mil |
| Frank Hoke | Information Directorate AFRL/RI ORTA | franklin.hoke@rl.af.mil |
| John Karasek | Office of Naval Research, Office of Counsel | john.karasek@navy.mil |
| Paul Mele | AMRMC ORTA | Paul.Mele1@us.army.mil |
| Christopher Monsey | NSWC Crane Office of Counsel | Christopher.monsey@navy.mil |
| Timothy Ryan | ARDEC Picatinny Arsenal ORTA | timothy.s.ryan@us.army.mil |
| C. Blake Sajonia | U.S. Army (Contractor) | Charles.B.Sajonia.ctr@us.army.mil |
| Denise Scott | RDECOM-ARDEC Legal Office | denise.c.scott@us.army.mil |
| George Winborne | AMC HQ Redstone Arsenal, Office of Command Counsel | george.winborne@us.army.mil |

# Appendix D
# Additional Policy Recommendations

**Table D-1. Additional Policy Recommendations**

| Theme | Policy | Issue Raised by Interviewee(s) |
|---|---|---|
| Empowering, training, and rewarding scientists and engineers | Entrepreneurial leave policy for researchers | The Department of Energy (DOE) has entrepreneurial leave policies and DoD should also have similar policies. Would need a policy that states this is allowed (the DoD lawyers tend to be very conservative, so with lack of a specific policy the default is to say that it is not allowed). |
| | Government-owned, government-operated (GOGO) researcher participation in start-ups | A DoD laboratory researcher teamed with former employee to start a company. After 6 years, the legal office determined it was improper for the researcher to hold equity in the company (although there is no written policy saying a researcher could not do this), and the researcher has now left the laboratory. Three other inventors have asked about starting company but have been put on hold until there is a resolution. Clarification as to whether researchers are permitted to hold consulting positions or work on start-ups on their own time would be helpful. |
| | Royalty payments for sales to government agencies | Many laboratories have a line in their patent license agreements that says, “No royalties due on sales to government,” meaning the licensee does not have to compensate the laboratory licensor when the product is sold to another government agency. Some believe that the inventors and laboratories should be compensated no matter who buys it. |
| | Royalties for multiple inventors | Suppose you have multiple inventors and patents, how do you determine the royalty share under a patent license agreement—do you first look at the number of patents and then inventors on each patent? Could use more specific instruction—this was part of draft language in 2004; but has not been incorporated, and implementation has been informal and people have not been obligated to use it. |

| Theme | Policy | Issue Raised by Interviewee(s) |
|---|---|---|
| Capturing and managing intellectual property (IP) | Cooperative Research and Development Agreement (CRADAs) and data rights | There is a need to make the CRADAs look more like the Defense Federal Acquisition Regulation (DFAR) guidance (for grants etc.—this is the other stream of regulations in addition to the DFAR that covers acquisitions). DFAR contract rules for data rights are based on who paid for the technology, so companies try to avoid having the government be involved in funding. There is a gap with the policy and acquisition/procurement matters. |
| | Management of Invention Disclosures | Another major problem is the invention disclosure rules say to send it to a contracting officer and not to the Office of Research and Technology Applications (ORTA). Contracting offices are not as concerned about IP, inventions, or technology transfer because they are not part of their charter. Need to make sure that the office getting the patent disclosure is the ORTA office, but the problem is that not all organizations have an ORTA. |
| | Patent Secrecy Orders | All patent applications under secrecy orders should be reviewed annually. The secrecy order program should be shifted to the Security Department (by direction of an Under Secretary) as patent attorneys that currently handle the program do *not* have enough knowledge of the technology to rescind or approve it. |
| | Surveillance of Contractor Inventions or Patents | There is a need for the government to better supervise contractor's inventions or patents. Without it, there is potential for the government to pay for the technology twice (buy back). The Office of Naval Research used to fund a surveillance mechanism where DDForm882 (for invention reporting) was compared with the Statement of Work. This should be reinstated. |
| Using technology transfer mechanisms to their full potential | Modification under Test Services Agreements | Regarding USC10 Section 2539b: Lawyers interpret the instruction differently—e.g., that DoD would have to make the modifications and pay for them because the regulation says that private industry cannot pay for this (depending on the lawyer and his or her interpretation of policy, it can mean not making any modifications at all or reverting to the original condition after modification). |
| | Omnibus or Multitask CRADAs | Allowing for omnibus or multitask CRADAs provides a great flexibility. Omnibus CRADAs involve having one CRADA with overarching objectives and with multiple projects under that CRADA; then, can carry on for multiple years. Must give incentives for cooperation. |
| | CRADA Definition | Under 15 USC § 3710a(d)(1) "the term 'cooperative research and development agreement' means any agreement…toward the conduct of specified research or development efforts which are consistent with the missions of the laboratory." This needs more detail to clarify what is and what is not appropriate for a CRADA (e.g., whether test and evaluation or just research and development). |
| | CRADA U.S. Manufacturing Preference | Under 15 USC § 3710a(c)(4), laboratories are to give preference to businesses located in the United States and those that agree that substantial manufacturing will take place in the United States. This may prove challenging given globalization of the economy. |

# Appendix E
# Legal Authorities

**Table E-1. DoD Technology Transfer Policies**

| Year | Type | Policy | Name | Owner | Text |
|---|---|---|---|---|---|
| 1992 | DoDD | 5230.11 | Disclosure of classified military information to foreign governments | USD(P) | (e) DoD Directive 2040.2, "International Transfers of Technology, Goods, Services, and Munitions," January 17, 1984…6.5.2.1. There is no transfer of, and the test will not reveal, technology that the United States would not license for manufacture in the foreign country. |
| 1993 | DoD | 5010.12-M | Procedures for the acquisition and management of technical data | USD(AT&L) | C7.5.2. Technical organizations that are providing technical support to the engineering data repository or other designated engineering data release organizations will need routine access to the Militarily Critical Technologies List (MCTL) as well as access to the CCAL [Certified Contractor Access List]. Requests for the MCTL should be submitted to the technology transfer focal points in the Military Services and the Defense Agencies. Technical review activities may also require access to or information on the State Department's Munitions List and the Department of Commerce's Commodities Control List. |
| 1994 | DoDD | 5132.3 | DoD policies and responsibilities relating to security assistance | USD(P) | 8. SECRETARIES OF THE MILITARY DEPARTMENTS. The Secretaries of the Military Departments shall: k. Ensure conformance with technology transfer, classified military information release, and disclosure policies for their respective areas of responsibility while conducting security cooperation activities. |
| 1994 | DoDI | 5200.1-M | Acquisition Systems Protection (ASP) program | USD(I) | DL1.1.33. Technology Transfer. Transferring, exporting, or disclosing defense articles, defense service, or defense technical data covered by the U.S. Munitions List to any foreign person or entity in the United States or abroad.…<br>C1.3.6.4. Perform technology transfer risk assessments for foreign countries of concern and foreign intelligence threat assessments in support of DoD-wide ASP planning. |
| 1998 | DoDD | 3200.12 | DoD Scientific and Technical Information Program (STIP) | DDR&E | 1.4. Authorizes the issuance of DoD 3200.12-R-4 (reference (f)), consistent with reference (d) to provide guidance for the implementation of policy and principles for the DoD Domestic Technology Transfer Program…(f) DoD 3200.12-R-4, "Domestic Technology Transfer Program Regulation," December 1988. |

| Year | Type | Policy | Name | Owner | Text |
|---|---|---|---|---|---|
| 1999 | DoDD | 3100.10 | Space policy | USD(I) | 4.12. Inter-sector Cooperation. Enhanced cooperation with the intelligence, civil, and commercial space sectors shall be pursued to ensure that all U.S. space sectors benefit from the space technologies, facilities, and support services available to the nation. Such cooperation shall share or reduce costs, minimize redundant capabilities, minimize duplication of missions and functions, achieve efficiencies in acquisition and future operations, improve support to military operations, and sustain a robust U.S. space industry and a strong, forward-looking space technology base. Improvement of the coordination and, as appropriate, integration of defense and intelligence space activities shall be a priority. Procedures shall be established for the timely transfer of DoD-developed space technology to the private sector consistent with the need to protect national security, in accordance with reference (a). |
| 1999 | DoDD | 5535.3 | DoD Domestic Technology Transfer (T2) Program | DDR&E | SUBJECT: DoD Domestic Technology Transfer (T2) Program. It is DoD policy that: 4.1. Consistent with national security objectives under 10 U.S.C. 2501 (reference (e)), domestic T2 activities are integral elements of DoD pursuit of the DoD national security mission and concurrently improve the economic, environmental, and social wellbeing of U.S. citizens (Section 3702 of reference (d)). Concurrently, T2 supports a strong industrial base that the Department of Defense may utilize to supply DoD needs. Those activities must have a high-priority role in all DoD acquisition programs and are recognized as a key activity of the DoD laboratories and all other DoD activities (such as test, logistics, and product centers and depots and arsenals) that may make use of or contribute to domestic T2. |
| 1999 | DoDI | 5535.8 | DoD Technology Transfer (T2) Program | DDR&E | SUBJECT: DoD Technology Transfer (T2) Program This Instruction: 1.1. Implements policy, assigns responsibilities, and prescribes procedures under reference (a) for implementation of T2 programs. |
| 2001 | DoDI | 3200.14 | Principles and operational parameters of the DoD STIP | AT&L | 6.2. The DoD STIP consists of many elements that facilitate and contribute to the acquisition, production, reproduction, and dissemination of intellectual property that result from or are of interest to the Defense R&E community. E4.4.6. In order to protect DoD interests in the inventions that result from DoD R&E efforts, DoD activities are encouraged to pursue the patenting and licensing of those inventions. Additionally, DoD activities shall pursue a coordinated effort to acquire Government rights to intellectual property developed in whole or in part at Government expense so that such intellectual property may be utilized in current and future DoD programs. |
| 2004 | DoDD | 2010.6 | Materiel interoperability with allies and coalition partners | USD(AT&L) | i. Provide, in conjunction with the Military Departments, technical positions regarding the exchange of technology with allies and coalition partners, and oversight for ongoing programs involving the transfer of technology. |

| Year | Type | Policy | Name | Owner | Text |
|---|---|---|---|---|---|
| 2007 | DoDD | 5535.09 | DoD branding and trademark licensing program | ASD(PA) | 1.3. Provides guidance for implementing and/or maintaining programs to license marks (as defined below) owned or controlled by the Department of Defense, including the Military Departments, as authorized and/or directed by section 2260 of Reference (b) and Reference (c). |
| 2008 | DoDI | 2040.02 | International transfers of technology, articles, and services | USD(P) | SUBJECT: International Transfers of Technology, Articles, and Services. b. Establishes policy, assigns responsibility, and provides instructions for the international transfer of dual-use and defense-related technology, articles, and services, by implementing relevant portions of section 1701 et seq. of title 50, United States Code (U.S.C.) (Reference (c)); section 2751 et seq. of title 22, U.S.C. (Reference (d)); National Disclosure Policy No. 1 (Reference (e)); DoD Directive 5230.11 (Reference (f)); DoD Directive 2010.6 (Reference (g)); DoD Directive 5105.72 (Reference (h)); National Security Directive No. 42 (Reference (i)); National Security Telecommunications and Information Systems Security Policy No. 8 (Reference (j)); DoD Directive 5530.3 (Reference (k)); DoD Instruction 5000.2 (Reference (l)); DoD Directive 5200.39 (Reference (m)); section 2537 of title 10, U.S.C. (Reference (n)); DoD 5105.38-M (Reference (o)); DoD Directive 5106.01 (Reference (p)); DoD Instruction 5505.2 (Reference (q)); parts 730-744 of title 15, Code of Federal Regulations (CFR) (Reference (r)); parts 120-130 of title 22, CFR (Reference (s)); and section 1342b (a)(3) of title 8, U.S.C. (Reference (t)). |
| 2008 | DoDI | 5000.02 | Operation of the defense acquisition system | USD(AT&L) | SBIR and Small Business Technology Transfer programs…are some of the activities that facilitate and provide early joint technology and capability definition, development, experimentation, refinement, testing, and transition. The USD(AT&L) shall be the Milestone Decision Authorities (MDA) for those projects that, if successful, will likely result in an Major Defense Acquisition Program (MDAP) or Major Automated Information System (MAIS) program unless the USD(AT&L) delegates MDA for a MAIS program. |
| 2008 | DoDD | 5205.07 | Special Access Program (SAP) policy | USD(I) | l. Support OSD efforts to resolve issues and decisions related to SAP security, technology transfer, technology export, the Committee on Foreign Investment in the United States, and foreign ownership, control, and influence. |
| 2008 | DoDD | 5230.09 | Clearance of DoD information for public release | DA&M | e. To ensure a climate of academic freedom and to encourage intellectual expression, students and faculty members of an academy, college, university, or DoD school are not required to submit papers or materials prepared in response to academic requirements for review when they are not intended for release outside the academic institution. Information intended for public release or made available in libraries to which the public has access shall be submitted for review. |

| Year | Type | Policy | Name | Owner | Text |
|---|---|---|---|---|---|
| 2008 | DoDI | 5200.39 | Critical Program Information (CPI) protection within the Department of Defense | USD(I) | AT [= anti tamper]. Systems engineering activities intended to deter and/or delay exploitation of critical technologies in a U.S. defense system in order to impede countermeasure development, unintended technology transfer, or alteration of a system. |
| 2009 | DoDI | 5230.29 | Security and policy review of DoD information for public release | DA&M | e. Respond to requests for review of information submitted voluntarily by non-DoD sources or DoD personnel acting in a private capacity to ensure that properly classified information is not disclosed. This review shall also address technology transfer and public releasability of technical data under DoDD 5230.24, DoDD 5230.25, and the International Traffic in Arms Regulations (References (e) through (g)). |
| 2012 | DoDI | 5535.11 | Availability of samples, drawings, information, equipment, materials, and certain services to Non-DoD persons and entities | USD(AT&L) | a. Establishes authority, assigns responsibilities, and prescribes procedures in accordance with section 2539b of title 10, United States Code (U.S.C.) (Reference (b)) as amended by section 232 of the FY 2008 Defense Authorization Act (Reference (c)) for provision of samples, drawings, information, equipment, materials, and certain services to non-DoD persons and entities. |

**Table E-2. Technology Transfer Legislation and Other Federal Regulations**

| Year | Citation | Title | Significance |
|---|---|---|---|
| 1950 | Executive Order No. 10096 | Providing for a Uniform Patent Policy for the Government with Respect to Inventions Made by Government Employees and for the Administration of Such Policy | All rights to inventions made by government employees within scope of employment are assigned to government. |
| 1980 | P.L. 96-517; 35 U.S.C. § 200-212 | Bayh-Dole Act | Allowed government-owned, government-operated (GOGO) laboratories to grant exclusive licenses to patents |
| 1980 | P.L. 96-480; 15 U.S.C. §§ 3701–3714 | Stevenson-Wydler Technology Innovation Act of 1980 | Focused on dissemination of information<br>Required Federal laboratories to take an active role in technical cooperation<br>Established Offices of Research and Technology Applications at major Federal laboratories (those with R&D budgets of $20 million or more)<br>Set maximum royalty award for researchers at $100,000 |
| 1982 | P.L. 97-219 | Small Business Innovation Development Act of 1982 | Required agencies to provide special funds for small-business R&D connected to the agencies' missions<br>Established the Small Business Innovation Research Program (SBIR) |
| 1984 | P.L. 98-620 | Trademark Clarification Act of 1984 | Permitted decisions to be made at the laboratory level in government-owned, contractor-operated (GOCO) laboratories regarding awarding licenses for patents<br>Permitted contractors to receive patent royalties for use in R&D or awards, or for education<br>Permitted private companies, regardless of size, to obtain exclusive licenses<br>Permitted laboratories run by universities and nonprofit institutions to retain title to inventions, within limitations |
| 1985 | 37 CFR § 404 | Licensing of Government-Owned Inventions | It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from federally supported research or development |
| 1985 | P.L. 99-145; 10 USC § 2514-2515 | National Defense Authorization Act for FY 1986 | Directed the Secretary of Defense to encourage the transfer of technology between DoD, other Federal agencies, State and local governments, colleges and universities, and private persons |

| Year | Citation | Title | Significance |
|---|---|---|---|
| 1986 | P.L. 99-502; 15 USC § 3710 | Federal Technology Transfer Act of 1986 | Made technology transfer a responsibility of all Federal laboratory scientists and engineers.<br>Mandated that technology transfer responsibility be considered in employee performance evaluations<br>Changed requirement for ORTAs to be for laboratories with 200 or more full-time equivalent scientific, engineering, and related technical positions<br>Established a principle of royalty sharing for Federal inventors (15 percent minimum) and set up a reward system for other innovators<br>Legislated a charter for the Federal Laboratory Consortium for Technology Transfer and provided a funding mechanism for that organization to carry out its work<br>Empowered each agency to give the director of GOCO laboratories authority to enter into cooperative R&D agreements and negotiate licensing agreements with streamlined headquarters review<br>Allowed laboratories to make advance agreements with large and small companies on title and license to inventions resulting from Cooperative Research and Development Agreements (CRADAs) with Government laboratories<br>Allowed directors of GOGO laboratories to negotiate licensing agreements for inventions made at their laboratories<br>Provided for exchanging GOGO laboratory personnel, services, and equipment with their research partners<br>Made it possible to grant and waive rights to GOGO laboratory inventions and intellectual property<br>Allowed current and former Federal employees to participate in commercial development, to the extent that there is no conflict of interest |
| 1987 | Executive Order Nos. 12591 and 12618 | (1) Facilitating Access to Science and Technology, and<br>(2) Uniform Treatment of Federally Funded Inventions | (1) Encouraged GOGO laboratories to enter into cooperative agreements<br>(2) Required, to the extent permitted by law, laboratories to grant contractors title to patents developed in whole or in part with Federal funds, so long as the Government reserved a royalty-free license to practice |
| 1988 | P.L. 100-418 | Omnibus Trade and Competitiveness Act of 1988 | Placed emphasis on the need for public/private cooperation in assuring full use of results and resources<br>Changed the name of the National Bureau of Standards to the National Institute of Standards and Technology and broadened its technology transfer role<br>Extended royalty payment requirements to non-Government employees of federal laboratories |

| Year | Citation | Title | Significance |
|---|---|---|---|
| 1988 | P.L. 100-676 | Water Resources Development Act of 1988 | Authorized Army Corps of Engineers laboratories and research centers to enter into CRADAs<br>Allowed the Corps to fund up to 50 percent of the cost of the cooperative project |
| 1989 | P.L. 100-519 | NIST Authorization Act for FY 1989 | Established technology administration within the Department of Commerce<br>Permitted contractual consideration for rights to intellectual property, other than patents, in cooperative research and development agreements<br>Clarified the rights of NIST guest worker inventors regarding royalties |
| 1989 | P.L. 101-189 | National Competitiveness Technology Transfer Act of 1989 | Granted GOCO Federal laboratories the opportunity to enter into CRADAs and other activities with universities and private industry, under essentially the same terms as stated under the Federal Technology Transfer Act of 1986 for GOGOs<br>Allowed information and innovations, brought into and created through cooperative agreements, to be protected from disclosure<br>Provided a technology transfer mission for the nuclear weapons laboratories<br>Section 251(a) gave DoD Other Transaction (OT) authority: it authorized the "Secretary of Defense, in carrying out advanced research projects through the Defense Advanced Research Projects Agency, [to] enter into cooperative agreements and other transactions with any person, any agency or instrumentality of the United States, any unit of State or local Government, any educational institution, and any other entity" |
| 1990 | P.L. 101-510; 15 USC § 3715; 10 USC § 2194 | National Defense Authorization Act for FY 1991 | Established model programs for national defense laboratories to demonstrate successful relationships among the Federal Government, State and local governments, and small businesses<br>Allowed a Federal laboratory to enter into a contract or memorandum of understanding with a partnership intermediary to perform services related to cooperative or joint activities with small businesses<br>Provided for the development and implementation of a National Defense Manufacturing Technology Plan |

| Year | Citation | Title | Significance |
|---|---|---|---|
| 1991 | P.L. 102-245 | American Technology Preeminence Act of 1991 | Extended Federal Laboratory Consortium (FLC) for Technology Transfer mandate, removed FLC responsibility for conducting a grant program, and required the inclusion of the results of an independent annual audit in the FLC summary report to Congress and the President<br>Included intellectual property as potential contributions under CRADAs<br>Required the Secretary of Commerce to report on the advisability of authoring a new form of CRADA that permits Federal contributions of funds<br>Allowed laboratory directors to give excess equipment to educational institutions and nonprofit organizations as gifts |
| 1992 | P.L. 102-484; 10 USC §§ 2515, 2511 | National Defense Authorization Act for FY 1993 | Required the Department of Defense to establish a DoD Office of Technology Transition.<br>Directed the Secretary of Defense to establish a program encouraging and providing for research, development, and application of dual-use critical technologies<br>Extended the potential for CRADAs to some DoD-funded Federally Funded Research and Development Centers (FFRDCs) not owned by the government<br>Extended the streamlining of small-business technology transfer procedures for non-Federal laboratory contractors |
| 1992 | P.L. 102-564 | Small Business Research and Development Enhancement Act of 1992 | Established a 3-year pilot program—Small Business Technology Transfer (STTR)—at the Department of Defense (DoD), Department of Energy (DOE), Department of Health and Human Services (HHS), National Aeronautics and Space Administration (NASA), and National Science Foundation (NSF)<br>Directed the Small Business Administration (SBA) to oversee and coordinate implementation of the STTR Program<br>Designed the STTR to be similar to the Small Business Innovation Research (SBIR) program. Some laboratories can apply directly for STTRs<br>Required each of the five agencies listed above to fund cooperative R&D projects involving a small company and a researcher at a university, FFRDC, or nonprofit research center |
| 1993 | P.L. 103-160 | National Defense Authorization Act for FY 1994 | Broadened the definition of a laboratory to include the weapons production facilities of the DOE |

| Year | Citation | Title | Significance |
|---|---|---|---|
| 1995 | P.L. 104-113 | National Technology Transfer and Advancement Act of 1995 | Guaranteed a CRADA industrial partner the option to choose a non-exclusive or exclusive license to the resulting invention in a field of use<br>Required CRADA partners to grant the government a royalty-free license to use the invention for their purposes, but it must not publicly disclose trade secrets or commercial or financial information<br>Stated that the Government will not use march-in rights except under exceptional circumstances<br>Partners retain title to inventions made solely by their employees in exchange for royalty-free license for the Government, but this license is not mandatory<br>Explained that agencies may use royalties to hire temporary personnel to assist in CRADAs or related projects<br>Restated right of current and former Government employees to assist in commercialization of inventions<br>Restated and clarified that a Federal employee inventor can obtain or retain title to his or her invention if Government does not choose to patent or commercialize it<br>Required federal laboratories to give first $2,000 of royalty income to the inventors and increases an inventor's maximum royalty award to $150,000 per year<br>Allowed laboratories to use royalties for related research in the laboratory |
| 2000 | P.L. 106-404 | Technology Transfer Commercialization Act of 2000 | Improved the ability of Federal agencies to license federally owned inventions by reforming technology training authorities under the Bayh-Dole Act<br>Permitted laboratories to bring already existing Government inventions into a CRADA |
| 2000 | P.L. 106-554; 15 USC § 638 | Small Business Innovation Research Program Reauthorization Act of 2000 | Continued the SBIR Program through September 30, 2008<br>Clarified data rights pertaining to SBIR Phase I, Phase II and federally funded Phase III awards<br>Required SBIR agencies to report to SBA on the calculation of the agency's extramural budget within 4 months of enactment of each agency's annual appropriations act<br>Established the Federal and State Technology (FAST) Partnership Program to strengthen the technological competitiveness of small business concerns. |
| 2001 | 10 USC § 2563 | Articles and Services of Industrial Facilities: Sale to Persons Outside the Department of Defense | Authority to sell outside DoD |

| Year | Citation | Title | Significance |
|---|---|---|---|
| 2004 | P.L. 108-375; 10 USC § 2260 | Ronald W. Reagan National Defense Authorization Act for FY 2005 | Permitted Defense Secretary to license trademarks and retain and expend fees received from licensing<br>Required fees be used to pay trademark and licensing costs and for morale, welfare, and recreation activities |
| 2007 | P.L. 110-69 | America COMPETES Act of 2007 | Eliminated the Department of Commerce Office of Technology Administration, and the associated Under Secretary, which had the principal reporting and analytical responsibilities for technology transfer activities Government-wide (these duties were reassigned within Commerce)<br>Initiated a President's Council on Innovation and Competitiveness to develop a comprehensive agenda to promote the economic competitiveness of the United States |
| 2008 | P.L. 110-181; 10 USC § 2539b | National Defense Authorization Act for FY 2008 | Establishes authority for provision of samples, drawings, information, equipment, materials, and certain services to non-DoD persons and entities (see DoDI 5535.11) |

**Table E-3. Technology Transfer Mechanisms Available to DoD Laboratories**

| Name | Acronym | Description | Legal Authority |
|---|---|---|---|
| Chemical and Biological Defense SBIR Program | CBD | SBIR program designed to elicit from the small business community innovative solutions that both address chemical and biological defense technology gaps and have high commercialization potential. | Executive Order No. 13329 |
| Commercial Test Agreement (AKA Commercial Services Agreement) | CTA | The process whereby Government facilities can be directly paid by industry to perform services that are unique to the laboratory and not commercially available elsewhere. | 10 USC § 2681 |
| Contracts (general) | | Instrument whereby the laboratory pays for the acquisition of materials or services, subject to Federal Acquisition Regulations. | 10 USC § 2358; 31 USC § 6303 |
| Cooperative Agreement | CA | Agreement between a laboratory and other organization(s) whereby money or property is transferred to the recipient to support or stimulate research. Similar to a CRADA, except money can be exchanged. | 10 USC § 2358; 31 USC § 6305 |
| Cooperative Research and Development Agreement | CRADA | Flexible vehicle that allows one or more Federal laboratories and one or more non-Federal parties to enter into agreements to conduct specified research and development-related activities that are consistent with the laboratory's mission. The Federal laboratory may provide personnel, services, facilities, and equipment, but no funds. The non-Federal party may provide funds, personnel, services, facilities, and equipment. | 15 USC § 3710a |
| Clinical Trials CRADA | CT-CRADA | A Clinical Trials CRADA (CT-CRADA) is used when the Government laboratory and the industry partner collaborate on the development and design of a clinical trial to assess the safety and effectiveness of a study agent (e.g., a drug, medical device, or dietary supplement) for a specific indication. | |
| Facility CRADA | | A facility CRADA is an agreement between a DoD laboratory and a contractor that runs a specialized research, development, test, and evaluation facility. It allows the contractor to contract out the use of the specialized facility to third parties, laboratory mission permitting, without having to obtaining another DoD laboratory agreement each for each use. | |
| Foreign Government CRADA | | A CRADA with a foreign government entity. | |
| Limited Purpose CRADA | LP-CRADA | The Limited Purpose CRADA (LP-CRADA) is restricted to the exchange of existing equipment or material that the collaborators need for their own research, test, evaluation, development, or engineering activities. | |
| Military-Use CRADA | | A CRADA between a DoD laboratory or technical activity and an industrial partner to utilize existing unique capabilities and facilities at the DoD laboratory in a product or process intended primarily for DoD or other military use. | |

| Name | Acronym | Description | Legal Authority |
|---|---|---|---|
| Multi-Party CRADA | | CRADA with multiple parties. | |
| Technical Assistance CRADA | | Allows a Federal laboratory and a non-Federal partner to work jointly to assist local businesses by providing limited (4-day maximum) free technical consulting. Preference is given to non-Federal partners that are State organizations, universities, nonprofit entities, or business incubators that shall publicize availability of Federal assistance, receive and assess requests for cooperative research, ensure that the laboratory or technical activity shall not compete with private organizations, and coordinate work of the laboratory and/or technical activity with the requester companies. | |
| Cost-Shared Contracts | | Collaborative agreements that include in-cash and in-kind arrangements. This type of arrangement must be based on research and development that is of mutual interest to the Government and the non-Federal parties. | 10 USC § 2358;<br>31 USC § 6303 |
| Direct Sales | | Sale of other goods and services; for example, consulting, equipment manufacture and repair | 10 USC § 2563 |
| Dual Use Science and Technology Program | DUST | Program that partners with industry to jointly fund and develop dual-use technology that has both military utility and commercial potential. | 10 USC § 2511 |
| Educational Partnership Agreement | EPA | A formal agreement between a “defense laboratory” and an educational institution to transfer and/or enhance technology applications, and to provide technology assistance for all levels of educations (pre-kindergarten and up). | 10 USC § 2194 |
| Enhanced Use Lease | | Agreement that allows for entry into long-term leases and the receipt of cash or in-kind consideration for income on leased property. | 10 USC § 2667 |
| Facility Usage (or User Facility Agreement) | | Agreements that allow other parties, Federal or non-Federal, to use a laboratory’s facilities that contain equipment or expertise not readily available elsewhere. | 10 USC § 2681 |
| Grants | | Agreements between the Government and a recipient granting funding or property to the recipient to support or stimulate research. | 10 USC § 2358;<br>31 USC § 6304 |
| Interagency Agreement | IAA | Agreement that allows two or more Federal agencies to exchange information, personnel, equipment, material, resources, and funds. | |
| Memoranda of Agreement/Memoranda of Understanding | MOA/MOU | A non-binding document that outlines the principles between partners. Typically, an MOU or MOA with authorization by another appropriate mechanism. | |
| Other Transactions | OT or OTA | Agreements used for two purposes: (1.) basic research and (2.) prototype projects that are directly related to weapons or weapon systems. They are not a contract, grant, or cooperative agreement. | 10 USC § 2371 |

| Name | Acronym | Description | Legal Authority |
|---|---|---|---|
| Partnership Intermediary Agreement | PIA | Entities serve as intermediaries in performing services for the laboratory that increase the likelihood of success in the conduct of cooperative or joint activities with small business firms or educational institutions/organizations. | 15 USC § 3715 |
| Patent License Agreement | PLA | An agreement by the patent owner permitting a third party to use or sell the patented invention in return for a royalty. | 35 USC §§ 207-209; 15 USC § 3710a |
| Personnel Exchanges | | Provide for a transfer of personnel, either to the laboratory from another party or from the laboratory to another party, generally for the purpose of exchanging expertise. | 5 USC §§ 3371-3374 |
| Small Business Innovation Research | SBIR | A three-phase competitive award program designed to stimulate technological innovation among U.S. small businesses. | 15 USC § 638 |
| Small Business Technology Transfer | STTR | Designed to provide an incentive for small companies, academic institutions, and nonprofit research institutions, including FFRDCs, to work together to move emerging technical ideas from the laboratory to the marketplace. While STTR has the same objectives as SBIR, the STTR program requires participation by a nonprofit research institution. | 15 USC § 638 |
| Technology Investment Agreement | TIA | Special type of assistance instrument used to increase the involvement of commercial firms, often consortia, in Federal R&D. Designed to increase participation of for-profit firms that have been reluctant to perform under traditional, cost-type Government instruments. | "Other Transactions" 10 USC § 2371 |
| Test Services Agreement (AKA Commercial Services Agreement) | TSA | Agreement that allows Federal laboratories to provide facilities or services to a non-Federal entity for a fee. | 10 USC § 2539b |

# Appendix F
# Technology Transfer Recommendations and Concerns

This appendix captures the breadth of recommendations and concerns raised by interviewees regarding technology transfer at the DoD. Comments vary from top-level DoD concerns regarding technology transfer strategy to specific recommendations on how to provide better incentives for technology transfer or improve laboratory-industry interactions.

The comments are grouped into categories. A brief description of each category follows, along with the number of comments. The order of the categories mirrors the life cycle of technology transfer (this approach used for the policy issues in the main report). Following these category descriptions is a listing of all the comments (which have been lightly edited for clarity), organized according to these categories.

1. **Establish Technology Transfer Strategy** (15 Comments): Comments relate to the need to establish a DoD-wide technology transfer strategy. This includes recognition by top levels of DoD leadership that technology transfer is a critical mission for DoD laboratories.
2. **Increase Technology Transfer Funding and Resources** (25 Comments): Comments draw attention to technology transfer as an unfunded mandate and the need for dedicated technology transfer funding, as well as ideas for alternative funding models. A primary theme is understaffing within Office of Research and Technology Applications (ORTA) offices. Additional comments include the necessity for billing researcher time for technology transfer activities and the need for more patent attorneys.
3. **Change Technology Transfer Organization** (10 Comments): Comments relate to organizational and structural changes at DoD offices with respect to technology transfer. Specific comments range from the need for more uniformity across the services, to concerns over the level of authority a legal office has over an ORTA, to the physical location of the legal counsel relative to the ORTA.
4. **Enhance Technology Transfer Education and Training** (5 Comments): Comments primarily relate to the need for better training and awareness of technology transfer practices. Specific examples include a technology transfer professional training

course at the Defense Acquisition University and a standardized training module on writing invention disclosures.

5. **Better Incentivize Technology Transfer** (12 Comments): Comments relate to the need to increase incentives for researches and technology transfer professionals to advance technology transfer at the laboratory level. Suggested incentives include the need to emphasize patent filing over publishing and providing awards and promotions to researchers and technology transfer professionals who excel at technology transfer practices.
6. **Improve Intellectual Property Management and Enforcement** (14 Comments): Comments suggest improvements in intellectual property (IP) management, patent drafting, and patent enforcement. Comments also focus on the need for better tracking of contractor inventions and bundling of patents across laboratories and the services.
7. **Clarify Technology Transfer and Acquisition** (9 Comments): Comments indicate that the DoD must integrate technology transfer into the acquisition process. Comments suggest a need for a better connection between the technology transfer community and the acquisition community, particularly when designing CRADAs.
8. **Ensure Data Rights Protected** (7 Comments): Comments highlight a concern that the DoD is not taking advantage of data rights. Reasons given are that technology transfer professionals do not understand data rights, invention documentation is critical to protecting data rights, and there is a lack of available of attorneys who understand data rights.
9. **Improve and Streamline Processes** (13 Comments): Comments address issues such as the need to reduce the administrative burden related to technology transfer, as well as the time lag in the patent review process and signing of licensing agreements. Comments indicate interest in more uniform technology transfer processes and automated processes across laboratories and Services.
10. **Improve Laboratory-Industry Interaction** (19 Comments): Comments suggest the DoD needs to do better at bridging the gap with industry to increase the number of licensees and develop longer term relationships. Suggestions for improving the lab-industry interaction are provided. There is also a discussion of issues related to required contract clauses in Government agreements.
11. **Better Metrics and Tracking of Success** (8 Comments): Comments focus on the need for systems to document and catalog Cooperative Research and Development Agreements (CRADAs), licenses, and other agreements. Additional comments suggest that while these metrics are needed, tracking them can be a burden.

## List of Recommendations and Concerns

1. **Establish Technology Transfer Strategy**

   - For the DoD, there is not complete agreement on why patents are filed in the first place.
   - From a DoD laboratory perspective, technology transfer is a secondary, if not third- or fourth-order mission.
   - One of the things that would make a big difference to technology transfer in the DoD laboratories is for senior leadership to understand the value of technology transfer to the warfighter and to the economy.
   - There needs to be more of a strategic vision on technology transfer. There is no strong linkage on prioritizing technologies for licensing and not much coordination between agencies.
   - One of the problems that the DoD and Congress have noted is that the DoD is doing a very bad job with IP rights. The leadership is not talking about it, and if leadership is not talking about it, then none of the subordinate leaders are going to be worrying about it.
   - DoD Acquisition, Technology, and Logistics (AT&L) has no vision for its IP portfolio. The first problem is that there is no vision (for technology transfer in the DoD). This is true for all the services. If you want organizations to go in the right direction there needs to be a vision statement.
   - ORTAs are considered second-class citizens—at the bottom of the food chain and not critical to mission.
   - The ORTA is not considered an integral part of the strategy for the lab. The ORTA is treated as a paper pusher.
   - The laboratory commander must realize technology transfer is part of the mission. This direction must come from the top down.
   - The development of a culture that motivates patenting and licensing partly comes from the people on command, the management structure. If those up in management actively support technology transfer then that percolates down through the laboratory management structure. Need to get management to realize that technology transfer is something that is important on the management level so that it flows down to the researcher level.
   - Mission of Partnership Intermediary Agreement (PIA) is defined by services, not the DoD. Currently, there is no one taking that strategic view. PIAs are there to support the ORTAs, which is a very narrow, down in the weeds perspective. Not a strategic perspective at all.

- There is a constant discussion of terminology and measures of success (i.e., difference between transfer and transition).
- There should be a CRADA conference that pulls together key Government and White House personnel to address technology transfer.
- Many DoD directives (particularly Directive 5535.3 and Instruction 5525.08, which were drafted in the late 1990s) are in need of revision to incorporate changes that have taken place since they were written.
- There needs to be some instruction for licensing similar to the CRADA Handbook.

2. **Increase Technology Transfer Funding and Resources**

- There is an unfunded and unenforced mandate for technology transfer—technology transfer mandate has no teeth within the DoD, and enforcement is an issue.
- Technology transfer is an unfunded mandate; there are not a lot of overhead funded staff functions.
- Need to provide some funding for technology transfer.
- There needs to be a funding line for technology transfer.
- There needs to be line-item funding for the technology transfer program. Technology transfer is mandated by Congress, but there is no funding attached to it.
- Unclear who the laboratory leadership expects to pay for the ORTA (i.e., Office of Naval Research or DoD).
- The guidance says that for every 200 scientists and engineers at the laboratory there must be 1 full-time employee supporting them as an ORTA, but there is no language that states who will pay for the position. It's a struggle to get proper funding and it's a struggle to stay afloat.
- It would be nice if a little percentage of the royalties went to fund Navy technology programs overall (at the headquarters level). The royalty money goes back to the laboratories.
- Implementation of CRADAs could be done on per deal basis / brokerage fee (per agreement). The directorates might find that more amenable than a tax on their revenue.
- There is a need to provide funds for the inventor's bill time in preparing patent applications because 10 to 11 hours of the inventor's time is needed to prepare

the patent application and prosecute the patent application to an issued patent. At this point, the project has ended and there is nothing to charge the time to.

- Researchers are overbooked in terms of the time they can commit to technology transfer. PIAs are critical to technology transfer in filling in this gap.
- One of the reasons the researchers gave for why they published instead of doing invention disclosures is the lack of staffing in the DoD patent office.
- Comment suggests providing the ORTAs with sufficient patent processing capabilities. The Army Corps could use two to three ORTAs and five to six patent attorneys.
- There is a need to increase the number of patent attorneys. More patent attorneys are needed to file patent applications on non-elected inventions by contractors.
- ORTAs often are not sufficiently staffed, which reflects the lack of commitment—not the focus of programs.
- Laboratories need to have a full-time professional technology transfer position, rather than administrator wearing two hats.
- Based on resources, the ORTA must focus on the execution of technology transfer, which does not leave much time for follow-up. It is hard to keep up with the reports or the results of CRADAs.
- Each laboratory has ORTAs, and they have a defined set of functions and requirements set by statute (in Title 15), but they don't have time, or in some cases the training, to do certain tasks (i.e., market assessments).
- The technology transfer office is considerably understaffed. It takes time and effort to prepare an invention disclosure, work with patent counsel and the technology licensing office, and promote the technology to potential licensees. So technology transfer may be viewed as a diversion from the research and the contract.
- More resources are needed to go out and proactively identify companies.
- Funding for travel is a problem because the technology transfer professionals can't get to the technology showcases, or they can't organize them because so many new hurdles have been put in the way in terms of funding.
- It takes a lot of marketing effort and strategy (e.g., linking with universities) to find a customer for technologies.
- PIAs are able to be highly focused on marketing of laboratory technology and capability and finding private sector partners. Many ORTAs do not have the

time or resources to do this, in part, because they have other responsibilities. The bottom line is that PIAs need to be funded to be effective.

- DoD laboratories don't necessarily have the internal capability to identify potential technology, perform a market assessment, and then go out and market the technology to the industry that could use those technologies. PIAs fill this technology transfer need.
- There are certain things that should be governmental, but the contractors that work at ORTAs have more commercial contacts to come up with more solutions. They are much better at dealing with industry, too. The ideal situation might be a combination.

3. **Change Technology Transfer Organization**

- Ought to make the technology transfer organizational structure across the DoD more uniform.
- The legal office at the Navy has too much control over the way technology transfer programs are managed—so much so that they influence the managing tools that are used to track technology transfer.
- To the extent that you can put the patent attorney in proximity (same building or at least on the same post) you will have a profound impact on the number of patent applications filed and the number of disclosures filed.
- Even though agencies have DoD guidance on technology transfer processes, agencies are still very individualized, which may be a cultural thing.
- Patent attorneys are making policy decisions on technology transfer that contradict a viable technology transfer program. Patent attorneys historically have not been involved in technology transfer, which is an issue.
- From a business perspective, the technology transfer office should have the autonomy to manage technology transfer, and the legal office should be there to support and consult to ensure that the technology transfer office is working within the confines of the law.
- A policy or instruction is needed that puts the best interest in the hands of the laboratory directors (laboratory leadership), researchers, and technology transfer offices that are in charge of the research and business decisions, rather than the patent office that is in charge of patents at the DoD agency level.
- Cannot have a successful program unless your patent attorney, ethics lawyers, etc., are on the same page.
- Small Business Innovative Research (SBIR) and technology transfer are two different stovepipes. The laboratories should join the two offices because there

are so many common elements. Technology transfer ranks low on the mission priority. There should be a top-down study at the DoD that recommends the integration of technology transfer and SBIR, even though bureaucracy will resist consolidation. All laboratories have separate SBIR and technology transfer offices.

- The Air Force Program Manager (PM) is buried low in branch and lacks authority to make changes. The Air Force PM needs to have an organizational structure in and of itself. Would like the PM to report to the Technology Executive Officer.

4. **Enhance Technology Transfer Education and Training**

   - There is a lack of awareness and education of technology transfer practices.
   - Scientists and engineers feel comfortable writing technical papers for publication in journals, but they don't often feel as comfortable writing patent disclosures because no one has taught them. So they're very or somewhat reluctant to sit down and type one up because they aren't sure what is supposed to be in it.
   - One thing that could be helpful would be, say, a standardized training module that could be employed at all the laboratories on how to write an invention disclosure.
   - Would be good if the Defense Acquisition University had a technology transfer professional training course or offered more courses for the technology transfer program and ORTAs.
   - If the DoD is going to have an Office productivity suite (Word, PowerPoint, and Excel) and wants people to use it for productivity, it should be able to be leveraged with the tool box that comes with it (including the programming language). There is no infrastructure support in the DoD for this.

5. **Better Incentivize Technology Transfer**

   - While management is very supportive of researcher needs in terms of technology transfer resources, the importance of patent filing should be elevated compared with publishing.
   - There's very little incentive for the uniform service personnel to do technology transfer, and it's a difficult process. If there's no incentive and it is difficult, then it won't be done.
   - There is little to no financial incentive to researchers. Many of the researchers come from universities and medical schools and Ph.D. programs. Working for

the Air Force, the researchers are still creative and are exposed to an excellent practice, but there is no mechanism for them to do technology transfer.

- Not really any benefits to the researchers beyond a few hundred dollars for doing invention disclosures. Management in the laboratories is not promoting or recognizing the efforts of researchers for doing invention disclosures.
- Need to incentivize the bench scientists in technology transfer activities.
- Technology transfer is supposed to be the responsibility of all scientists and engineers, but technology transfer doesn't show up in any performance evaluation.
- Make technology transfer part of review process for researchers: Would result in more invention disclosures, but more importantly would save money through not having to pay for technology from a contractor that has essentially stolen the idea from attending a meeting.
- Recommends giving awards, but also highlight what others (who did not win awards) are doing.
- Researchers with entrepreneurial ambitions don't seek employment at DoD laboratories.
- Once a year hold an award ceremony where the senior officer (admiral, captain, or colonel) gives out awards and presents the ribbon copy of a patent to the inventor with his or her family present.
- ORTA incentives don't get tied into the royalty streams or funding that is generated now. If ORTAs get some small fraction of the royalties, it would incentivize the ORTAs and make the ORTA job more desirable.
- There is no track for promotion in the job of an ORTA.

6. **Improve Intellectual Property Management and Enforcement**

- As budgets are shrinking, it is critical to prioritize patent [applications and marketing of patents], and this tool helps with that. Need to develop the capability to look across the IP of multiple laboratories. This can be done with Innography, but the cost to maintain Innography is greater than one laboratory can manage.
- There's still a need for patent prosecution and document and technology workflow management of agreements.
- Do not have good linkages between invention disclosures and technology transfer; it is ad hoc.

- A patent is written not to the invention, but to the claimed invention. You have to look at the patent claim to see what the scope of the patent is. "You need to be the utter expert on the product," but program managers are unaware of state of the art that has been filed at the Patent Office.
- Ineffective patent lawyers and counseling (if they are provided at all) with regard to prior art search, patent drafting, missing content, or prosecution. Patent attorneys are also not willing to spend time on applications.
- Patent prosecution is rare, and enforcement is lacking.
- There is an unresolved tension between licensing and enforcement. Without enforcement, licensees will be victims of infringement. Lack of patent enforcement is a true weakness in the system.
- Inventors should be encouraged to file [patents] with trademark-able names with the aim of filling future trademarks, and then license those future trademarks together with the patent rights.
- The DoD does not monetize international patent rights wisely. In fact, most of the time they are not monetized at all.
- The DoD needs to get better at making it clear what was purchased and when (the Government) purchased it. There needs to be a better tracking system of contractor work, such as through a watermark. There should be a watermark on hard copies and a script on audio that the product is in public domain. This assures an installation that a contractor is not reselling the work, so the DoD does not pay a second or third time for that work.
- The Defense Contract Management Agency needs to enforce the requirement that contractors report their inventions (DD Form 882 Invention Disclosure).
- The DoD or the Army should establish a journal where IP that is not going to be patented can be catalogued. This should be done to prevent a contractor from "serendipitously" coming up the same idea, patenting the technology, and then selling it back to the DoD.
- Could bundle technology more across the laboratory or use auction houses.
- Clustered patents and expanded use of PIAs—national PIAs could help with clustering patents across services to increase their value and the return on licenses.

7. **Clarify Technology Transfer and Acquisition**
    - CRADAs should be constructed to mitigate risks with contractors. Ways that have been used to mitigate risk are:

  - Be very aware of the IP concerns for procurement.
  - Reach out to the community to develop technologies with multiple companies to avoid sole source (this takes a lot of work to arrange firewalls and work with multiple companies).
  - State in the Request For Proposal that partners are sought for certain technologies.

- With many universities having many start-up-based inventions funded by the Government, the Government should have license rights (not data rights) in the inventions. Acquisition attorneys or contracting officer's representatives would not know to check for patents. Therefore, a database is needed that would contain metadata on all patents in which the Government owns or has non-exclusive royalty-free nontransferable licenses.
- The acquisition office wants the widest acquisition opportunities—if you start with a CRADA and do not think about acquisition, you can create a sole source since the Government may not have the necessary data rights to provide the technology to other companies. The DoD must do a better job of identifying issues and stakeholders and understanding the process of integrating technology into the acquisition process.
- The acquisition office should be aware and be briefed on what is going on with the technology transfer office activities and be part of the review process for agreements.
- Technology transfer folks don't have insight into the acquisition side and that the current DoD Instruction is not adequate (it was last revised in 1999), particularly when in 2009 Congress identified that current regulations were not sufficient. There is concern that the instruction is not working the way it is supposed to work. Need to provide better guidance for CRADAs because these have implications downstream for acquisition. The DoD has never properly responded to the 2009 National Defense Authorization Act.
- Technology transfer professionals don't know the first thing about acquisition.
- Portfolio management and vision—there are few attorneys that know both patent and technical data. The technology transfer community doesn't know about acquisition—it is focused on short term.
- Researchers could not say where and how their technology was used because "they had lost touch with the acquisition process." Connecting technology transfer to a product is more concrete. One reason for this is that the DoD reduced staff by 40 percent in the 1990s. The planning personnel were cut.

These were the people who formerly connected the dots with downstream partners.

- In many instances technology transfer and the implementation of CRADAs gets murky when one is not talking about a specific widget, hardware, or software, but rather a system of systems that involves multiple sets of technology.

8. **Ensure Data Rights Protected**

   - The Government needs to negotiate its data rights, taking into account its contributions to the project. Often this is not done, and as a result, the contractor can claim to have exclusively developed a product.
     - Contractors should not be able to say that they have exclusively developed technologies under CRADAs; instead, the contract should describe the resources that the laboratory puts up (labor hours and equipment).
   - Need to establish data rights when setting up CRADAs, especially for spin-in CRADAs. Many of the technology transfer/ORTA staff (including the attorneys) do not understand data rights issues. More training and checklists need to be set up.
   - The way the current laws work in the IP universe is that you get your data rights during the development/ research stage. Unfortunately for protecting IP when dealing with contract work, contractors are supposed to report their inventions at certain points in the contract, but they generally don't do so. This puts IP rights in jeopardy due to lack of invention documentation.
   - Need clearly stated authority to transfer ownership of Federal technical data (license at least).
   - Lack of data rights knowledge across the lines creates problems with not having the data rights correctly detailed in the CRADA initially.
   - One must be very cognizant of the need to pick the correct data rights provisions. If the contract officer does not understand the data rights, it is helpful to have someone with an IP background work with him or her.
   - Each service needs an Senior Executive Service-level data rights attorney in charge of training and solving issues—one who is a member of the Defense Acquisition Regulations Council.

9. **Improve and Streamline Processes**

   - Have no centralized method or repository to manage the patent application. No ability to collectively track and capture the patent process.

- The DoD should have an automated system for technology transfer. The DoD needs a system to collect metrics and manage workflow for technology transfer; IP attorneys don't have a uniform system.
- The current automated system for tracking technology transfer is an administrative burden because the ORTA doesn't have the help to enter the large amount of data sets that are required.
- According to researchers, the process for invention disclosures is too laborious.
- The criteria for an invention's approval are its military and commercial applicability, where military application is most important. However, finding the right area expert for the reviews can be challenging because not all areas are represented, and not every expert has time to dedicate to the review process.
- One of the hold-ups in licensing technology is the 3-year lag in the patent review process. This makes licensing difficult, because the 3-year lag is too long for the information technology, cyber security, and information assurance markets, and some of the information and IP becomes irrelevant during that time.
- The Army and DoD probably need to streamline the paperwork involved. They don't have much direct interaction with patent attorneys, and they would like to avoid having applications and requests stuck at an attorney's desk for several weeks when they are just interested in calling them up to explain the prior art etc. and get a rapid opinion of the technology.
- In addition to a vision problem, the DoD has the problem of lacking a standard approach to handling patents to achieve commercialization.
- Every organization does technology transfer and licensing differently. Many venture capitalists are turned off to working with some organizations or laboratories and universities because they are inefficient at the process of licensing.
- Should be able to structure a contract with one service and have the format work for other services. As it is, what goes for the Army does not necessarily go for the Navy. If you can structure a deal with one DoD laboratory, it should work for multiple DoD laboratories.
- There is a cultural problem with the traditional ethics community. The ethics community feels that the current number of statutes (between 16 and 17) is not sufficient for Government, but the bureaucracy involved in technology transfer impedes the process. There are too many checks and balances.
- The single biggest complaint about Government licensing is how long it takes.

- Would like to have a very short form collaborative agreement (about one page) for when researchers go to conferences and come up with a collaborative idea. They have no terms and conditions governing something that has come up over beers.

10. **Improve Lab-Industry Interaction**

- Most companies don't realize you can license technologies from Government laboratories.
- The DoD has the attitude that customers will call or come to us.
- ORTAs need to take the initiative to interface with industry. There needs to be a systematic way to interact with industry.
- Venture capitalists and other investors are a part of the spectrum, and contacting them should be a part the focus for the ORTAs.
- Patent attorneys in the Government would have a lot of problems working with venture capitalists. The Government is wary of venture capitalists, and Government culture is a barrier.
- There need to be Memoranda of Understanding that work to develop long-term relationships between companies and laboratories. This would work better and would increase communications and business transactions.
- Bureaucracy—companies don't want to set up a separate accounting system in case they get audited, and if you have a set of books that are not compatible, then this is against the Securities and Exchange Commission regulations.
- The challenge is that there are too many companies to work with all of them, or too few. A lot of these technologies are so nascent that a lot of big companies won't work with them.
- Setting up places to work 'just outside the gate" makes it easier for laboratory and company scientists to work together. Many company scientists do not have the required security clearances to work on site with DoD scientists.
- Use of Manufacturing Extension Partnership centers across the country would be very valuable to the technology transfer program. They bring services to small businesses that the DoD doesn't.
- One of the barriers to technology transfer is the challenge of finding licensees to push the inventions forward to industry. A couple of specific technologies can't get the attention of big companies, so ORTAs have to craft their own technology and technology transfer strategy and look for start-ups or new companies as intermediaries to develop these novel technologies. This is challenging.

- The DoD needs a storefront (i.e., iTunes) where we can commercialize software (can't be Government domain). This is important. If one does a software license, it could be worth tens of thousands of dollars, whereas pharmacology licenses are worth far more. Thus, to encourage development of software licenses, the DoD needs to develop a software store to capitalize on a tremendous volume of intellectual property.
- There should be a technology transfer national challenge, where it is a challenge posed by the Government. It could be multiple agencies pooling their efforts into a single challenge. Sort of like a DARPA challenge, but on a national scale. Industry would get some incentives for participating in the challenge.
- Cost reimbursement contracts are particularly a problem. The DoD is becoming more and more marginalized and not intertwined with what is going on in the start-up community.
- Company attorneys want to revise contracts to benefit companies (for fuels areas—attorneys aren't familiar with agreements that the DoD has and are more familiar with working with other companies).
- Try to make lawyers understand that DoD can only do what is authorized by the President, Congress, and legislation—the DoD does not have the flexibility to negotiate what makes sense and is bound by regulations (e.g., non-disclosure agreements—don't have authority to sign but companies want this, so we came up with a Limited Purpose CRADA non-disclosure agreement, but not fully bound).
- Companies need to better understand that the Government does not negotiate and personnel are held within the bounds of their authority. Overall, the key is to get everyone on the phone and communicate why things are the way they are—due to regulations.
- Overall, the legal interpretation of what you can do and can't do is a major barrier to technology transfer contracts.
- As the economy and industry are global, there are restrictions on where the technology is manufactured and export controls. U.S. manufacturing is too expensive, and this limits advancement of technology transfer.

11. **Better Metrics and Tracking of Success**

- There needs to be more follow-up on CRADA results—whether it achieved impact—and to track benefits.

- Would be beneficial if organizations would establish a CRADA library to provide an understanding of what CRADAs are out there already and what technology areas they are affiliated with.
- The services must get together and adopt a system for recording technology transfer activities (i.e., CRADAs, licenses, agreements, etc.).
- Services have no measures of performance for IP and technology transfer.
- It is suggested that any memorandum coming out of OUSD (AT&L) Defense Laboratory Programs office be not overly burdensome in terms of metrics or reporting.
- The Presidential Memo related to metrics elevated attention toward needing to better understand the results of technology transfer, but resources limit the ability to execute.
- There is a need for an incentive to report jobs. The problem with the system is that the world wants to maximize its royalties, but in reporting jobs, the money required to track this has to come out of the royalties. Technology transfer is wanted to fuel jobs.

# Appendix G
# Comments on the Impacts of the Changes to the Patent Law

According to the America Invents Act enacted on September 16, 2011, the United States will switch from to a first-to-invent system to a first-to-file that defines the rights to a patent on an invention. The effective date for this change will be March 16, 2013 (U.S. Patent and Trademark Office 2011).

During the interviews, 10 individuals commented on the impacts of this change. These comments can be summarized as follows.

1. No impact to their organization (one interviewee).
    - There will be no impact on technology transfer. Locally, staff members are fairly aggressive about moving forward on invention disclosures. The backlog is months, not years.
2. Advantageous given the time-sensitive nature of IT patents in their patent portfolio and their need to quickly file patents to license the technologies (one interviewee).
    - Patents at the laboratory are typically in information technology (IT), cyber security, and information assurance technology areas. The nature of these technologies requires a different time scale than for other technology areas. There is currently a 3-year lag in the patent-review process. This is too long, and some of the technologies and information in IT-related patents can become irrelevant in that time frame. The change in the patent law is particularly advantageous to the laboratory, given the need to review patents quickly to license the inventions. It will make it easier for the laboratory to license IT-related patents.
3. Discussions on the change occurring through working groups (two interviewees).
    - There is an internal group that is thinking about this at the Department of Energy. The Interagency Working Group for Technology Transfer has also looked into responding to this issue and what impact it would have on each laboratory.
    - One of the topics on the agenda of the Federal Laboratory Consortium in September is the impact of the patent law rule-making.

4. Concerns with the lack of resources, such as time, money, and staff to deal with the change (two interviewees).
    - In the case of rival patent applications filed before the laboratory could process the patent application, the inventor's notebook and notes on the invention could be used to prove the date of invention was before (that of) the rival patent application. With the change from first-to-file to first to invent, the important dates are the invention disclosure date and the patent application date. With a limited number of patent attorneys in DoD, there is a concern.
    - There are two main impacts: cost and time. The shift to first-to-file will create enormous pressure to get applications filed early or at least provisional applications filed early, which entails a little more cost. When aggregated, this additional cost starts to be significant.
5. Change will hinder the willingness to share information and could affect research collaborations (two interviewees).
    - Researchers used to be protected by their laboratory book, but now they could tell others about an invention, and the person who is the first to file gets the protection. The revisions may affect the ability to have early open discussions with researchers and industry. It could have a potentially negative effect on collaborations. We will need to make sure stakeholders have a solid non-disclosure agreement in place, and we will need to be more vigilant in protecting intellectual property. On the other hand, the new approach to technology transfer can make the process more efficient and generate more revenue.
    - It will be more difficult to share patent information with other parties (e.g., governmental agencies, contractors, academic sector). The laboratory may have to withhold more information.
6. Need to revise the patent review process and agreements (five interviewees).
    - The patent secrecy order assessments will need to be much faster under the new law. The new patent law will require that DoD be more prompt in analyzing and deciding whether a patent should be subject to a secrecy order.
    - The laboratory has proposed a new invention disclosure form to try to make it in line with the new legislation and simpler to complete. It removes questions no longer relevant to the new law that slows down the process of filling out the form (e.g., if an invention had been offered for sale or sold).
    - The laboratory is going to have to process the patent application on a timelier basis.

- One of our laboratories is trying to figure out how to streamline operations to offset the increased costs.
- They may change their CRADA language for joint disclosures to clearly state who will file a patent on the technology and ensure this is specified up front.

7. Need for technology transfer staff to revise or develop a patent prioritization strategy (three interviewees).
    - It used to be that anyone could quickly protect an invention by first filing a provisional application. There is a perception, which is incorrect, that provisional applications can be filed quickly and inexpensively. There is concern that provisional patent applications need to comply with Paragraph 112, meaning that they have to have the claims and can't just be a cover sheet provisional. This will affect how staff prioritize patents.
    - It will be an adjustment figuring out what invention disclosures and provisional patent applications to prioritize and pursue.
    - What to patent will need to be prioritized and a patenting strategy will need to be developed.
8. Concerns about communication with researchers and promoting awareness of impacts of the patent law change (three interviewees).
    - Researchers need to be even more cognizant of publishing time. Due to filing costs, researchers sometimes wait until the next fiscal year to file patents. They need to understand that they may be putting themselves at risk because the first-to-file change may have a detrimental effect.
    - DoD may become more stringent about what is considered patentable. If what is patentable becomes overly stringent, researchers will just publish a paper to share the ideas and results rather than bothering to patent the technology at all.
    - The laboratory is telling researchers they can't ensure that a patent will get filed before they publish their work. They are trying to get researchers to file their invention disclosures with the technology transfer office earlier. However, researchers are worried about having to file patent applications before they have the technology fully prepared for the application.

# Appendix H
# Implications of Reduced Funding for Partnership Intermediaries

The main hurdle with using partnerships to perform technology transfer activities is that congressional partnership intermediary agreement (PIA) funding has been reduced. There have been seven national Office of Technology Transition Partnership Intermediary Network PIAs, of which five are still operating. Only one, TechLink, was funded by DoD (and still is).

The sponsor requested that the research team inquire about implications of decreased PIA funding. The research team asked Office of Research and Technology Applications (ORTA) representatives this question, and edited responses are shown below. (Responses from the PIAs TechLink and TechComm are not included.)

Fourteen interviewees commented on the role of the partnership intermediaries (eight organizations) and implications of decreasing PIA funding (three organizations). The benefits of PIAs range from helping to license technologies to easing the burden of patenting for researchers and technology transfer staff. The implications for decreased funding for PIAs include the move to make PIAs more self-sufficient and the expansion of PIA services so that they are shared among a wider group of other DoD laboratories and research centers.

1. **Role of PIAs (eight organizations)**

   - The existence of TechLink and MilTech has been essential to us.[1] The laboratory has worked with TechLink on licenses. The laboratory has used MilTech to help make early samples needed for preclinical studies.
   - For a while they did not have a PIA, and the researchers had to go back to doing patents. The researchers didn't have the time to do the patents due to the extensive patent package
   - By the nature of their organizations, PIAs are more in tune with industry than DoD laboratories. Thus, PIAs are able to reach out to a wider range of companies. PIAs can determine if there is a commercial market, as the laboratories have a hard time determining this. Can task PIAs to assist with

[1] MilTech is a partnership between TechLink and the Montana Manufacturing Extension Center.

technology transfer when staffing allowances are limited, such as applying for patents. While other organizations may be able to fill this role, it would be up to what they want to do, not what DoD needs them to do. The laboratory used PIAs for market or patent portfolio analysis, but this use has been limited since patents are not common at the laboratory.

- For example, TechLink spends time helping the Air Force identify potential intellectual property to protect. Air Force can't task others to do this because the step happens before licensing.
- TechLink did an economic impact study on their impact in brokering the movement of technology from DoD laboratories to businesses. The resulting economic impact was 4,290 jobs created and $729 million put into the economy. TechLink has been responsible for approximately 50 percent of licenses from DoD laboratories. DoD laboratories don't necessarily have the ability to identify a commercially viable technology, perform a market assessment, and then market the technology to the company that could use it. PIAs fulfill this need. PIAs help DoD laboratories to connect technologies with companies, particularly small businesses. PIAs help DoD laboratories apply for patents and develop CRADAs. TechComm has brought together industry people to determine their technology needs and then connect them to the appropriate laboratory staff. DoD laboratories focus more on local businesses. PIAs give laboratories the ability to reach out nationwide. TechLink gave DoD laboratories national outreach to small businesses through marketing letters, cold calls, and e-mail. TechComm helped to develop technology showcases of DoD laboratory technologies for local companies.
- The relationships between the laboratories and PIAs are win-win; PIAs have processes and networks, and laboratories have technologies. Local PIAs connect laboratories with companies who can make use of the laboratory's assets, and national PIAs assist in closing the deals. The numbers of licenses, CRADAs, start-ups, amount of media attention, and number of awards have increased and are attributable to this network.
- PIAs work with the service to prepare nominations for Federal Laboratory Consortium awards.
- They use two PIAs and a business incubator partnership to provide commercialization assessment services and links with industry

2. **Implications of Decreased PIA Funding (three organizations)**

- If the DoD or the Federal Government was serious about moving its technology forward and into application, there should be a funding line for these activities.

OSD used to have a funding line. When it got killed last year, the only savior was that additional funding was moved to the Air Force. Otherwise, we would have lost everything related to technology transfer. TechComm has started to become self-sufficient by charging industry for its services.

- There are no out-of-pocket costs associated with working with Navy PIAs. Navy policy is to work with PIAs, but not fund them. PIAs are paid for out of other resources, such as state funding.
- Their PIAs have expanded, and they have starting working with the Navy in China Lake and Marines in Quantico to broaden their business base to survive.

# Appendix I
# Recommended Practices "Watch List"

Many programs that may be of interest for DoD technology transfer are still too new or not yet evaluated to call them a recommended practice. We include a discussion of TechComm's Beta Laboratory program, a consortium of laboratories and affiliated company partners, and the CRADA leading to commercialization agreement with a venture capital firm.

The programs and initiatives described in this appendix have the potential to improve technology transfer practices. We recommend that DoD monitor (watch) these over the next few years to assess their applicability to DoD laboratories.

## Beta Laboratory Program

The DoD's partnership intermediary TechComm has created a Beta Laboratory Network that was initially funded by an earmark, but is now self-sustaining through TechComm's establishment of a global "Affiliate Partner Network," composed of corporations, research-oriented universities, venture funds, technology-based economic development entities, municipalities, and even airports. Each member of the Affiliate Network provides an annual investment to support and enable the work of TechComm:[1]

> TechComm established the Beta Laboratory Network to enable selected federal laboratories to provide guidance, direction, and oversight to TechComm on how federal laboratories can interact with TechComm's "affiliate partner network" comprised of industry, research universities, economic development entities, and venture capital funds. Working with and through the Beta Laboratories, TechComm is developing its processes and enhancing its network to commercialize Beta Laboratory technologies and invite R&D through cooperative research.

The Beta Laboratory program has the following components:

- The Beta Laboratory members (14 laboratories, 7 of which are DoD laboratories). They must commit to working with the program 52 weeks per year. TechComm has weekly calls with each individual member and monthly phone meetings as a group.

[1] TechComm (Technology Commercialization and Manufacturing), TechComm Beta Laboratory Program Overview, August 2012.

- The TechComm Affiliate Partners Network[2] is a consortium of companies, venture capitalists, universities, and other organizations interested in working with the laboratories. The consortium members pay an annual fee. All members except Government members pay $25,000 per year, and Government members pay $5000 per year. It currently has 21 members and 17 prospective members.
- The Beta Laboratory working group members include representatives from each Beta Laboratory and the TechComm Affiliate Partners Network.

Beta Laboratory activities include the following:

- In 2013, TechComm will launch a series of "Federal Innovation Marketplace" events that will allow investors, corporate licensees, and others the opportunity to access technology emerging from the Federal laboratories and affiliates. The plan is to conduct the first two forums in 2013 to showcase available technologies. The first event will be held in Denver, May 22–23, 2013. The second will be held in New Jersey in October 2013.
- These Federal Innovation Marketplace Events open the door to the laboratories within the region to TechComm's Affiliate Partner Network, as well as other regional institutions and local governments, with the goal to launch "regional ecosystems" across a region. The National Renewable Energy Laboratory is cosponsoring the first event with Lockheed Martin and expects to get about 150 companies and representatives from across the Rocky Mountain region to attend.
- Communities of Practice are groups within the Affiliate Network who share a concern or a goal and interact regularly to learn, solve problems, and seek opportunities to work together. The plan is to create 12 Communities of Practice, and the number will grow as the network grows. The topics will include corrosion, cyber security, water treatment, wind, and others. Each Community of Practice meets monthly.
- Technology Challenges are challenges designed to meet industry needs, based on the technology pull concept. In response to each industry challenge, a range of two to eight responses are received from the Beta Laboratories. The Beta Laboratories are about 50 percent successful in addressing these challenges. TechComm is now developing a revised process to enable Beta Laboratories to post similar challenges to the Affiliate Network.

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[2] See http://www.thecenterforinnovation.org/sites/default/files/techcomm/TechComm_Project.pdf.

- The Prototyping Program advances technology development and marketability of laboratory technologies.

Potential benefits of the TechComm Beta Laboratory program include the following:

- Commercializing laboratory patents.
- Participating in Regional Technology Marketplace events.
- Expanding collaboration and funding sources.
- Participating in TechComm's Communities of Practice.
- Leveraging recommended practices.
- Building interagency relationships.
- Responding to technology challenges from the private sector.
- Accessing venture capital.
- Expanding web presence.

It may be difficult to convince enough companies to join the Affiliates Network for the Beta Laboratory Program to become self-sustaining. However, the number is gaining and has now become global, with the latest member of the Network being the Federation of India Chambers of Commerce and Industry.

**Why on Watch List**

The Beta Laboratory Program is in its infancy.

## CRADAs Leading to Commercialization

Edgewood Chemical Biological Center set up a CRADA with Allied Minds Federal Innovations, Inc. (AMFI) to forge a partnership to commercialize laboratory technologies (Dunn 2012). They signed the agreement on April 9, 2012. They hold periodic commercialization sessions to discuss available laboratory technologies. AMFI can either fund incubation projects through smaller CRADAs or license the technologies. If seeking an exclusive license, AMFI must follow required procedures, including posting a Federal Register Notice and preparing a commercialization plan. The firm will then fully fund the establishment of a start-up business to develop commercial applications for the technology. According to AMFI, it is in the process of signing similar CRADAs with Army's Research, Development and Engineering Command (seven laboratories), Naval Surface Warfare Center Crane, China Lake, Patuxent River, and Space and Naval Warfare Systems Command.

AMFI plans to initially deploy $100 million into the partnerships and anticipates establishing through its investment model 20 companies in the first year. At scale, AMFI expects to develop about 100 companies a year.

The amount of money intended to be devoted to Edgewood Chemical Biological Center technologies is a relatively small amount (an average of $5 million per project).

**Why on Watch List Watch List**

Some have characterized this relationship as a “right of first refusal.” The agreement is only a few months old and still untested.

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# Abbreviations

| | |
|---|---|
| AFI | Air Force Instruction |
| AFMC | Air Force Materiel Command |
| AFMS | Air Force Medical Service |
| AFRL | Air Force Research Laboratory |
| AMC | Army Materiel Command |
| AMFI | Allied Minds Federal Innovations, Inc. |
| AMRMC | Army Medical Research and Materiel Command |
| ARDEC | Armament Research, Development and Engineering Center |
| ASD | Assistant Secretary of Defense |
| ASD(PA) | Assistant Secretary of Defense for Public Affairs |
| ASJA/MRMC | Office of the Staff Judge Advocate, Army Medical Research and Materiel Command |
| ASP | Acquisition Systems Protection |
| CA | Cooperative Agreement |
| CBD | Chemical and Biological Defense |
| CFR | Code of Federal Regulations |
| CJCS | Chairman of the Joint Chiefs of Staff |
| CPI | Critical Program Information |
| CRADA | Cooperative Research and Development Agreement |
| CTA | Commercial Test Agreement |
| CT-CRADA | Clinical Trials CRADA |
| DA&M | Director of Administration and Management |
| DAU | Defense Acquisition University |
| DDR&E | Director of Defense Research and Engineering |
| DEPSECDEF | Deputy Secretary of Defense |
| DFAR | Defense Federal Acquisition Regulation |
| DOC | Department of Commerce |
| DoD | Department of Defense |
| DoDI | Department of Defense Instruction |
| DOE | Department of Energy |
| DUST | Dual Use Science and Technology Program |
| ECBC | Edgewood Chemical Biological Center |
| EPA | Educational Partnership Agreement |
| FAR | Federal Acquisition Regulation |
| FAST | Federal and State Technology |
| FFRDC | Federally Funded Research and Development Center |
| FLC | Federal Laboratory Consortium |
| FTTA | Federal Technology Transfer Ac |
| FY | Fiscal Year |

| | |
|---|---|
| GOCO | Government-Owned, Contractor-Operated |
| GOGO | Government-Owned, Government-Operated |
| HHS | Health and Human Services |
| IAA | Interagency Agreement |
| IP | Intellectual Property |
| JHU-APL | Johns Hopkins University Applied Physics Laboratory |
| LANL | Los Alamos National Laboratory |
| LLNL | Lawrence Livermore National Laboratory |
| MAIS | Major Automated Information System |
| MAR | Minimum Annual Royalty |
| MDA | Missile Defense Agency<br>Milestone Decision Authorities |
| MDAP | Major Defense Acquisition Program |
| MEP | Manufacturing Extension Partnership |
| MIT-LL | Massachusetts Institute of Technology Lincoln Laboratory |
| MIT-TLO | Massachusetts Institute of Technology Technology Licensing Office |
| MOA/MOU | Memoranda of Agreement/Memoranda of Understanding |
| MTA | Material Transfer Agreement |
| NDA | Non-Disclosure Agreement |
| NDAA | National Defense Authorization Act |
| NIST | National Institute of Standards and Technology |
| NRL | Naval Research Laboratory |
| NSA/CSS | National Security Agency/Central Security Service |
| NSF | National Science Foundation |
| NSWC | Naval Surface Warfare Center |
| OASA/ALT | Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology |
| ONR | Office of Naval Research |
| ORTA | Office of Research and Technology Applications |
| OSD | Office of the Secretary of Defense |
| OSS | Open Source Software |
| OT | Other Transaction |
| OTA | Other Transaction Agreement |
| PIA | Partnership Intermediary Agreement |
| PLA | Patent License Agreement |
| PM | Program Manager |
| R&D | Research and Development |
| S&AC | Studies and Analysis Center |
| SAF/GCQ | Secretary of the Air Force/General Counsel |
| SAF/PA | Secretary of the Air Force/Public Affairs |
| SAP | Special Access Program |
| SBA | Small Business Administration |
| SBIR | Small Business Innovation Research |

| | |
|---|---|
| SEIC | Systems Engineering and Integration Center |
| SPAWAR | Space and Naval Warfare Systems Command |
| STI | Scientific and Technical Information |
| STIP | Scientific and Technical Information Program |
| STTR | Small Business Technology Transfer |
| T2 | Technology Transfer |
| TEO | Technology Executive Officer |
| TIA | Technology Investment Agreement |
| TSA | Test Services Agreement |
| UARC | University Affiliated Research Center |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |
| USD(AT&L) | Under Secretary of Defense for Acquisition, Technology, and Logistics |
| USD(I) | Under Secretary of Defense for Intelligence |
| USD(P) | Under Secretary of Defense for Policy |
| WRAIR | Walter Reed Army Institute of Research |

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**14. ABSTRACT**

This report presents technology transfer issues and potential policy actions that the Office of the Secretary of Defense (OSD) could consider to enhance existing technology transfer mechanisms or to create new ones. Using themes identified in a review of academic literature, government reports, and legal documents on technology transfer, the study team interviewed DoD laboratory staff, Offices of Research and Technology Applications (ORTAs), DoD legal staff, and other stakeholders. From the data collected from these interviews, the research team selected 15 policy issues and organized them into the following categories: ensuring effective ORTA organization and staffing; empowering, training, and rewarding scientists and engineers; capturing and managing intellectual property; using technology transfer mechanisms to full potential; managing and monitoring technology transfer processes; and building partnerships. Adoption of appropriate policy actions would require implementing or clarifying DoD guidance or instructions, potentially leading to improvements in technology transfer practices. Actions that would require new legislation have the potential to provide new or improved technology transfer tools.

**15. SUBJECT TERMS**

Department of Defense (DoD); technology transfer; defense laboratories; innovation; best practices; commercialization; intellectual property; partnerships

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