

Expediting Cost-Effective Solutions Through Government Technology Transfer and Commercialization

Theresa A. Baus

Technology Partnerships Office
Naval Undersea Warfare Center, Division Newport
Newport, RI USA
theresa.baus@navy.mil

Abstract— The U.S. and other nations fund basic and applied research at government owned facilities to develop technologies that satisfy security, economic, social and other national needs. Multiple mechanisms exist for private sector firms and academia to work with government laboratories to transition investments to commercial products. However, the number of companies aware of and taking advantage of these opportunities to leverage these avenues remains relatively small. In addition, recently proposed U.S. legislation will expand the authority to create public-private partnerships at Department of Defense laboratories within their core competencies. This paper will explore the value of partnering with nationally funded entities and the return on investment for both the public and private sectors.

Keywords—technology transfer; commercialization; economic development; economic impact

I. INTRODUCTION

Since the 1980's, U.S. legislation has existed to leverage the outcomes of federally funded research and development by the private sector. In 1980, the U.S. Congress passed the Stevenson-Wydler Act which enabled federal laboratories to engage directly with the private sector to commercialize laboratory developments. This legislation was the federal counterpart and similar in intent to the Bayh-Dole Act 1980, which gave small businesses, universities and not-for-profits the right to retain ownership of intellectual property developed under public funding. Both statutes supported further development of federally funded R&D by the private sector by providing invention and patent rights that could be used by commercial licensees to create exclusivity in the market, and thereby call forth the necessary investments to successfully commercialize and monetize an invention.

Congress recognized the role federal laboratories could play in U.S. job creation, business expansion and economic growth through engagement with the private sector. In 1986, the Federal Technology Transfer Act (FTTA) established technology transfer as a mission of all federal laboratories and mandated the creation of Offices of Research and Technology Applications (ORTAs) at laboratories with 200 or more scientists and engineers. The FTFA also provided the

authority for the federal laboratories to enter into Cooperative Research and Development Agreements (CRADAs) and license laboratory inventions under patent license agreements.

II. TECHNOLOGY TRANSFER MECHANISMS

CRADAs are a key component of a federal laboratory's technology transfer program. The agreements allow collaboration between the laboratory and a private sector entity including businesses; academic institution; not-for-profits; state and local agencies; and individuals. The work under the agreement must support the laboratory mission. The laboratory may provide personnel, expertise, equipment and facilities to the non-federal entity, but not funds. The non-federal entity may provide personnel, expertise, equipment, facilities and funds to support the cooperative effort. Although a legal contract, CRADAs are not governed by the Federal Acquisition Regulations (FAR) and are not a procurement contract.

Intellectual property, including data rights and rights to inventions, is covered under the CRADA. Company proprietary information is protected from disclosure, including Freedom of Information Act (FOIA) requests. The CRADA statute allows the non-federal entity to gain a non-exclusive, irrevocable, paid up license to practice an invention made by the federal entity under the CRADA statement of work. In addition, the statute provides an option for an exclusive license to the subject invention in a predetermined field of use. Normally, government patent licensing procedures require the publishing of a notice of an intent to grant an exclusive license in the Federal Register. Inventions made under CRADAs are not subject to this requirement. This provision creates an opportunity for the non-federal entity to gain an advantage over a competitor through early market development before the competitor is made aware of the invention and its potential for development.

The statute governing CRADAs (10 USC 3710a) states that preference will be given to small businesses and companies manufacturing substantially in the U.S. Congress requires a yearly report on CRADA activities at the federal agencies and tracks the number of agreements with small businesses. Although small businesses are explicitly mentioned, federal

laboratories enter into agreements with businesses of all sizes. Agreements with non-U.S. entities are also permitted and require additional reviews and approvals by the U.S. Trade Representative and an export authority (E.O. 12591). The non-U.S. agreements are still signed by the laboratory head or his/her designee.

Federal technology transfer promotes the use of the products of federally funded research and development for economic development and global competitiveness. The R&D results take many forms, from developed expertise to patented inventions to specialized facilities and equipment. A CRADA partner may gain access and leverage knowledge and expertise anywhere along the research, development, test and evaluation spectrum. As a business tool, CRADAs allow an entity to leverage the investments of the U.S. government for new product development and market expansion. Taking advantage of previous public research and development can reduce business and product development risk, due to the advancement of a technology to a more mature development level at the government's expense.

More recent legislation including the Technology Commercialization Act of 2000 further emphasized the importance of technology transfer to the U.S. economy. The Presidential Memorandum on Accelerating Federal Technology Transfer of October 2011 provided direction to increase the speed and number of transactions to more fully realize the benefits of federal technology transfer to U.S. economic growth and wellbeing. The Presidential Memorandum required additional reporting by the federal laboratories on the impacts of the technology transfer programs, such as the number of businesses and jobs created and the revenues associated with and enabled by the federal technology transfer activities.

III. OTHER TECHNOLOGY TRANSFER MECHANISMS

In addition to CRADAs, technology transfer mechanisms include patent license agreements; Work for Private Party Agreements (WFPP) (under 10 USC 2539b and 10 USC 2563 for the Department of Defense); and Cooperative Agreements, Grants and Other Transactions (10 USC 2371). The Department of Defense also considers procurement contracts as technology transfer mechanisms under which a DoD or privately funded development is adapted or further expanded for DoD use and deployment.

Under a patent license agreement, a licensee is granted the right to practice a government owned invention. Federal laboratories are authorized to enter into non-exclusive, partially exclusive or exclusive license agreements. The U.S. government retains the right to practice the invention, or have others do so on its behalf, under all licenses. The license agreements contain performance measures and milestones; obligations for upfront fees, running royalties and minimum annual royalties; termination clauses and sublicensing rights; and reporting requirements on metrics required by the Presidential Memorandum. The patent license is provided without warranties from the government on the validity of the patent(s). As with CRADAs, non-US entities may enter into

patent license agreements with federal laboratories and are subject to the same additional reviews and approvals.

WFPP agreements are different from CRADAs in their nature and intent. Authorities for WFPP agreements were established to offset the government's costs of maintaining unique facilities and equipment. WFPPs allow access to these facilities for test services, as well as engineering services. Materials made by the laboratory may also be transferred to a non-DoD entity under a WFPP agreement. The services or materials must not be available from the private sector.

While CRADAs are collaborative, there is no collaboration covered under a WFPP. A test or engineering plan is provided by a company or other entity for execution by the laboratory, and the results are then delivered to the company or entity. Unlike CRADAs, there are no invention rights provisions under a WFPP. If the laboratory employees should develop a solution as part of the WFPP statement of work, then the company or other entity would need to apply for a license to that invention if it wishes to use it commercially. The company would be treated the same as all other interested parties. There is no allowance for a paid-up, irrevocable non-exclusive license and the intent to grant an exclusive license will be required to be published in the Federal Register.

In contrast to CRADAs, the government does not have ownership of the data generated under a WFPP. In such cases, the government cannot use the data without permission of the company or other entity. Under a CRADA, the government would own the data and provide certain rights to the CRADA partner. In addition, the company could request that the laboratory mark the data generated under the CRADA as Restricted Access Information. Restricted Access Information is information that would be proprietary if the federal government had the ability to produce proprietary information. Properly marked Restricted Access Information is exempt from FOIA and can be held for up to five years from the date of creation. The ability to request Restricted Access Information markings helps ensure that the CRADA partner can fully exploit the data and potentially gain an advantage over a competitor.

The difference in data rights underlines the importance of understanding the goals of each party when considering the proper mechanism to use. While CRADAs and WFPP may seem interchangeable at times, there could be consequences if certain rights are needed in the future and the agreement type chosen did not support the granting of those rights.

WFPP agreements promote the use of excess capacity at a laboratory facility in order to reduce ownership costs. Under a WFPP the company or other entity must declare that the services to be provided are not available from the private sector. The laboratory cannot compete with private industry under a WFPP agreement. However, exemptions exist for quality, quantity and schedule related availability in the private sector. Under these conditions, the laboratory would not be perceived as competing with industry.

Lastly in the review of technology transfer mechanisms, agreements with academia, consortia and "non-traditional" companies (those that have not done business with the US

government) can include grants, Cooperative Agreements, and Other Transactions (OTs). These non-FAR agreements are covered under the DoD Grant and Agreement Regulations (DoDGARs) and require participation of a grants officer, usually in the federal laboratory's contracts department, to execute. Grants, Cooperative Agreements and OTs are funding mechanisms under which government funds are provided to a non-federal entity.

A grant involves an academic or non-profit recipient and differs from a procurement contract in that no deliverable or tangible product or service is expected back to the government for its direct benefit. A grant is used to carry out a public purpose of support or stimulation authorized by a law of the United States. No substantial involvement is expected between the DoD laboratory and the recipient when carrying out the activity contemplated by the grant. Cooperative Agreements are similar to grants except that substantial involvement between the DoD laboratory and the grantee is expected when carrying out the activity contemplated by the cooperative agreement.

OTs are agreements other than contracts, grants and cooperative agreements for basic, applied or advanced research projects. They are utilized in support of a weapons system, and any aspect of RDT&E and prototyping may be addressed by an OT.

Unlike CRADAs and WFPPs, grants and Cooperative Agreements must be competitively awarded because government funding is involved. CRADAs and WFPP do not require notice of availability and competition as they are funds in mechanisms, although some laboratories have advertised and awarded opportunities to satisfy a particular program objective. OTs may be unfunded and, therefore, may not always be required to be competed.

IV. TECHNOLOGY TRANSFER IMPACT

As mentioned above, Congress established the technology transfer authorities at the federal laboratories to influence economic development and global competitiveness. A study of the national economic impact of the DoD patent licensing program was conducted by TechLink, a federally funded technology transfer center at Montana State University, Bozeman, in collaboration with the Bureau of Business and Economic Research (BBER) at the University of Montana, Missoula [1]. The study estimated the economic contribution effects of the total sales resulting from approximately 600 DoD laboratory patent license agreements executed between 2000 and 2011. The analysis, which utilized the IMPLAN software program, incorporated company sales as well as indirect and induced economic activities. The study revealed that nearly \$13.4 billion (2011 \$) in direct sales of new products and services was reported as generated by the licensing companies. In addition, a total of \$22.9 billion in sales economy-wide was estimated to be attributable to the licensing activities due to \$11.6 billion in indirect sales from inter-industry purchases (firms purchasing from each other), and another \$11.3 billion that was generated from the induced effect, the result of households spending payroll on goods and services economy-wide. The report estimated the total economy-wide output

(the sum of direct, indirect, and induced sales) of the DoD patent licensing activity over the period covered by the study to be an impressive \$36.3 billion. The report also stated an estimated 163,067 jobs resulted nationwide from the licensing activities due to the direct (27,128 jobs), indirect (56,728 jobs), and induced effects (79,210 jobs) predicted by the IMPLAN model.

Further breakdown at the Department of the Navy level showed a total economic impact of over \$1.5 billion for patent licenses executed in 2000 to 2011 with over 8900 jobs created or retained nationwide. These figures do not include the economic activity created or sustained due to CRADAs with the Navy laboratories. Many times CRADAs are used to gain access to the expertise that makes a product or service viable in the commercial market. A study performed by the Indiana Business Research Center for the Department of the Navy's Technology Transfer Program Office looked at the economic impact of a portion of the Navy's CRADAs executed between 1999 and mid-2009 [2]. While limited in scope, the report documents the job creation and revenues attributable to the CRADA activities. In addition, the report provides insights on the financial implications for small businesses entering into CRADAs. Companies experienced reduced equipment and research costs along with savings on component materials. Companies also reported increased revenues and enhancements to their product lines due to involvement under the CRADAs.

Analysis and documentation of the impacts of federal technology transfer are needed to fully understand and articulate its benefits to the public and the nation. As more studies are done, a more complete picture of the contributions of the laboratories to the nation's economy will emerge. The laboratories play a dual role in developing capabilities for specific missions while providing critical support for local, regional and national economic development.

V. RECENT DEVELOPMENTS

The TechLink study provided concrete figures on job growth and retention; revenues and other economic impacts that could be associated with the licensing of DoD inventions and technologies to the commercial sector. The results of the study indicated that federal technology transfer has a much broader affect than just with the partnering company's business development and profit. However, despite such documented success, the federal laboratories are not well-known partners or suppliers of technologies to industry. The percentage of businesses actively engaged with federal laboratories using technology transfer agreements is actually quite small. The Federal Laboratory Consortium for Technology Transfer, which was chartered by Congress in the FTTA, is seeking to remedy the perceived lack of awareness of both the knowledge of the capabilities of the federal laboratories and the ability to gain access for private sector utilization. FLC Business (<https://flcbusiness.federallabs.org/FLCBiz/>) was launched in the fall of 2014 to provide a repository of information on facilities and areas of expertise at each of the federal laboratories and a conduit for establishing relationships with the laboratories.

At the time of this writing, the U.S. Congress is considering the National Defense Authorization Act (NDAA) for fiscal year 2016. The House and Senate Armed Services Committees have put forth language that is relevant to the DoD technology transfer community [3]. In particular, Section 211 of H.R. 1735 proposes the designation of DoD laboratories as Centers for Science, Technology, and Engineering Partnership. As stated in the document, a motivation for these Centers is to “enhance capabilities by reducing the cost and improving the performance and efficiency of executing laboratory missions.” Section 211 grants authorization through the Secretary of Defense for the Centers to enter into public-private cooperative arrangements referred to as public-private partnerships in the proposed legislation. Under the public private partnerships, the Centers could enter into contracts with industry and non-DoD entities for the conduct of work related to the Center’s core competencies. In addition, the Centers could provide access to facilities and equipment that are not being fully used for DoD activities to private industry and anon-DoD entities.

The Centers for Science, Technology, and Engineering Partnership would be actively engaged with the private sector to a greater extent than the current DoD laboratories. Section 211 can be seen as expanding the role of the DoD laboratories in accomplishing the DoD missions through cooperative arrangements. In addition to fostering cooperation between the armed forces, academia, and private industry, Section 211 (b)(2) identifies leveraging of private sector investment in a Center’s research and equipment recapitalization as an objective for entering into public-private partnerships.

A further objective for establishing authority for public-private partnerships at the Centers is the promotion of the undertaking of commercial business ventures based on the core competencies of a Center. This goal can be seen to be tied to the technology transfer mission of a DoD laboratory. Potential commercial business ventures could include spin-outs of DoD laboratory developed technologies, or the creation of new companies based on a technical competency required by a laboratory. The mechanisms that could be used to accomplish this goal include CRADAs, patent license agreements, contracts and Other Transactions. Although Congress does not specify a connection between the public-private partnerships and technology transfer it is clear that knowledge of technology transfer will be required to successfully attain this goal.

Section 211 also contains a provision, found in article (c), for private sector use of facilities or equipment of a Center for Science, Technology, and Engineering Partnership to perform research and testing activities. The motivation for making such facilities and equipment available under the authorization goes beyond the excess capacity premise of the WFPP statutes to include encouragement of “the creation and preservation of jobs to ensure the availability of a workforce with the necessary research and technical skills to meet the needs of the armed forces.” The Centers for Science, Technology, and Engineering Partnership will be more closely linked to the private sector than the current DoD laboratories and will be in a position to influence local and regional economic development strategies through access to its physical assets.

If passed as part of the 2016 NDAA, the Section 211 authorities would augment the existing authorities and should not be seen as duplication. The various statutes have stated intents that need to be considered when selecting a legal authority to authorize a commitment or action by the government. One or more mechanisms could be used depending on the overarching goals of a proposed plan. The existence of multiple tools increases the government’s flexibility when dealing with the private sector.

Section 211 would expand the function and value of the DoD laboratories to the DoD mission. The increased involvement by the private sector will present new opportunities. Leveraging the investments and assets of the private sector can be readily addressed by the DoD technology transfer community which has the experience and knowledge of working with industry and academia in a cooperative environment.

Technology commercialization and its role in U.S. national security are recognized by Congress and DoD. Recent world events have highlighted the need for accelerating technological advances in order to keep the U.S. ahead of its adversaries. Deputy Defense Secretary Robert O. Work has stated, “The explosion of research and development in the non-defense sector means DoD must devise new means of pulling in commercial technology” [3]. Section 211 addresses this need.

As a counterpart, commercialization of technology developed with DoD research funding is the subject of Section 212 of the 2016 NDAA. In this section, authorization to establish a technology offset program is proposed. The technology offset program would accelerate the fielding of technologies developed using DoD research funding, such as autonomous systems and undersea warfare. The technology offset program would also accelerate the commercialization of those technologies. This section also has direct implications for the DoD technology transfer community. Accelerating the commercialization process will require more access to qualified potential partners. The provision for public-private partnerships at the Centers for Science, Technology, and Engineering Partnership will support the outreach needed to ensure success of the technology offset program.

VI. SIGNIFICANCE FOR TECHNOLOGY TRANSFER

As with all new authorities, the delegation of authority from the Secretary of Defense level down to the proposed Centers for Science, Technology, and Engineering Partnership will be needed to fully implement the provisions and achieve the intent of Section 211. Such delegations take time to put into place. Hence, there will be a delay between the passage of the 2016 NDAA during which the DoD laboratories can engage with private industry in preparation for Center of Science, Technology, and Engineering Partnership status.

The provisions of the proposed Sections 211 and 212 include authorities to fund private sector entities. Public-private partnerships can be developed and partially or fully funded with government funds which will assist in attracting partners that do not normally work with the government. Many aspects of the intent of Section 211 support the U.S. Navy’s Better Buying Power initiatives to leverage commercial

technology developments, especially from small businesses involved in basic to applied research. Government support of those companies through contracts or OTs will promote job growth while reducing the timeline for fielding a capability. Technology transfer mechanisms such as CRADAs, WFPP and patent license agreements can augment the new authorities when seeking ways to engage with the private sector. Partnering with a DoD laboratory situated near the private businesses will support local economic development efforts, help create a stronger industrial base and increase the ties between the laboratory and the community or region. These efforts will raise awareness of business development opportunities and assets available at the laboratory which could result in additional economic activity.

While not being contemplated as part of the technology transfer authorities, various pieces of the 2016 NDAA will affect industry, academia and the DoD laboratories and their efforts to successfully develop and commercialize technologies for the public and private sectors. New provisions for partnering mechanisms are proposed that are intended to attract more private sector interactions and relationships. The resulting public-private partnerships can be a driver for business development and expansion while at the same time maintain their focus on delivering technologies needed for U.S. domestic and global security.

VII. CONCLUSION

New initiatives to engage the private sector in technology development and fielding for national security being considered at the local, regional and national government levels will have direct impact on technology transfer activities at the federal laboratories, particularly those at DoD. The initiatives support engagement of public-private partnerships that will increase awareness of federal laboratory capabilities and assets while developing private sector business

opportunities. The envisioned outcomes are increased job creation rates; accelerated development of advanced technology products for commercial and national use; a stronger U.S. economy; and the realization of the goal of continued global competitiveness as put forth by Congress in the establishment of the federal technology transfer authorities.

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REFERENCES

- [1] TechLink, Montana State University, and Bureau of Business and Economic Research, University of Montana, "National Economic Impacts from DoD License Agreements with U.S. Industry 2000 – 2011," 2013. Available at <http://static.techlinkcenter.org/techlinkcenter.org/files/economic-impacts/DoD-Economic-Impact-Final-2.13.pdf>
- [2] Indiana Business Research Center at the Indiana University Kelley School of Business the Department, "The Economic Contribution Of The Department Of The Navy Technology Transfer Program," report prepared for the Navy Technology Transfer Program Office, October 2010. Approved for Public Release.
- [3] H.R. 1735 National Defense Authorization Act for Fiscal Year 2016, 114th Congress (2015-2016). Available at <https://www.congress.gov/bill/114th-congress/house-bill/1735/text>
- [4] C. Roulo, "Offset strategy puts advantage in hands of U.S., allies," DoD News, Jan. 28, 2015. Available at <http://www.defense.gov/news/newsarticle.aspx?id=128064>