



The California Governor's Military Council

# Guidebook for California Businesses on Department of Defense Technology Transfer



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**State of California Governor’s Military Council**  
Sacramento, California

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### Introduction

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Effective technology transfers provide U.S. companies significant competitive advantages to develop new products and services by providing access to federal laboratory technology and research capabilities as well as built-in end-users who deploy and support the products within the defense system. Businesses can leverage their limited time and resources by engaging in military technology transfer through two outlets: Cooperative Research and Development Agreements (CRADAs) and Patent License Agreements. Both methods allow businesses to not only acquire new intellectual property, but also to gain access to specialized expertise, knowledge, and capabilities found in the federal science and technology community. Engaging and accelerating the transition from development and innovation to new technologies for national defense supports California's growing defense and aerospace industries and provides cutting-edge commercial products and services to the nation's warfighter.

This guidebook is not an exhaustive report of the technology transfer process, but it uses such reports as source material to provide a template for business owners in California for how to engage in successful partnerships with federal laboratories and academia. Technology transfer or transition from invention to development and finally deployment uses partnerships between government, academic and corporate entities to commercialize innovations that leverage federally funded research. The Department of Defense (DoD), Department of Veterans Affairs (VA), Department of Homeland Security (DHS), and Department of Energy (DOE) fund federal laboratory research and technology development. TechLink, based at Montana State University's Office of Research and Economic Development, facilitates licenses for the DoD and VA and estimates that between 2000 – 2017, DoD license agreements alone generated \$27 billion in total sales of new products and services.<sup>1</sup> Despite this potential for lucrative returns, the military technology transfer process is typically lengthy and not widely known to many businesses.

This guidance document concludes with online resources and examples of current efforts in California to foster military technology transfer partnerships.

### Defining a Military Technology Transfer

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Federal law requires U.S. government agencies such as federal laboratories to transfer their patented inventions to industry.<sup>2</sup> Additionally, though federal laboratories are sources of new technology and ideas that can provide advantages to the U.S. warfighter, they require commercial industries and intermediary partners to create commercial viability of these developments outside of the federal laboratory environment. Finally, technology transition ensures that defense systems do not become obsolete, ineffective, or expensive.<sup>3</sup> Despite previous efforts of federal organizations to facilitate technology transfer, there is still no universally accepted understanding

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<sup>1</sup> National Economic Impacts from DoD License Agreements with U.S. Industry, 2000-2017. [https://techlinkcenter.org/wp-content/uploads/2019/06/DoD\\_Licensing\\_Study\\_2018\\_With\\_Cover.pdf](https://techlinkcenter.org/wp-content/uploads/2019/06/DoD_Licensing_Study_2018_With_Cover.pdf)

<sup>2</sup> 15 U.S.C. 3701 and 3710, *inter alia*

<sup>3</sup> "Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems," National Research Council, 2004. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>



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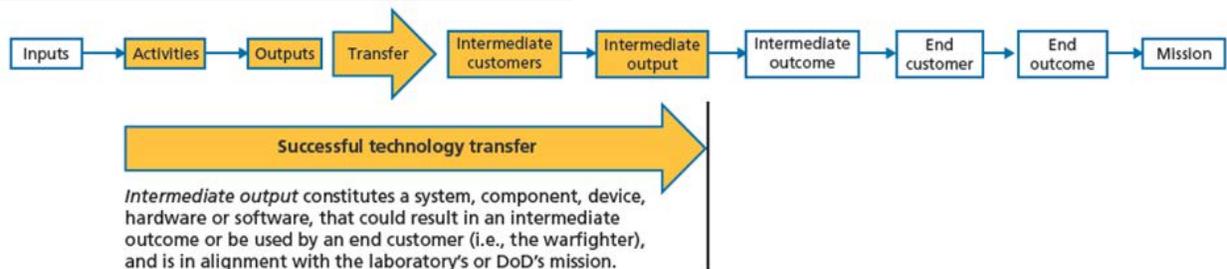
of the process and the complexity of the technology, development and transition process can result in lengthy process delays from invention to deployment in defense systems.<sup>4</sup>

Ultimately, federal laboratories patent new discoveries, then offer them for businesses to license and commercialize for their own benefit. Businesses then sell the technology back to the military and other customers. Technology transfers present an opportunity for businesses to capitalize on the proposed \$58 billion federal dollars slated to fund defense-related research and technology and cutting-edge technology consistently provided by federal defense research spending.<sup>5</sup>

Recognizing this lack of universal understanding for how to conduct technology transfers, the RAND Corporation created a generic definition of the transfer process to aid interested parties. In their publication, a successful technology transfer is defined as having the following elements:

**Laboratory inputs** (funding, formal requirements, staff, research equipment, facilities) that facilitate **laboratory activities** (research and development, patent registration, findings presentations) that lead to **laboratory outputs** (scientific papers, reports, prototypes, patents) that are then **transferred** (through fact sheet circulation, industry discussion, patent licensing) to one or more **intermediate customers** (other research labs or companies) who in turn produce an **intermediate output** (a product such as a system, component, device, software) that could result in an **intermediary outcome** (new military operations or a change in existing operation/procedures) or a direct use by an **end customer** (the warfighter) to achieve an **end outcome** in alignment with the DoD's laboratory mission.<sup>6</sup>

**Figure 1. Definition of a Successful Technology Transfer**



RAND RR2122-S.2

It is important to note that the process to transfer federal research technology to commercial markets may not always be linear and can require multiple rounds of technology development (outputs) and transfers to intermediate customers in the commercial sector. In fact, “effective technology transition, involving collaboration among all...stakeholders, drives an

<sup>4</sup> “Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems,” National Research Council, 2004. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>

<sup>5</sup> Includes 2019 proposed amounts for Defense Research, Development, Test, and Evaluation; Homeland Security Science and Technology; National Aeronautics and Space Administration Exploration and Research Technology; and, Veteran's Affairs Medical and Prosthetic Research budgets: [https://www.whitehouse.gov/wp-content/uploads/2018/02/ap\\_18\\_research-fy2019.pdf](https://www.whitehouse.gov/wp-content/uploads/2018/02/ap_18_research-fy2019.pdf)

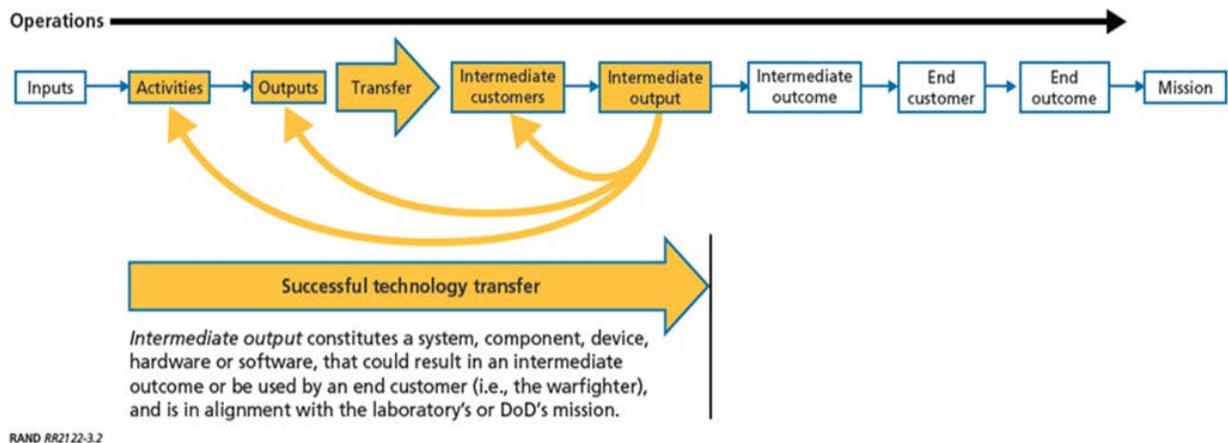
<sup>6</sup> “Application of Logic Models to Facilitate DoD Laboratory Technology Transfer,” RAND Corporation, 2018. [https://www.rand.org/pubs/research\\_reports/RR2122.html](https://www.rand.org/pubs/research_reports/RR2122.html)



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iterative process of development, implementation, and acceptance.”<sup>7</sup> These intermediate customers may then create new intermediate technology developments and outputs from the original technology transfer in one or more iterations before an initial transfer results in an end customer and product or benefit (outcome). Figure 1 above is a model developed by the Rand Corporation’s to visually represent the linear version of this process.<sup>8</sup> Figure 2 below represents the RAND Corporation’s model of the iterative version of a technology transfer process.

**Figure 2. Successful Technology Transfer Through Multiple Intermediate Customers**



## Commercializing Federal Labs' Technological Inventions

Military technology transfer does not solely benefit federal research laboratories or the warfighter. Participating in the military technology transfer process also allows intermediary customers to reap benefits from new technologies for their own research, design and development of new products and services. While the intermediary customer may incur the costs to make this technology commercially viable, the potential benefits of military technology transfer to commercialized products greatly outweigh the initial investments.

Developing and commercializing inventions from federal laboratories have shown to be very lucrative for businesses. TechLink demonstrated in its latest study on nationwide economic impacts that 915 companies, which held a combined 1,137 different DoD technology license agreements from 2000-2017, reported \$27 billion in direct sales of products made from DoD inventions. These 915 companies furthermore conducted \$4.5 billion in sales of new products to the U.S. military and created 214,791 jobs with an average compensation of \$74,762,<sup>9</sup> resulting in a total economic impact of \$58 billion nationwide.<sup>10</sup> This study demonstrates military technology transfer to industry significantly impacts the nation's economic activity, job creation and contributes to increasing military access to new technology.

<sup>7</sup> "Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems," National Research Council, 2004. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>

<sup>8</sup> Ibid.

<sup>9</sup> Ibid, p. 4.

<sup>10</sup> National Economic Impacts from DoD License Agreements with U.S. Industry, 2000-2017. [https://techlinkcenter.org/wp-content/uploads/2019/06/DoD\\_Licensing\\_Study\\_2018\\_With\\_Cover.pdf](https://techlinkcenter.org/wp-content/uploads/2019/06/DoD_Licensing_Study_2018_With_Cover.pdf). Retrieved November 26, 2019.



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In addition to the economic and military capacity benefits for the nation, the DoD is a motivated consumer of the new products and services, providing a steady source of revenue to businesses who take advantage of these license agreements. Federal labs are primarily focused not on profits but rather on identifying capable companies of all sizes that can manufacture and sell products and services derived from patented inventions. As such, federal patent license agreements include negotiable financial terms that provide businesses with flexibility to obtain the most beneficial terms for their operations.

### Getting Started in Technology Transfers

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Two main outlets through which firms can engage in commercialization of military technology are Cooperative Research and Development Agreements (CRADAs) and Patent License Agreements (license agreements). Engaging in the process through CRADAs or license agreements allows businesses to gain access to specialized expertise, well-funded technology assets, and unrivaled research capabilities in the federal science and technology community.

#### **Patent License Agreements**

The preferred method, license agreements authorize government-operated laboratories to grant exclusive, partially exclusive, or non-exclusive licenses to private sector entities for their patented technologies. Once the federal laboratory files a patent application for a technology invention, they can then license it for commercialization and use in one of three tiers of exclusivity. An exclusive license restricts the use of a military technological invention to a single licensee. A partially exclusive license allows for multiple licensees but restricts the use of a military technological invention by any single licensee to a geographic area or to a particular use. Non-exclusive licenses can be issued to any number of licensees. Applicants for patent licenses are required by law to submit a plan for the commercialization and marketing of a military technological invention. The application must also describe how the applicant will convert military technology inventions into civilian applications.<sup>11</sup>

When granting exclusive or partially exclusive licenses, federal laboratories are required to give preference to small businesses to enhance market competition and maximize public benefit of research and development funding (US Code 35 USC § 209. See FLC, 2005).<sup>12</sup>

Exclusive and partially exclusive licenses may only be granted under the following conditions:

- exclusivity is essential to ensure the investment capital and expenditures needed to bring an invention to practical application.
- granting of exclusivity will not substantially lessen competition.
- the applicant makes a commitment to achieve practical application in reasonable time.
- the public is best served by granting some level of exclusivity.<sup>13</sup>

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<sup>11</sup> Ibid.

<sup>12</sup> "US Department of Defense Technology Transfer: The Partnership Intermediary Model". Int. J. Technology Transfer and Commercialisation, Vol. 8, Nos. 2/3, 2009.

<sup>13</sup> Ibid, p.275.



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### Cooperative Research and Development Agreements

Unlike license agreements, CRADAs involve sharing technical expertise and non-financial resources such as personnel, equipment, and facilities between federal laboratories and non-federal partners.<sup>14,15</sup>

Under CRADAs, the intellectual property (IP) rights of the non-federal partner are secure under the National Technology Transfer and Advancement Act of 1995. The Act, which provides not only for the rights for U.S. companies to justify expenditures in technology development, also grants the non-federal partner non-exclusive and irrevocable license to a new technology developed by the partner federal lab if done so independently while under the terms of a CRADA.<sup>16</sup> This non-exclusive license can be converted to an exclusive license upon request if the terms are reasonable.

CRADAs are appropriate when partners intend to share ideas, staff, materials, and equipment over time with the intent of producing a new defense technology. This relationship also provides for non-federal partners to obtain an exclusive license and maintains protection of company proprietary information, which can be valuable for potential collaboration efforts.<sup>17</sup>

CRADAs must involve at least one non-federal partner, which includes one or more following types of entities: private corporations (U.S. or foreign allies); non-profit and not-for-profit institutions; or U.S. state and local governments. Other federal agencies may participate in a CRADA, so long as one collaborating entity is non-federal.

### Improving Tech Transfers with TechLink

In 1999, the DoD created TechLink, first agency-wide partnership intermediary to coordinate technology transfers between federal labs and the private sector, considerably easing the technology transfer process.

In 2016, federal laboratories began to use an “express” licensing option with non-federal partners developed by TechLink. Partners can access this express option through TechLink’s website where they find pre-negotiated agreements and upfront financial terms listed. This express licensing reduces the license process to as little as three weeks, allowing businesses to rapidly commercialize federal technologies.<sup>18</sup>

Furthermore, TechLink provides businesses with no-cost licensing assistance and maintains the only web-accessible database of technologies available for commercialization. Potential non-federal partners can easily search one of the following 11 commercialization categories on [TechLink’s website](#)<sup>19</sup> for opportunities to engage with federal labs: communications; materials; medical and biotechnology; energy; sensors; photonics; software and information technology;

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<sup>14</sup> 15 U.S.C. 3710a

<sup>15</sup> “Cooperative R&D Agreements,” U.S. Army Research Laboratory. <https://www.arl.army.mil/www/default.cfm?page=14>. Retrieved November 26, 2019.

<sup>16</sup> “US Department of Defense technology transfer: the partnership intermediary model.” Int. J. Technology Transfer and Commercialisation, Vol. 8, Nos. 2/3, 2009

<sup>17</sup> Ibid.

<sup>18</sup> “Why your Business Should Develop Inventions from Defense Labs”. Techlink. 2018 <https://techlinkcenter.org/why-your-business-should-develop-inventions-from-defense-labs/> Retrieved November 26, 2019.

<sup>19</sup> <https://techlinkcenter.org/technologies-category/military-technology/>



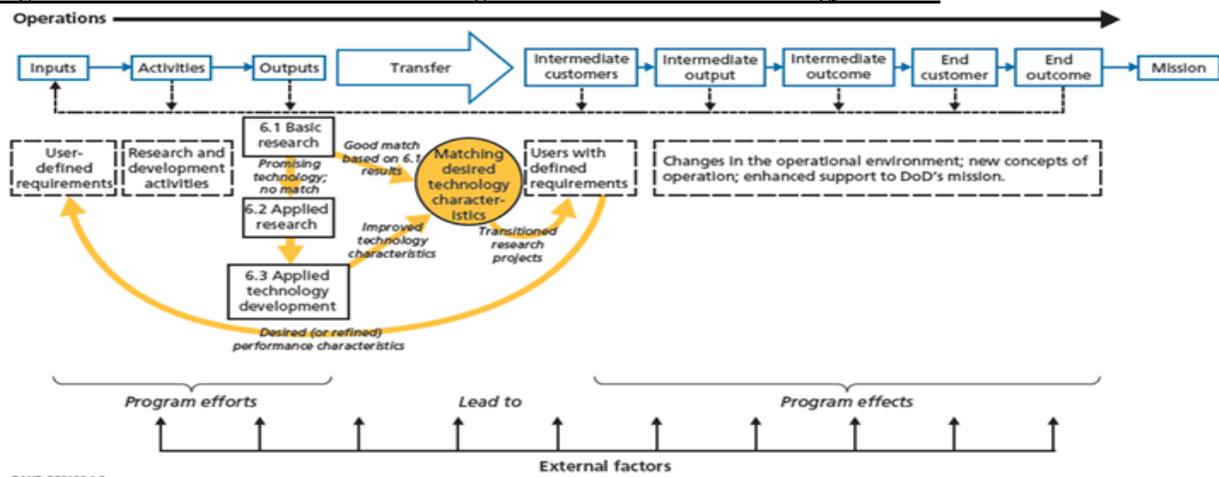
military technology; electronics; and, environmental. For every technology available for licensing, TechLink provides a quick description of its function and capabilities which streamlines partner searching for businesses interested in commercializing military technology.

TechLink’s resources and unique offerings such as express licensing make it the quickest way for businesses to get the necessary resources to commercialize military technology.

### Successful Military Technology Transfer Programs

Military technology transfers require active engagement and participation from federal laboratories and intermediary customers to avoid the “valley of death,” whereby proven technologies fail to reach commercialization.<sup>20</sup> Successful partnerships result when lab developments align with the intermediary customer’s capabilities, goals, visions, and technology performance needs.<sup>21</sup> Further, sharing a culture of flexibility, open communication, acceptance of certain risks, passion and commitment for the end products and promoting innovation over short-term gains among all partners will increase the success of a technology partnership.<sup>22</sup> Therefore, in a successful military technology transfer program, federal researchers and development teams understand the final user needs in ways that relate to their own work. Likewise, intermediary customers understand federal labs’ science and capabilities that they in turn can translate to match their organization’s needs. The RAND Corporation model shown in Figure 3 depicts the inclusion of vital capabilities and needs matching into the existing technology transfer process.<sup>23</sup>

**Figure 3. Schematic of Connection Between Logic Model Elements and Technology Transfer**



<sup>20</sup> “Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems,” National Research Council, 2004, p. 8. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>

<sup>21</sup> “Application of Logic Models to Facilitate DoD Laboratory Technology Transfer,” RAND Corporation, 2018. [https://www.rand.org/pubs/research\\_reports/RR2122.html](https://www.rand.org/pubs/research_reports/RR2122.html)

<sup>22</sup> “Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems,” National Research Council, 2004. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>

<sup>23</sup> Ibid.



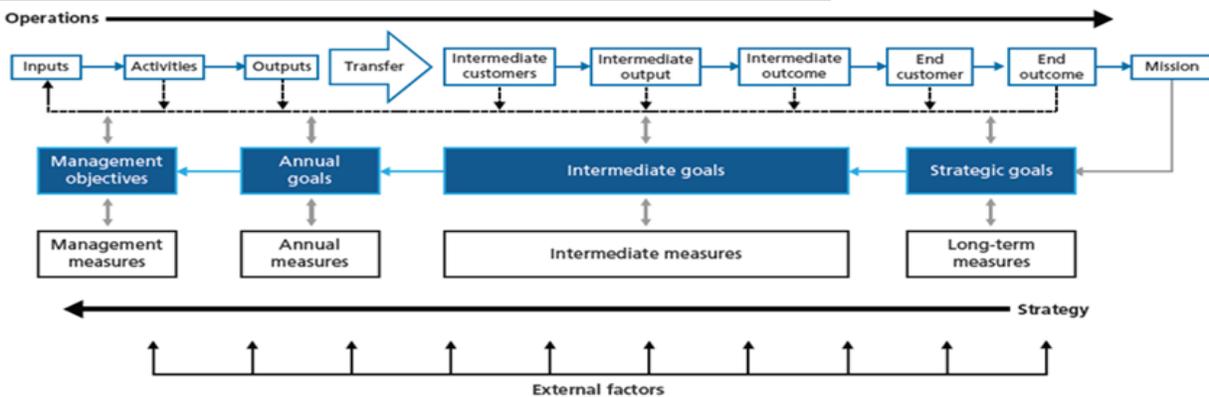
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Per Fig. 3 above, initial basic research may match the required technology characteristics determined by the non-federal partner and lead to a transfer over to an intermediary customer. There are scenarios, however, wherein the basic research provides a promising technology but falls short of matching the non-federal partner’s capabilities or performance needs and applied research is required. Applied research may then lead to applied technology development and improved technology characteristics, which then meet the matching desired technology characteristics and a technology transfer can occur.

Once federal laboratories transfer their technology inventions to an intermediary customer, the customer continues to develop additional outputs for the end commercial or warfighter customer. Matching desired technology characteristics is an important component of the “transfer” portion of the logic model as it delineates the necessity for research labs and their commercial partners to work together to develop compatible technologies that the non-federal partners can commercialize and take to market. Otherwise, the transfer will result in no new technologies for the warfighter and the research efforts are wasted.

In addition to matching desired technology characteristics, a successful military technology transfer program uses its strategy and strategic goals to inform its operations as inputs in several places throughout the operation process. Figure 4 below is another schematic developed by the RAND Corporation that depicts the alignment of program operations with program strategy (its goals and performance measures).<sup>24</sup> The organization’s strategic goals continue alongside its operations, consistently providing feedback and information throughout the development process of a new technology.

**Figure 4. Depiction of Alignment of Program Operations with Goals and Measures**



SOURCE: Adapted from Greenfield, Williams, and Eisman, 2006.  
RAND RR2122-2.2

Successfully technology transfers require metrics to measure the program’s efficiency and effectiveness. Labs can develop notional measures such as the number of prototype demonstrations given, or number of patents licensed. Another RAND Corporation logic model,

<sup>24</sup> “Application of Logic Models to Facilitate DoD Laboratory Technology Transfer,” RAND Corporation, 2018.  
[https://www.rand.org/pubs/research\\_reports/RR2122.html](https://www.rand.org/pubs/research_reports/RR2122.html)



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Table 1 below, lists additional notional measures for each of the operations and strategy processes depicted in the logic model shown in Fig. 1 provided earlier in this guidebook.

Assessing notional performance measures like these allows federal laboratory management to assess and evaluate their technology transfer activities, determine the value and contribution of all partners in a technology transfer and determine which programs are the most effective in leading to transfers of military technology to intermediate customers. Moreover, it allows federal laboratory management to determine the ultimate outcomes for the end customer – the warfighter.<sup>25</sup>

**Table 1. Notional Measures for Monitoring Successful Technology Transfer**

<b>Logic Model Element</b>	<b>Notional Measures</b>
Activities	What research is being done? What engagements are occurring with (potential) intermediate customers or end customers?
Outputs	How many prototypes are developed? How many patents are filed? How many papers or reports are written?
Transfer	How many prototype demonstrations are done? How many patents are licensed? How many papers or reports are published as articles and in which journals?
Intermediate Customer	Who has attended prototype or product demonstrations? Who has licensed which patents? Who cited a particular paper, report, or article?
Intermediate Output	What and how many new products or capabilities have been developed by specific intermediate customers? What and how many new procedures or changes in practice have been developed by specific intermediate customers? What and how many reports, scientific articles, or documents have been developed by intermediate customers that cite specific outputs? Which of these led to further activities or outputs by the laboratory or were used by intermediate customers to generate a system, component, device, hardware or software with the potential to be used by an end customer?

Notional measures do not have to be unique to just the elements of a simple logic model such as the one shown in Fig. 1. Measures can be used to gauge progress in an organization’s strategic, intermediate, and annual goals, and management objectives. In addition, long term measures that align with strategic goals, end outcomes, and end customers can be developed and may be entirely qualitative, instead assessing how the developments have improved or increased capabilities for the end user along each step in the process.

A well-rounded military technology transfer program should account for intermediary partner needs and capabilities as well as align its strategic, intermediate, and annual goals and management objectives with its operations, and monitor and track its program operations with identified measures of program success. Utilizing all three suggestions to design a military technology transfer program ensures the process is streamline and increases efficiencies at DoD laboratories.

<sup>25</sup> Ibid.



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### **Avoiding the Valley of Death**

Communications between partners in a technology transfer process is key to avoiding the pitfalls known as the “Valley of Death,” or the “gap between technological invention and acquisition.”<sup>26</sup> While there is no one resolution to avoiding this potential outcome, some key recommendations include developing a parallel, iterative technology development process that allows for rapid transmission of key information to all partner entities. Communication and continuous checks on progress is vital as is the clear understanding at the outset of what “success” means to each of the partners from the outset. Working towards developing a product that meets a need (functional requirement) vice what was specified from some other process, will ensure the developed technology addresses capabilities needs that serve the purposes of national security and all partners are bought into the process and desire its success.

### **Actions to Foster Military Technology Transfer Partnerships**

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In 2013, the Institute for Defense Analysis (IDA) published best practices for technology transfer. The researchers collated 24 practices into seven cohesive categories that ranged from empowering and rewarding engineers to building partnerships between the DoD and academia or economic development organizations.<sup>27</sup>

The IDA also identified that challenges arise between coordinating DoD’s interest in technology transitions and the commercial industry’s interest in technology transfer.<sup>28</sup> Technology interest, DoD’s interest to develop technologies back into DoD products and processes, does not always lead to commercially viable products that would benefit an industry partner. Technology transfers, however, where non-federal partners can develop federal lab technology in commercial products and processes, can be mutually beneficial to both defense procurement and commercial businesses. Below are recommendations to improve the environment to foster more military technology transfer partnerships.

### **Engaging and Rewarding Researchers**

Military technology transfer faces obstacles that can hamper its ability to benefit the U.S. economy and warfighter. For instance, federal and non-federal researchers are not always focused on ensuring that an end product is developed; their main focus and efforts stop at the outputs stage. IDA recommends that the government recognize researchers at DoD laboratories. This recognition may take forms such as cash awards, certificates, public announcements, and royalties from patents aimed at incentivizing researchers to ensure military technological inventions are commercialized. Recognizing researchers for their technology transfer activities may increase opportunity-seeking behavior for researchers’ potential transfer technology to the market. In addition, recognition can improve the visibility of technology transfer to other

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<sup>26</sup> “Accelerating Technology Transition: Bridging the Valley of Death for Materials and Processes in Defense Systems,” National Research Council, 2004, p. 32. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a604936.pdf>

<sup>27</sup> “Exemplar Practices for Department of Defense Technology Transfer.” Institute for Defense Analysis, 2013

<sup>28</sup> Ibid



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researchers, which may then encourage them to participate in technology transfer activities as well.

In September 2018, the California Governor's Military Council recognized faculty at Stanford University and the University of California, Merced for their selection as research leaders in the Air Force's Defense Enterprise Science Initiative pilot program. The program is designed to support university-industry collaboration focused on accelerating the impact of basic research on defense capabilities to foster sustainable university-industry partnerships, identify and apply new discoveries and knowledge on existing defense capabilities, and accelerate the transfer of basic research to innovative technologies. Recognition such as this encourages both existing and potential inventors to seek opportunities to transfer their new technologies into commercial application.

### **Well-Managed Intellectual Property**

Once a business determines it is interested in partnering with a federal laboratory, finding appropriate intellectual property can be a challenge. Therefore, it is imperative that research laboratories maintain good records and information on their research. Businesses are also encouraged to participate in informative events such as the Innovation Discovery events held around the country to showcase innovative new technology's commercial uses to potential commercial developers.<sup>29</sup>

### **Marketing Laboratory Technologies and Capabilities**

Using tools and methods such as technology showcases, industry training on how to engage with federal laboratories, advertising for military technology and performing marketing assessments are all considered methods for increasing industry interest and engagement in the technology transfer process.<sup>30</sup> Conducting technology showcases, where researchers and industry members can engage directly, aids in matching laboratories with appropriate intermediary partners which is essential to having a well-rounded military technology transfer program. IDA found that each technology showcase event produced from one to three new CRADAs or licenses, demonstrating these methods have remarkable success in their application.<sup>31</sup>

Showcasing technology also informs companies and intermediary partners about the expertise and technology available at the various laboratories. Although hard to measure how well technology showcasing informs potential partner companies, providing this type of information is likely to have long term impacts on increased commercial engagement with technology transfers.<sup>32</sup> In attending these showcases, businesses can network and connect with staff from federal laboratories and raise their visibility to the technology transfer community. These connections may lead to future collaborations with federal researchers to commercialize military technology.

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<sup>29</sup> Innovation Discovery. TechLink. <https://techlinkcenter.org/services/innovation-discovery/>

<sup>30</sup> "Exemplar Practices for Department of Defense Technology," Institute for Defense Analysis, 2013.

<sup>31</sup> "Exemplar Practices for Department of Defense Technology," Institute for Defense Analysis, 2013.

<sup>32</sup> Ibid



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The DoD customarily hosts events throughout the year to showcase military technology. It held its 23<sup>rd</sup> Annual Technical Transfer (T2) Training Workshop at the Westin Convention Center in Pittsburg, PA July 8-11, 2019.<sup>33</sup> Hosted by the Defense Laboratories Office, the event comprises a forum of defense T2 professionals, laboratory Office of Research and Technology Applications personnel, intellectual property attorneys, keynote speakers from industry and academia, and supporting DoD T2 staff. During the event, the DoD T2 community participated in developing new strategies and sharing agency-wide lessons learned and best business practices as well as specialized roundtable discussions on various T2 areas of concern such as sustainment and leveraging transaction authorities to enhance partnerships. Businesses can sign up or subscribe to [Marine Military Expositions](#)<sup>34</sup>, [DoD Office of Small Business Programs](#)<sup>35</sup>, or [SBIR/STTR Fall Innovation Summit](#)<sup>36</sup> and [Defense Innovation Marketplace](#)<sup>37</sup> to learn about or participate in these kind of events.

Industry training, such as what the U.S. Air Force T2 Program Office co-hosted in 2016 with the University of Southern California (USC) Viterbi School of Engineering, teaches participants the basics of developing and evaluating new investment and innovation opportunities. The event, called the Air Force Development of Ventures in Science and Engineering, was designed as an introductory course for scientists and engineers and taught about startup thinking, customer discovery and value propositions, all increasing an awareness around the how-to and benefits of partnering with federal laboratories. This type of training also capitalizes on the benefits of partnership with universities and education organizations.

### **Promoting More Partnerships with Universities**

Partnerships with universities can result in deploying more military technologies into the commercial sector as it allows for students to engage with real case studies and work on lab innovations while they are in the process of exploring interests and determining future career fields. Students can offer new and unique insights and ideas for commercializing technologies and may go on to start new enterprises and continue to work with federal laboratories after graduation. Universities, in exchange, have access to laboratories' increased resources and technologies and continuing programming for their students to learn how to coordinate with federal research and development entities.

In addition to its work with the U.S. Air Force, USC initiated a partnership in 1999 with the U.S. Army to facilitate the Institute for Creative Technologies (ICT). A DoD-sponsored University Affiliated Research Center, ICT conducts basic research and development to create engaging and effective systems that shape the future of Army training and analysis using virtual, constructive, and live simulations. The ICT aims to redefine the range of skills that warfighters can obtain from future, dynamic simulation systems by focusing research on counter insurgency, sustainment operations, tactical intelligence, leadership, and decision-making. The ultimate goal

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<sup>33</sup> <https://dodt2trainingworkshop.com/>

<sup>34</sup> <https://www.marinemilitaryexpos.com/>

<sup>35</sup> <https://business.defense.gov/Events/>

<sup>36</sup> <https://events.techconnect.org/DTCFall/sbir.html>

<sup>37</sup> <https://defenseinnovationmarketplace.dtic.mil/>



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of the combined research and prototype developmental efforts of the ICT and its partners is to harness the power of artificial intelligence, emerging visuals, immersive simulation technologies, and storytelling to provide a worldwide technological advantage on the battlefield against terrorism.<sup>38</sup> Businesses that are operating in the film and video game industry can also benefit from these joint research efforts. The ICT brings film and game industry artists together with computer and social scientists to study and develop immersive media for military training, health therapies, education and more. In addition to research, the ICT graphics innovations help create realistic computer-generated characters for Hollywood blockbusters and enhance virtual characters for museum and military projects.<sup>39</sup> Business interested in these types of technologies and research are encouraged to visit the [ICT website](#).

The California state government also provides another prominent example of fostering new partnerships with universities through the Governor's Offices of Business and Economic Development (GO-Biz) and Planning and Research (OPR). Employing funding from the DoD's Office of Economic Adjustment, OPR and GO-Biz run a cybersecurity and defense supply chain grant known as the California Advanced Supply Chain Analysis and Diversification Effort (CASCADE). As part of this effort, Santa Clara University's Leavey School of Business is developing a commercialization pilot program to assist defense-dependent businesses in developing commercial applications for their products and services to foster defense innovations and help bolster the defense industry due to changes in defense spending.<sup>40</sup>

Industry and academic-federal partnerships increase the likelihood of military technology commercialization. Not only do they teach students how to commercialize military technology, but they prevent technological breakthroughs from "shelving" away in academia before the full execution of bringing an innovation to market is complete. Universities also gain the benefit of using federal research laboratory resources and should seek opportunities to partner with labs.

## Conclusion

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Military technology transfer partnerships are a great way for businesses to partner with the DoD and federal laboratories to support defense innovation, increase economic activity and serve the U.S. warfighter. They are demonstrably lucrative but require some effort on the part of both federal research labs and potential economic and academic partners. Entities can partner to commercialize innovations through either CRADAs or Licensing agreements, using services like TechLink and participating in various T2 workshops and showcase events to identify opportunities to take to market. Ultimately, by continuing to take advantage of technology transfer opportunities, businesses and academic institutions can capitalize on the research capabilities, technological innovation, and scientific expertise federal research labs bring to the partnership with little cost and maximum benefit. Ensuring that the important research and innovations created in federal labs become valuable products and processes that provide a comparative advantage to the battlefield is vital to fully utilizing the taxpayer funds that go into

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<sup>38</sup> [University Affiliated Research Centers. Army Research Laboratory. 2018.](#)

<sup>39</sup> <http://ict.usc.edu/about/>

<sup>40</sup> <https://www.scvedc.org/cascade-workshops>



## State of California Governor's Military Council Sacramento, California

such valuable research. It is important that U.S. businesses and universities fully participate in this vibrant system and bring products designed to solve real-world problems into reality.

### About the State of California Governor's Military Council

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The California State Legislature codified the Governor's Military Council in 2015 to protect and enhance U.S. military and national security operations in California, as well as support California's service members, veterans and their families. The bipartisan Council – comprised of retired flag officers, civic leaders, state legislators, senior policymakers and related state agencies – identifies important policy issues and is the statutory national security policy advisor to the Governor and Legislature. It also coordinates the state's diverse advocacy efforts to underscore the unique national security value of California's military bases, national security activities, defense technology companies, and workforce to policymakers and the public, ensuring California speaks with a unified voice. The Council Chair is Colonel Rocky Chávez, United States Marine Corps (Retired) and its Vice Chair is Vice Admiral Jody Breckenridge, United States Coast Guard (Retired). For more information on the Council, please visit: <http://militarycouncil.ca.gov/>.

Colonel Rocky Chávez, USMC (Ret.)  
Chair, California Governor's Military Council

Vice Admiral Jody Breckenridge, USCG (Ret.)  
Vice Chair, California Governor's Military Council