**July 30, 2018**

**VIA EMAIL:** [**roi@nist.gov**](mailto:roi@nist.gov)

Dr. Courtney Silverthorn

Deputy Director

Technology Partnerships Office

National Institute of Standards and Technology

100 Bureau Drive, MS 2201

Gaithersburg, MD 20899

**Re: National Institute of Standards and Technology’s Request for Information Regarding Federal Technology Transfer Authorities and Processes, Docket No.: 180220199-819-01**

Dear Deputy Director Silverthorn:

The Pharmaceutical Research and Manufacturers of America (PhRMA) appreciates the opportunity to comment on the National Institute of Standards and Technology (NIST) *Request for Information Regarding Federal Technology Transfer Authorities and Processes* (RFI). PhRMA represents leading innovative biopharmaceutical research companies, which are devoted to discovering and developing medicines that enable patients to live longer, healthier, and more productive lives. Since 2000, the biopharmaceutical industry has invested more than $600 billion in the search for new treatments and cures, including an estimated $90 billion in 2016 alone. [[1]](#footnote-1)

PhRMA applauds NIST’s efforts to foster stakeholder engagement and solicit input on a topic of national importance —opportunities to maximize the effective commercialization of technology stemming from federally-funded research. PhRMA is committed to ensuring the continued health and competitive strength of a biomedical research and development (R&D) ecosystem that fosters innovation and benefits U.S. consumers. One of the United States’ key competitive advantages has historically been its robust funding of basic research across federal agencies as well as its support of applied research. PhRMA applauds the RFI’s focus on seeking to foster the further development and commercialization of technologies funded by the federal government by transfer to the private sector where these promising discoveries can be translated into new products and services benefiting society and the U.S. economy.

**Overview**

Government-funded discoveries often provide the springboard for private sector investment to develop such discoveries into potential products that benefit patients. The strong public-private sector collaboration that exists in the U.S. between the government, academia, and biopharmaceutical companies is among our country’s greatest strengths in moving medical advances forward, making the U.S. the worldwide leader in biopharmaceutical innovation.

A critical component of this successful ecosystem is the **efficient and effective transfer of “scientific findings from one organization to another for the purpose of further development and commercialization****.”**[[2]](#footnote-2) **The** Bayh-Dole Act and the Stevenson-Wydler Technology Innovation Act (“Stevenson-Wydler”) collectively establish the rules and economic expectations within which business, government and academia interact to commercialize federally-funded inventions and benefit U.S. consumers.

Roughly five of every six research dollars of the National Institutes of Health (NIH) fund extramural research conducted under grants, contracts and collaborative agreements with universities, medical schools, and other research institutions.[[3]](#footnote-3) Accordingly, our comments focus on the Bayh-Dole Act, the important role it plays in the technology transfer ecosystem, and the need to protect and preserve the fundamental provisions of this legislation. We urge the Administration to refrain from making any changes to our current technology transfer framework that would negatively impact the system. In particular, the scope of march-in rights articulated in the Bayh-Dole Act are appropriate and should not be modified. Further, we believe the license to funding agencies authorized in the Bayh-Dole Act should remain limited to government purpose use.

PhRMA, consistent with prior assessments of technology transfer in the U.S., supports efforts to further foster public-private partnerships. In the biopharmaceutical space such partnerships are becoming increasingly critical to address some of our most costly and challenging diseases, such as Alzheimer’s Disease. Perhaps most critical to bolstering technology transfer is the need to address the growing gap in science, technology, engineering and math skills between the U.S. and other countries. In addition, we support increased focus on the development and dissemination of model frameworks and best practices to foster success technology transfer.

Since passage of the Bayh-Dole Act in 1980, a number of government reports have confirmed the value and importance of maintaining the Bayh-Dole model of public-private R&D partnerships.[[4]](#footnote-4) However, some of these reports have also identified barriers that should be addressed, with one report noting that "even extremely successful partnerships identified IP [intellectual property] negotiations as a significant barrier and a continual challenge in the development of new partnerships" and "[a]nother obstacle often cited is the long 'cycle time' required to work through negotiations."[[5]](#footnote-5) To the extent these remain ongoing challenges, we urge identification and dissemination of best practices in patent license negotiations between the federal contractor and potential licensees as part of a model framework that appropriately allocates rights and obligations to facilitate technology transfer.

Our comments focus on a few specific aspects of Bayh-Dole that we believe are critical to fostering successful technology transfer. In addition, we highlight targeted areas where improvements could be made outside of the statutory framework to foster even greater success.

1. **Technology Transfer is a Critical Component of the U.S. Innovation Ecosystem**

The U.S. biomedical research ecosystem is characterized by robust collaboration between the government, academia, biopharmaceutical companies, patient groups and others. This collaborative framework is among our country’s greatest strengths and competitive advantages.

The role of government and universities in the development of new medicines is complementary to that of the private sector. Although the biopharmaceutical industry is increasingly investing in basic research, early discoveries and scientific insights resulting from federally-funded research are still important to fuel important medical advances.[[6]](#footnote-6) **Technology transfer from the public to the private sector ensures that potentially promising scientific discoveries do not remain on the shelf, unavailable for further development and unable to benefit patients or the broader U.S economy. It is critical that we continue to ensure an efficient and effective transfer of these important insights to private industry, which can then take on the significant scientific, regulatory and financial risks associated with developing new insights and ultimately new medicines, as well as make the substantial R&D investments required to yield results.**

**Technology transfer is the mechanism by which promising discoveries may be translated into meaningful treatments for patients. Beyond the important role of facilitating commercialization, technology transfer also plays an important role in creating jobs and growing the economy.**

**The United States has a strong system of fo benefits under threat covery, and industry focuses on development.**ederal technology transfer laws, namely the Bayh-Dole Act and the Stevenson-Wydler Act. Passed with strong bipartisan support in 1980, the Amendments to the Patent and Trademark Act, commonly referred to as “the Bayh-Dole Act,” created the uniform framework for technology transfer of federally-sponsored research to the private sector for development and commercialization. The Stevenson-Wydler Technology Innovation Act, passed earlier that same year, plays a complementary role, facilitating technology transfer from federal laboratories to the private sector.

1. **Bayh-Dole Is Critical to the Success of the United States R&D Innovation Ecosystem and Must be Protected**
2. **Bayh-Dole Created the Uniform Framework for Technology Transfer That is the Basis of Today's World-Leading Biopharmaceutical Industry**

The Bayh-Dole Act allows universities and other nonprofit and for-profit institutions that receive **federal government support through grants and contracts to retain title to patents covering inventions arising from federally-funded research. Such institutions may then license these inventions to partners who subsequently invest substantial resources to translate such discoveries into commercial products**. As such, the Bayh-Dole Act creates a viable route by which new insights from universities and other institutions can be transferred to start-ups or more established firms for commercial development. These third-parties then assume the full risk and expense of development and commercialization.

The process of developing a new medicine is fraught with risk. Only 12 percent of medicines that enter clinical trials are ultimately approved by the U.S. Food and Drug Administration (FDA). Simply achieving the milestone of beginning to test biomedical products in patients comes years after company researchers make an initial discovery or license promising research from an academic partner. Indeed, developing just one pharmaceutical product can take 10 to 15 years of development and on average more than $2.6 billion in investment, accounting for the costs of failures.[[7]](#footnote-7) These costs, risks, and frequent setbacks are borne by private industry and their investors.[[8]](#footnote-8) It is not realistic to expect that NIH, or any combination of federal agencies, could invest a comparable amount of time, expertise, and financial resources in medical product development.

1. **The Bayh-Dole Act Has Been Instrumental in Driving Commercialization of Federally-Funded Research**

Before the Bayh-Dole Act’s passage in 1980, the government had the option to retain title to all inventions resulting from federally-funded research and development. As a result, there were few incentives for the private sector to partner with government-funded researchers to seek to commercialize these inventions. To obtain rights to an invention resulting from federally-funded research, institutions receiving federal grants or contracts had to request a waiver on a case-by-case basis. Varying policies and practices across federal agencies created inconsistent and unpredictable results that served as a deterrent for the private sector to seek to license federally-funded technologies. To the extent licenses were granted, typically they were non-exclusive licenses, which served as a further disincentive to private sector investment.[[9]](#footnote-9) This allowed more than one entity to have rights to commercialize certain technology, creating even more uncertainty for private-sector partners. Exclusive licenses provide more certainty, which is needed to foster the substantial additional investments by the private sector.

In turn, this created a lack of incentives for university grantees to invest in building the infrastructure in their institutions to support commercialization efforts.[[10]](#footnote-10) As a result, before the passage of Bayh-Dole, it was estimated that only 5% of government-owned patents had been licensed for use in the private sector. Today, the environment looks much different:

* Between 1996 and 2015, the licensing activity spurred by Bayh-Dole contributed close to $591 billion to U.S. gross domestic product and supported an estimated 4.2 million jobs in the United States across all industries.[[11]](#footnote-11)
* In 2016, more than 1,000 start-up companies were formed and nearly 800 commercial products were introduced into the market, stemming from university research.[[12]](#footnote-12)

More fundamentally, Bayh-Dole helped establish a culture of entrepreneurship in America's universities and research institutes by creating a well-defined path for ownership and development rights for university researchers and spin-offs.[[13]](#footnote-13),[[14]](#footnote-14) Clear IP ownership by the grantee and the certainty of exclusive licensing terms established under Bayh-Dole have fostered licensing of technology resulting from federal funding for use by private sector entities to advance biomedical research. An independent National Academy of Sciences report concluded there is “no reason to believe that either governmental retention of title or routine retention of title by individual inventors would yield more commercial applications or achieve a better balance of the public’s stakes.”[[15]](#footnote-15)

The widely recognized success of the Bayh-Dole technology transfer model has prompted other countries to adopt strategies in an attempt to emulate the U.S. record of success **in commercialization and collaboration on R&D between academia and industry. As the most recent Organization for Economic Cooperation and Development (OECD)** Science, Technology and Innovation Outlook series **report observed, "Building the required institutional capabilities at universities and PRIs [Public Research Institutions] is central to public efforts to commercialize public research. Following the passage of the Bayh-Dole legislation in the United States – which gave public research institutions incentives to patent and license academic inventions – many countries have developed technology transfer and licensing offices (TTOs/TLOs) at universities and PRIs."**[[16]](#footnote-16) **While the U.S. remains the leader in technology transfer, other countries are attempting to replicate the U.S. Bayh-Dole model by making significant investments in national technology and innovation strategies, higher education, technical capabilities, and research infrastructure.**

1. **What are the core federal technology transfer principles and practices that should be protected, and those which should be adapted or changed?**

The RFI seeks information on the principles and practices that should be protected in the technology transfer system that exists today. As explained above, PhRMA believes that technology transfer in the United States is robust and generally functions well, and that no legislative change to the Bayh-Dole Act is currently necessary. Below we highlight key elements that should be preserved.

1. **Strong and Predictable IP Protections Must Be Preserved**

Preserving the certainty of IP ownership and providing reliable patent protections are essential to supporting licensing of applicable inventions, to the private sector. It is especially important to avoid taking actions that will undermine IP protections, given the current environment, where the certainty of patent protection has already been reduced, for example, through judicial decisions about patentable subject matter and through the implementation and use of the *inter partes review* (IPR) process. As a 2012 Congressional Research Service report stated, "one of the major factors in the reported success of the Bayh-Dole Act is the *certainty it conveys concerning ownership of intellectual property*.”[[17]](#footnote-17) In addition, as the Director of the United States Patent and Trademark Office (USPTO) recently noted, "when patent owners and the public have confidence in the patent grant, inventors are encouraged to invent. Investments are made. Companies are created and grown. Jobs are created and science and technology advance."[[18]](#footnote-18) Accordingly, it is critical that NIST considers this need for certainty and reliability when evaluating what core principles and practices should be protected, and those that should be adapted or changed to enhance technology transfer effectiveness further. The principles and practices that have made the Bayh-Dole Act so successful must be protected.

1. **The Current March-In Provisions Incentivize Timely Access to Federally-Funded Inventions and Should Not Be Modified**

To preserve timely and effective commercialization of federally-funded research, Congress built in safeguards through a provision of the Bayh-Dole Act that grants the federal agency funding the research a limited right to “march-in” and require the owner of a patent developed through federal funding to grant additional licenses to the technology. This provision is applicable only under certain limited circumstances, such as if the current licensee fails to take effective steps to achieve practical application of the product or fails to reasonably satisfy public health and safety needs.[[19]](#footnote-19)

The limited march-in rights laid out in the Bayh-Dole Act strike a careful balance between securing an inventor’s rights in the federally-funded invention and providing an incentive to commercialize that invention, while also ensuring that the public has timely access to those inventions. The intent of march-in authority was to ensure that grantees were in fact making efforts to commercialize the licensed technology and bring applications of the technology to market to the benefit of patients and society.

Confirming this interpretation, to-date NIH has considered and rejected a handful of petitions seeking to use march-in as a form of price control. NIH’s responses to these petitions, as well as the Bayh-Dole Act’s legislative history, confirm that march-in was never intended to be used to address prices deemed “unreasonable” by a petitioner. Indeed, when these petitions first surfaced, Senator Bayh, one of the law's co-sponsors, confirmed that it was never the intent of Congress to use the Bayh-Dole Act to exercise government price controls.[[20]](#footnote-20) Exercising march-in rights in this way could have a chilling effect on industry willingness to partner with academia and the public sector. Moreover, in cases where a government-funded patent is only one of several patents related to a product, the use of march-in may not result in any more timely access to the medicine. It would, however, create significant uncertainty for licensees who, having spent the time and resources needed to develop the government-funded patented technology into FDA-approved medicines, may be unwilling to do so again.

1. **The Government-Use License Strikes an Appropriate Balance and Should Be Preserved**

In addition, the scope of the government use license is appropriate and should not be modified. In exchange for federal funding, the Bayh-Dole Act grants the federal government “a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the Subject Invention throughout the world.”[[21]](#footnote-21) This license ensures that private industry has sufficient interests to invest in federally-funded inventions while also providing the funding agency the ability to use – for its own purposes under a paid-up license – an invention that it helped fund.

In recent years, there have been suggestions that funding agencies should offer their licenses in federally-funded inventions to third parties to extend use of the government license to commercial competitors to practice the invention. Such proposals would extend the government-use license provision well beyond its intended purpose which is to allow the government agency providing funding access to subject inventions *for its own consumption*.[[22]](#footnote-22) Expanding the government license to allow commercial competitors to infringe on the innovation of the patent holder and directly compete with the Government’s own contractors poses a significant disruption to the patent system and the very purpose of the Bayh-Dole Act.[[23]](#footnote-23) The disruption of the patent system and the balance of rights established by the Bayh-Dole Act could have a chilling effect on private-sector collaboration with federally-funded researchers by introducing uncertainty about the rights the private sector would have in licensed intellectual property.[[24]](#footnote-24)

1. **What are other ways to significantly improve the transfer of technology, knowledge, and capabilities resulting from Federal R&D to benefit the U.S. economy? What changes would these proposed improvements require to Federal technology transfer practices, policies, regulations, and legislation?**

Numerous scholars and government entities who have reviewed the performance of the R&D ecosystem under the Bayh-Dole Act framework have lauded the model and applauded its concrete successes.[[25]](#footnote-25) However, these observers and experts have also identified ongoing challenges, and PhRMA appreciates the opportunity to identify proactive solutions. Building on these prior analyses and recommendations, PhRMA believes improvements could be made in the following areas:

* Expand technology transfer infrastructure in academic institutions;
* Foster public-private partnerships; and
* Enhance future competitiveness and build the labor force of the future with effective investments in STEM.

We will address each of these in turn below. We further observe that these improvements may be made without legislative changes to the Bayh-Dole Act.

* + 1. **Expand technology transfer infrastructure in academic institutions.**

The technology transfer process is resource intensive, requiring broad expertise, human and financial capital, and time. To maintain and strengthen U.S. leadership, PhRMA supports efforts to facilitate technology transfer by helping universities and academic institutions do so as effectively and efficiently as possible. This could include the following by the government:

* Establish new government-supported educational opportunities and training programs to improve proficiency among academic institutions and industry in intellectual property, contract drafting and negotiation, and substantive technology areas.
* Take steps to streamline the process of technology transfer negotiations between universities and industry. This could be accomplished by, for example, reviewing existing model agreements to ensure they are current, and developing new model agreements as needed.
* Identify and disseminate best practices in patent license negotiations as part of a model framework to facilitate technology transfer.
* Align investment and budget planning to improve consistency across federal agencies and renew focus on ensuring the United States remains a global leader in R&D.
  + 1. **Foster public-private partnerships**

The traditional model of technology transfer typically involves one academic partner and one private sector licensee, both of whom are focused on advancing a particular asset. However, biopharmaceutical companies increasingly are partnering with a diverse set of health care stakeholders in public-private partnerships (PPPs) to address our most complex and pressing scientific challenges. Many PPPs may be characterized as non-asset based, pre-competitive collaborations where the primary goal is to take on research that no one party can do or is willing to do individually in order to advance health care and generate scientific knowledge rather than pursuing specific commercial opportunities. PPPs allow “stakeholders to address jointly the grand challenges within the field of pharmaceutical innovation that are of mutual interest."[[26]](#footnote-26) As this public-private partnership model continues to proliferate, it is important that technology transfer policies keep pace to ensure promising ideas and discoveries are able to advance in the marketplace.

A recent report by Deloitte, “Partnering for Progress: How Collaborations are Fueling Biomedical Advances,” analyzed partnerships across the biopharmaceutical ecosystem and noted a trend toward broader partnerships that include more partners, more open structures, and a greater emphasis on scientific (rather than product) progression.[[27]](#footnote-27) Specifically, Deloitte found that between 2005 and 2014 the number of consortia, broad partnerships with multiple parties involved who share resources to pursue a common goal, have increased nine-fold. This trend likely reflects the increasing complexity of the science biopharmaceutical researchers are tackling.

One example of a pre-competitive PPP is the Alzheimer’s Disease Neuroimaging Initiative (ADNI). ADNI was formed in 2004 with the goal of advancing understanding of Alzheimer’s to develop new treatments to slow or stop disease progression. The initiative, formed by the NIH, National Institute on Aging (NIA), FDA, and numerous industry, academic, and non-profit organizations, has made tremendous strides in Alzheimer’s disease detection, improving the efficiency of clinical trials related to addressing Alzheimer’s.

PhRMA supports cross-agency efforts to foster and promote pre-competitive PPPs as well as the sharing of lessons learned and best practices from previous PPP experiences. Because many PPPs feed into the knowledge base that creates opportunities for technology transfer, it is critical that they have the tools to do so effectively and efficiently to ensure that promising discoveries continue to advance. Having successful pre-competitive PPPs will enhance the output of federally-funded institutions by streamlining R&D and addressing broad research questions more effectively and efficiently with participants sharing in the risk/reward for such endeavors. At the same time, successful technology transfer programs will create an environment for PPPs to succeed, by providing a robust ecosystem for discoveries and innovations to flourish and advance.

* + 1. **Enhance future competitiveness and build the labor force of the future with effective investments in STEM**

Virtually all elements of the biopharmaceutical R&D enterprise, from discovery and development to commercialization, require well-educated, highly skilled and talented individuals, particularly in the fields of science, technology, engineering, and mathematics (STEM). A robust STEM workforce is critical to ensuring the United States continues to generate the exciting and important discoveries funded by federal research dollars, that are then transferred to the private sector and further developed into viable commercial products.

A 2014 National Research Council report highlighted the importance of a strong STEM workforce to U.S. R&D strength and competitiveness: "To compete globally, the United States must be able to leverage the expertise of world-class researchers….[t]his can be accomplished by maintaining a strong pool of scientists and engineers familiar with research at the cutting edge, whose networks can broaden their expertise."[[28]](#footnote-28)

We encourage NIST to work across federal agencies to identify ways to further foster public and private sector collaborations aimed at strengthening STEM education in the United States. Diverse skills are necessary for effective technology transfer, and we urge a systemic review of federally-funded STEM programs to identify best practices as well as to identify potential gaps and recommendations to enhance STEM efforts across agencies.

**Conclusion**

On behalf of PhRMA and our member companies, we thank you for consideration of these comments. We believe that a robust and productive R&D ecosystem requires effective technology transfer and we welcome the opportunity to work with NIST and other stakeholders to ensure the United States remains a leader in biomedical innovation.

Respectfully submitted,

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2. **AUTM, About Technology Transfer. Available at: https://www.autm.net/autm-info/about-tech-transfer/about-technology-transfer/.** [↑](#footnote-ref-2)
3. Overview of the 2019 President's Budget: Department of Health and Human Services Fiscal Year 2019 Justification of Estimates for Appropriations Committees, National Institutes of Health. Available at: <https://officeofbudget.od.nih.gov/pdfs/FY19/br/Overview.pdf>. [↑](#footnote-ref-3)
4. *See, e.g.*, President's Council of Advisors on Science and Technology (PCAST), University-Private Sector Research Partnerships in the Innovation Ecosystem. November 2008. Available at: <https://www.nasa.gov/pdf/404101main_past_research_partnership_report_BOOK.pdf>; PCAST Report on Technology Transfer of Federally-Funded R&D: Findings and Proposed Actions. May 2003. Available at: <https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast-03-techtransfer.pdf>; Schacht, W. The Bayh-Dole Act: Selected Issues in Patent Policy and the Commercialization of Technology. Congressional Research Service Report 7-5700 (Dec 3 2012). Available at: <https://www.fas.org/sgp/crs/misc/RL32076.pdf>. [↑](#footnote-ref-4)
5. PCAST. University-Private Sector Research Partnerships in the Innovation Ecosystem. November 2008. Available at: <https://www.nasa.gov/pdf/404101main_past_research_partnership_report_BOOK.pdf> at 42-43. [↑](#footnote-ref-5)
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18. Andrei Iancu, Director of U.S. Patent and Trademark Office, comments at NIST symposium presentation April 19, 2018. Available at: <https://www.nist.gov/tpo/return-investment-roi-initiative/unleashing-american-innovation-symposium>. [↑](#footnote-ref-18)
19. If the contractor and exclusive licensee refuse to grant such a license, the government may “march-in” and convey the license itself, if it is necessary (1) to achieve practical application of the Subject Invention, (2) to satisfy health and safety needs, (3) to meet the requirements for public use specified by Federal regulations, or (4) to ensure that U.S.-bound products containing the Subject Invention are manufactured in the United States. *See* 35 U.S.C. § 203(a)(1)-(4). Notably, the Stevenson-Wydler Act does not permit the government to exercise its march-in rights based on a failure to achieve practical application of the Subject Invention, but otherwise the march-in rights operate in the same way that they do under the Bayh-Dole Act. *See* 15 U.S.C. § 3710a(b)(1)(C). [↑](#footnote-ref-19)
20. Senator Birch Bayh, Statement to the National Institutes of Health, May 25, 2004. Available at: <https://www.ott.nih.gov/sites/default/files/documents/2004NorvirMtg/2004NorvirMtg.pdf>. [↑](#footnote-ref-20)
21. 35 U.S.C. § 202(c)(4). The Stevenson-Wydler Act also grants the collaborating Federal laboratory a nonexclusive, nontransferable, irrevocable, paid-up license to practice the invention or have the invention practiced throughout the world by or on behalf of the Government. 15 U.S.C. § 3710a(b)(1)(A). [↑](#footnote-ref-21)
22. *See* Dep’t of Defense, *Intellectual Property: Navigating Through Commercial Waters, Department of Defense*, 2-3, available at http://www.acq.osd.mil/dpap/Docs/intelprop.pdf; Nat’l Institute of Health, *NIH Response to the Conference Report Request for a Plan to Ensure Taxpayers’ Interest are Protected, 5 (July 2001)*, available at <http://www.ott.nih.gov/sites/default/files/documents/policy/wydenrpt.pdf>; *see also* See DFARS 252.227-7013(12); see also DFARS 252.227-7014(11) and DFARS 252.227-7018(14), available at <http://www.acq.osd.mil/dpap/dars/dfars/html/current/252227.htm> (explicitly excluding use of a government license for commercial purposes). [↑](#footnote-ref-22)
23. This same issue arises under the Stevenson-Wydler Act with any suggestion that the Federal laboratory rely on its government license to allow subsequent third-party collaborators with the laboratory use prior Subject Inventions. The infringement on the patent holder’s rights would be equally as disrupting under these circumstances. [↑](#footnote-ref-23)
24. The Bayh-Dole Act’s legislative history is rife with discussion regarding the government’s inability to produce commercial products. For example, the Draft Report on Patent Policy issued by the Advisory Subcommittee on Patent and Information Policy noted that “[i]t has been well demonstrated over a number of years that Federal agencies are not as successful in delivering new products and inventions to the marketplace as the private sector. The result is that the public is not receiving the full benefits of the research and development efforts that it is supporting.” *See* Sen. Jud. Comm. Rep. on S. 414, Rep. No. 96-480, 19 (1979). [↑](#footnote-ref-24)
25. PCAST. Report on Technology Transfer of Federally-Funded R&D: Findings and Proposed Actions. May 2003. Available at: <https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast-03-techtransfer.pdf>. PCAST. University-Private Sector Research Partnerships in the Innovation Ecosystem. November 2008. Available at: <https://www.nasa.gov/pdf/404101main_past_research_partnership_report_BOOK.pdf>. National Research Council. 2011. Managing University Intellectual Property in the Public Interest. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13001>. W Schacht, “The Bayh-Dole Act: Selected Issues in Patent Policy and the Commercialization of Technology,” Congressional Research Service, 7-5700. (Dec 3 2012) Available at: <https://www.fas.org/sgp/crs/misc/RL32076.pdf>. [↑](#footnote-ref-25)
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27. N. Lesser, M. Hefner, Deloitte, “Partnering for Progress: How Collaborations are Fueling Biomedical Advances,” 2017, <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/life-sciences-health-care/us-lshc-partnering-for-progress-how-collaborations-are-fueling-biomedical-advances.pdf>. [↑](#footnote-ref-27)
28. National Research Council. (2014). Furthering America’s Research Enterprise. R.F. Celeste, A. Griswold, and M.L. Straf (Eds.). Committee on Assessing the Value of Research in Advancing National Goals, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press. [↑](#footnote-ref-28)