

# References

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- Abramson, H. Norman, Jose Encarnacao, Proctor P. Ried, and Ulrich Schmock (1997). *Technology Transfer Systems in the United States and Germany: Lessons and Perspectives*, Washington, DC: National Academy Press.
- Adams, James D. and Albert N. Link (2018). “The Structure and Performance of U.S. Research Joint Ventures: Inferences and Implications from the Advanced Technology Program,” *Economics of Innovation and New Technology*, 27: 551–575.
- Adams, James D., Eric P. Chiang, and Jeffrey L. Jensen (2003). “The Influence of Federal Laboratory R&D on Industrial Research,” *Review of Economics and Statistics*, 85: 1003–1020.
- Anderson, Gary W. and Anthony Breitzman (2017). “Identifying NIST Impacts on Patenting: A Novel Data Set and Potential Uses,” *Journal of Research of the National Institute of Standards and Technology*, 122: 1–16.
- Andes, Scott, Mark Muro, and Matthew Stepp (2014). *Going Local: Connecting the National Labs to their Regions to Maximize Innovation and Growth*, Washington, DC: Brookings Institution.
- Argonne National Laboratory (2016). *Enhancing National Laboratory Partnership and Commercialization Opportunities*, Reston, VA: Innovation Associates.
- Arthur, W. Brian (2009). *The Nature of Technology: What It Is and How It Evolves*, New York: Simon and Schuster.
- Audretsch, David B. and Albert N. Link (2019). *Sources of Knowledge and Entrepreneurial Behavior*, Toronto, Canada: University of Toronto Press.
- Audretsch, David B., Albert N. Link, and John T. Scott (2018). “Frederic M. Scherer: Over a Half Century—and Counting—of Seminal Scholarly Contributions,” *Review of Industrial Organization*, DOI: 10.1007/s11151-017-9611-y.
- Bodde, David L. (1993). “On Guns and Butter: Reflections on Technology Transfer from Federal Laboratories,” *Technology and Society*, 15: 273–280.
- Bozeman, Barry (2013). “Technology Transfer Research and Evaluation:

- Implications for Federal Laboratory Practice,” Report to VNS Group, Inc. and the US National Institute of Standards.
- Bozeman, Barry and Albert N. Link (2014). “Toward an Assessment of Impacts from US Technology and Innovation Policies,” *Science and Public Policy*, 42: 369–376.
- Bozeman, Barry and Maria Papadakis (1995). “Company Interactions with Federal Laboratories: What They Do and Why They Do It,” *Journal of Technology Transfer*, 20: 64–74.
- Bozeman, Barry and Larry Wilson (2004). “Market-Based Management of Government Laboratories: The Evolution of the U.S. National Laboratories’ Government-Owned, Contractor-Operated Management System,” *Public Performance & Management Review*, 28: 167–185.
- Bradley, Samantha R., Christopher S. Hayter, and Albert N. Link (2013). “Models and Methods of University Technology Transfer,” *Foundations and Trends in Entrepreneurship*, 9: 365–570.
- Brand, C. Dan (2003). “Availability and Accessibility of the Nation’s Research Infrastructure: The Transfer of Assistive Technology by Federal Laboratories,” *Journal of Technology Transfer*, 28: 197–205.
- Bush, Vannevar (1945). *Science—the Endless Frontier*, reprinted by the National Science Foundation in 1960 <<https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm>>.
- Carr, Robert K. (1992a). “Doing Technology Transfer in Federal Laboratories (Part 1),” *Journal of Technology Transfer*, 17: 8–23.
- Carr, Robert K. (1992b). “Menu of Best Practices in Technology Transfer (Part 2),” *Journal of Technology Transfer*, 17: 24–33.
- Chan, Gabriel A. (2015). “The Commercialization of Publicly Funded Science: How Licensing Federal Laboratory Inventions Affects Knowledge Spillovers,” Harvard Business School working paper.
- Chatterjee, Sabarni K. and Mark L. Rohrbaugh (2014). “NIH Inventions Translate into Drugs and Biologics with High Public Health Impact,” *Nature Biotechnology*, 32: 52–58.
- Chen, Chuchu, Albert N. Link, and Zachary T. Oliver (2018). “U.S. Federal Laboratories and their Research Partners: A Quantitative Case Study,” *Scientometrics*, 115: 501–517.
- Choudhry, Vidita and Todd A. Ponzio (2019). “Modernizing Federal Technology Transfer Metrics,” *Journal of Technology Transfer*, DOI: [org/10.1007/s10961-018-09713-w](https://doi.org/10.1007/s10961-018-09713-w).
- Clark, John, Barbara Good, and Paul Simmonds (2008). “Innovation in the Public and Third Sectors,” London: NESTA working paper.
- Cochrane, R.H. (1966). *Measures for Progress: A History of the National Bureau of Standards*, Washington, DC: National Bureau of Standards.

- Czarnitzki, Dirk, Kornelius Kraft, and Susanne Thorwarth (2009). "The Knowledge Production of 'R' and 'D'," *Economics Letters*, 105: 141–143.
- De Vries, Hanna, Victor Bekkers, and Lars Tummers (2016). "Innovation in the Public Sector: A Systematic Review and Future Research Agenda," *Public Administration*, 94: 146–166.
- Department of Commerce (DOC) (1990). *Emerging Technologies: A Survey of Technical and Economic Opportunities*, Washington, DC: US Department of Commerce.
- Department of Energy (DOE) (2000). *From Invention to Innovation*, Washington, DC: Department of Energy.
- Department of Health and Human Services (HHS) (1993). *Technology Transfer and the Public Interest: Cooperative Research and Development Agreements at NIH*, Washington, DC: Department of Health and Human Services.
- European Commission (2013). *European Public Sector Innovation Scoreboard 2013: A Pilot Exercise*, Brussels: European Commission.
- Executive Office of the President (1990). *U.S. Technology Policy*, Washington, DC: Office of Science and Technology Policy.
- Federal Laboratory Consortium for Technology Transfer (FLC Mechanism Matrix) (2008). *Federal Technology Transfer Mechanisms Matrix*, Cherry Hill, NJ: Federal Laboratory Consortium for Technology Transfer.
- Federal Laboratory Consortium for Technology Transfer (FLC) (2013). *Technology Transfer Desk Reference: A Comprehensive Guide to Technology Transfer*, Cherry Hill, NJ: Federal Laboratory Consortium for Technology Transfer.
- Federal Laboratory Consortium for Technology Transfer (FLC Playbook) (2017). *Technology Transfer Playbook*, Cherry Hill, NJ: Federal Laboratory Consortium for Technology Transfer.
- Feldman, David L. (1990). "Transferring Superconductivity Technology at a National-Laboratory User Center," *Journal of Technology Transfer*, 15: 15–24.
- Foray, Dominique (2004). *Economics of Knowledge*, Cambridge, MA: The MIT Press.
- Franza, Richard M., Kevin P. Grant, and W. Austin Spivey (2012). "Technology Transfer Contracts between R&D Labs and Commercial Partners: Choose Your Words Wisely," *Journal of Technology Transfer*, 37: 577–587.
- Frazier, A.H. (1978). *United States Standards of Weights and Measures: Their Creation and Creators*, Washington, DC: Smithsonian Institution Press.
- Galvin Report (1995). *Alternative Futures for the Department of Energy National Laboratories*, Washington, DC: US Department of Energy.

- Griliches, Zvi (1979). "Issues in Assessing the Contribution of Research and Development to Productivity Growth," *Bell Journal of Economics*, 10: 92–116.
- Guston, David H. (1998). "Technology Transfer and the Use of CRADAs at the National Institutes of Health," in *Investing in Innovation* (edited by L.M. Branscomb and J.H. Keller), Cambridge, MA: The MIT Press.
- Hall, Bronwyn H. and Rosemarie H. Ziedonis (2001). "The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995," *RAND Journal of Economics*, 32: 101–128.
- Ham, Rose Marie and David C. Mowery (1995). "Improving Industry-Government Cooperative R&D," *ISSUES in Science and Technology*, Summer: 67–73.
- Ham, Rose Marie and David C. Mowery (1998). "Improving the Effectiveness of Public-Private R&D Collaboration: Case Studies at a U.S. Weapons Laboratory," *Research Policy*, 26: 661–675.
- Hart, David M. (2014). "An Agent, Not a Mole: Assessing the White House Office of Science and Technology Policy," *Science and Public Policy*, 41: 411–418.
- Hyman, Malcolm D. and Jürgen Renn (2012). "From Technology Transfer to the Origins of Science," in *The Globalization of Knowledge in History* (edited by Jürgen Renn), pp. 75–104, Berlin: Neopubli GmbH.
- Information Technology and Innovation Foundation (ITIF) (2013). "Turning the Page: Reimagining the National Labs in the 21st Century Innovation Economy," Washington, DC: Information Technology and Innovation Foundation.
- Innovation Associates (2016). *Enhancing National Laboratory Partnership and Commercialization Opportunities*, Reston, VA: Innovation Associates.
- Institute for Defense Analysis (IDA) (2011). "Technology Transfer and Commercialization Landscape of the Federal Laboratories," Alexandria, VA: Institute for Defense Analysis Paper NS P-4728.
- Institute for Defense Analysis (IDA) (2013a). "Exemplar Practices for Department of Defense Technology Transfer," Alexandria, VA: Institute for Defense Analysis Paper P-4957.
- Institute for Defense Analysis (IDA) (2013b). "Expediting the Transfer of Technology from Government Laboratories into the Aeronautics Industry," Alexandria, VA: Institute for Defense Analysis Paper P-4952.
- Jaffe, Adam B. and Josh Lerner (2001). "Reinventing Public R&D: Patent Policy and the Commercialization of National Laboratory Technologies," *RAND Journal of Economics*, 32: 167–198.
- Jaffe, Adam B., Michael S. Fogarty, and Bruce A. Banks (1998). "Evidence from Patents and from Patent Citations on the Impact of NASA and

- Other Federal Labs on Commercial Innovation,” *Journal of Industrial Economics*, 46: 183–205.
- Jankowski, John E., Jr. (1993). “Do We Need a Price Index for Industrial R&D?” *Research Policy*, 22: 195–205.
- Jones, S.A. (1936). *Weights and Measures in Congress: Historical Summary Covering the Period of the Continental Congress to and Including the Adoption of the Joint Resolutions of 1836 and 1838*, Washington, DC: US National Bureau of Standards.
- Judson, L.V. (1976). *Weights and Measures Standards of the United States: A Brief History*, Washington, DC: US National Bureau of Standards.
- Kay, Robert and Chris Goldspink (2016). *Public Sector Innovation: Why It's Different*, Sydney: Australian Institute of Company Directors.
- Kerrigan, Jack E. and Christopher J. Brasco (2002). “The Technology Transfer Revolution: Legislative History and Future Proposals,” *Public Contract Law Journal*, 31: 277–291.
- León, Lorena Rivera, Paul Simmonds, and Laura Roman (2012). *Trends and Challenges in Public Sector Innovation in Europe*, Brussels: Technopolis Group.
- Leyden, Dennis Patrick and Albert N. Link (2015). *Public Sector Entrepreneurship: U.S. Technology and Innovation Policy*, New York: Oxford University Press.
- Leyden, Dennis Patrick and Matthias Menter (2018). “The Legacy and Promise of Vannevar Bush: Rethinking the Model of Innovation and the Role of Public Policy,” *Economics of Innovation and New Technology*, 27: 225–242.
- Link, Albert N. and Jamie R. Link (2009). *Government as Entrepreneur*, New York: Oxford University Press.
- Link, Albert N. and Eric Maskin (2016). “Does Information About Previous Projects Promote R&D on the International Space Station?” in *Economic Development of Low Earth Orbit* (edited by P. Besha and A. MacDonald), pp.43–59, Washington, DC: National Aeronautics and Space Administration.
- Link, Albert N. and Laura T.R. Morrison (2019). *Innovative Activity in Minority-Owned and Women-Owned Business: Evidence from the U.S. Small Business Innovation Research Program*, New York: Springer.
- Link, Albert N. and Frederic M. Scherer (2005). *Essays in Honor of Edwin Mansfield: The Economics of R&D, Innovation, and Technological Change*, Boston, MA: Springer.
- Link, Albert N. and John T. Scott (2010). *Public Goods, Public Gains: Calculating the Social Benefits of Public R&D*, New York: Oxford University Press.
- Link, Albert N. and John T. Scott (2013). *Bending the Arc of Innovation:*

- Public Support of R&D in Small, Entrepreneurial Firms*, New York: Palgrave Macmillan.
- Link, Albert N. and John T. Scott (2017). "Toward an Assessment of the U.S. Small Business Innovation Research (SBIR) Program at the National Institutes of Health," *Science and Technology Policy*, 45: 83–91.
- Link, Albert N. and John T. Scott (2018). "Propensity to Patent and Firm Size for Small R&D-Intensive Firms," *Review of Industrial Organization*, 52: 561–587.
- Link, Albert N. and John T. Scott (2019a). "Creative-Enhancing Technological Change in the Production of Scientific Knowledge," *Economics of Innovation and New Technology*, DOI: 1080/10438599.2019.1636449.
- Link, Albert N. and John T. Scott (2019b). "The Economic Benefits of Technology Transfer from U.S. Federal Laboratories," *Journal of Technology Transfer*, 44: 1416–1426.
- Link, Albert N. and Donald S. Siegel (2003). *Technological Change and Economic Performance*, London: Routledge.
- Link, Albert N. and Martijn van Hasselt (2019). "A Public Sector Knowledge Production Function," *Economics Letters*, 174: 64–66.
- Link, Albert N., Cody A. Morris, and Martijn van Hasselt (2018). "The Impact of Public R&D Investments on Patenting Activity: Technology Transfer at the U.S. Environmental Protection Agency," *Economics of Innovation and New Technology*, 28: 536–546.
- Link, Albert N., Donald S. Siegel, and David D. van Fleet (2011). "Public Science and Public Innovation: Assessing the Relationship between Patenting at U.S. National Laboratories and the Bayh-Dole Act," *Research Policy*, 40: 1094–1099.
- Merton, Robert K. (1968). "The Matthew Effect in Science," *Science*, 159: 56–63.
- Metcalf, Harold (1994). "Lessons from History: Origins of the Federal Laboratory Consortium for Technology Transfer," *Journal of Technology Transfer*, 19: 13–17.
- Mowery, David C. (2003). "Using Cooperative Research and Development Agreements as S&T Indicators: What do We Have and What Would We Like?" *Technology Analysis & Strategic Management*, 15: 89–205.
- Moy, Russell (2014). "History and Approaches to Technology Transfer from US Federal Laboratories," Presentation to the Government-University-Industry Research Roundtable, The National Academies, May 29.
- Mulgan, Geoff (2014). *Innovation in the Public Sector: How Can Public Organizations Better Create, Improve, and Adapt?* London: NESTA.
- National Institute of Standards and Technology (NIST) (2018a). *Federal Laboratory Technology Transfer, Fiscal Year 2015*, Gaithersburg, MD: US National Institute of Standards and Technology.

- National Institute of Standards and Technology (NIST) (2018b). "Return on Investment Initiative for Unleashing American Innovation," NIST Special Publication 1234, Gaithersburg, MD: US National Institute of Standards and Technology.
- National Research Council (2011). *Measuring the Impacts of Federal Investments in Research*, Washington, DC: The National Academies Press.
- Nightingale, Paul (1998). "A Cognitive Model of Innovation," *Research Policy*, 27: 689–709.
- OECD (2015). *The Innovation Imperative in the Public Sector: Setting an Agenda for Action*, Paris: OECD Publishing.
- OECD (2017). *Fostering Innovation in the Public Sector*, Paris: OECD Publishing.
- Office of Technology Assessment (1993). *Defense Conversion: Redirecting R&D*, Washington, DC: US Government Printing Office.
- Popp, David (2016a). "Economic Analysis of Scientific Publications and Implications for Energy Research and Development," *Nature Energy*, 1: 1–8.
- Popp, David (2016b). "From Science to Technology: The Value of Knowledge from Different Energy Research Institutions," NBER working paper 22573.
- Potts, Daniel T. (2012). "Technological Transfer and Innovation in Ancient Eurasia," in *The Globalization of Knowledge in History* (edited by J. Renn), pp.105–123, Berlin: Neopubli GmbH.
- Pressman, Lori, Mark Planting, Robert Yuskavage, Jennifer Bond, and Carol Moylan (2018). *A Preliminary Application of an I-O Economic Impact Model to US Federal Laboratory Inventions: 2008–2015*, Gaithersburg, MD: US National Institute of Standards and Technology.
- Prosser, Glen A. (1995). "The role of Incentives in the Deployment of Technologies from Cooperative R&D," *Journal of Technology Transfer*, 20: 13–17.
- RTI International (2019). *Empirical Measurement of Technology Transfer Activities across Federal Agencies*, Research Triangle Park, NC: RTI International.
- Schacht, Wendy (2012). *Technology Transfer: Use of Federally Funded Research and Development*, Washington, DC: US Congressional Research Service.
- Schooley, J.F. (2000). *Responding to National Needs: The National Bureau of Standards Becomes the National Institute of Standards and Technology, 1969–1993*, Washington, DC: US National Institute of Standards and Technology.
- Shama, Avraham (1992). "Guns to Butter: Technology-Transfer Strategies in the National Laboratories," *Journal of Technology Transfer*, 17: 18–24.

- Sink, Claire H. and Kevin Easley (1994). "The Basis for U.S. Department of Energy Technology Transfer in the 1990s," *Journal of Technology Transfer*, 19: 52–62.
- Snyder, Belinda and Jeffrey W. Thomas (undated). "GOGOs, GOCOs, and FFRDCs ... Oh My!?" <<https://www.federallabs.org/download/file/fid/23628>>.
- Stevens, Ashley J., Jonathan J. Jensen, Katrine Wyller, Patrick C. Kilgore, Sabarni Chatterjee, and Mark L. Rohrbaugh (2011). "The Role of Public Sector Research in the Discovery of Drugs and Vaccines," *The New England Journal of Medicine*, 364: 535–541.
- TechLink (2016). *National Economic Impacts from DoD License Agreements with U.S. Industry: 2000–2014*, Bozeman, MT: TechLink.
- The President's Management Agenda (undated). <<https://www.whitehouse.gov/omb/management/pma/>>.
- Tibbetts, Ronald (1999). "The Small Business Innovation Research Program and NSF SBIR Commercialization Results," in *SBIR—The Small Business Innovation Research Program: Challenges and Opportunities*, pp. 129–167, Washington, DC: National Academy Press.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1968). *National Science Policies of the U.S.A.: Origins, Development and Present Status*, Paris: United Nations Educational, Scientific and Cultural Organization.
- Wu, Kepi (1994). "A Partnership Approach to Successful, Cost-Effective Technology Transfer," *Journal of Technology Transfer*, 19: 4–12.