

Federal Technology Transfer Data 1987-2009

1. Background

In 1980, the Stevenson-Wydler Technology Innovation Act explicitly recognized the benefits derived from the transfer of federally funded technology. Among other things, this Act explicitly incorporated technology transfer into the mission of all federal departments and agencies. More recently, the Technology Transfer Commercialization Act of 2000 revised Stevenson-Wydler including the reporting requirements on the utilization of federal technology. This Act explicitly enumerated technology transfer reporting requirements for all agencies that operate federal laboratories and direct research activities that result in federally-owned inventions as well as the responsibilities of the Secretary of Commerce.¹ With the passage of the America Competes Act was in 2007, and subsequent delegations by the secretary of Commerce, the Technology Partnerships Office at The National Institute of Standards and Technology (NIST) has been responsible for preparing the Department of Commerce (DOC) report on technology transfer utilization, as well as the summary report on technology transfer utilization that The Secretary of Commerce prepares on behalf of all federal agencies.² By law, this report covers activities at federally operated labs as well as federally funded research and development centers (FFRDC).

2. Data Collection and Limitations

The scope data contained in the reports broadly reflects a number of areas:

- information and data specifically requested by legislation,
- metrics that had traditionally been collected through the prior agency,
- informal, even if only anecdotal, information on downstream outcomes of laboratory technology transfer activities.

¹The statute defines of laboratories subject to the reporting requirement(15 USC Sec. 3710a (d)(2)):

“(2) the term “laboratory” means –

(A) a facility or group of facilities owned, leased, or otherwise used by a Federal agency, a substantial purpose of which is the performance of research, development, or engineering by employees of the Federal Government;

(B) a group of Government-owned, contractor-operated facilities under a common contract, when a substantial purpose of the contract is the performance of research and development for the Federal government; and

(C a Government-owned, contractor-operated facility that is not under a common contract described in subparagraph (B), and the primary purpose of which is the performance of research and development for the Federal Government,”

² This report summarizes the technology transfer achievements of the eleven Federal agencies that have significant Federal laboratory operations: Department of Agriculture (USDA); Department of Commerce (DOC); Department of Defense (DoD); Department of Energy (DOE);Department of Health and Human Services (HHS); Department of Homeland Security (DHS); Department of the Interior (DOI); Department of Transportation (DOT); Department of Veterans Affairs (VA); Environmental Protection Agency (EPA); National Aeronautics and Space Administration (NASA).

Federal departments and agencies have diverse missions, employ different technology transfer mechanisms and even operate under varying technology transfer authorities. Overtime, the reporting requirements, responsibilities and needs have also changed. As a result, the data in the reports have been of limited use for analytical purposes. Limitations include:

- Variation across departments and agencies in the collection and relevance of the data and metrics;
- Data reporting does not facilitate time series analysis. Data coverage varies and there is no single source for long time series;
- Data reporting does not facilitate analysis of normalized data. There is no ability to control for the differing scale of research and development (R&D) inputs between agencies;
- The aggregate level data does not enable analysis that accounts for the delay between the performance of research and research outputs (e.g., invention disclosures), outcomes (patents and licenses) and impacts (revenues and license income).
- Data collection methodology and other factors contribute to data quality issues.

3. Analytical Data

In order to enhance the ability of researchers to understand and analyze the impact of federal research and technology transfer activities, The NIST Technology Partnerships Office has assembled a core dataset that aims to overcome many of the weaknesses identified above. The goal of this effort is to build a database and begin to foster a research community. Ultimately, the aim is to improve the measurement understanding and impact of federal technology transfer efforts.

The dataset draws on information from a decade of reports and assembles a core set of data that are consistently available over a long time series. The dataset also includes data on obligated funds for research at federal laboratories and federally funded research and development centers. These data are drawn from various National Science Foundation (NSF) surveys and contain information at the department and agency level. Within the Department of Commerce, the data set contains agency R&D obligations for NIST, the national Oceanic and Atmospheric Administration (NOAA) and National Telecommunications and Information Administration (NTIA). The scope of the obligated R&D expenditures in the NSF Federal Funds Survey matches the scope of the reporting requirements in the Technology Transfer Commercialization Act. That is to say NSF reports obligations for intramural research as well as federal obligations for FFRDCs. The dataset also contains R&D deflators and the gross domestic product (GDP) deflator that can be used to control for the changing purchasing power of R&D expenditures. Appendix A lists a broader set of indicators that have more limited coverage. A complete data dictionary is included in Appendix B.

Data Element	Availability
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Cooperative Research and Development Agreements - Total Active in Fiscal Year	1987-2009
Cooperative Research and Development Agreements - New in Fiscal Year	1997-2009
New Inventions Disclosures	1987-2009
Patent Applications filed in Fiscal Year	1987-2009
Patents Issued in Fiscal Year	1997-2009
Invention licenses, active in the FY	1997-2009
Invention Licenses New, executed in the FY	1987-2009
Income from invention licenses	1987-2009
R&D Obligated for Intramural and Extramural Research	1982-2009
R&D Obligated for Intramural Research	1982-2009
R&D Obligated for Extramural Research at Federally Funded Research and Development Centers	1982-2009
GDP Deflator	1982-2009
Federal R&D Input Price Deflator	1959-2007
Federal R&D Input Price Deflator - Extramural Expenditures	1959-2007
Federal R&D Input Price Deflator - Intramural Expenditures	1959-2007

4. Limitations and Future Work

There are number of caveats that still apply to this data. First, the traditional technology transfer metrics which are contained in this data set are most relevant to a narrow concept of technology transfer. For example, NIST transfers measurement technology to the private sector through sales of standard reference materials and various measurement services. Metrics such as these are contained in agency technology transfers reports but such a broad concept of technology transfer is not amenable to broad inter-agency measurement. Additionally, the limited metrics reported here may not be relevant for all types of intellectual property. Further, these metrics may fail to measure valuable technology transfer mechanisms. For example, agencies that distribute information technology as open source data and software will not report invention, patenting, licensing activity or license income. This is particularly concerning given the breadth of impact that this mechanism may have even when compared to non-exclusive licensing. Finally, technology transfer stakeholders warn that data collected prior to the Technology Transfer Commercialization Act of 2000 may not be as accurate.

Ultimately, the intent of this effort is to begin working with a broader community. The community will have the data to support a broader discussion of technology transfer metrics – in particular metrics for the transfer of public good technologies - and improve the measurement of the impact of federal technology transfer.

Appendix A: Sample Complete Data

Collaborative Relationships for Research & Development

- **CRADAs**, total active in the FY⁽¹⁾
 - New, executed in the FY
- Traditional CRADAs,⁽²⁾ total active in the FY
 - New, executed in the FY
- Non-traditional CRADAs,⁽³⁾ total active in FY
 - New, executed in the FY
- **Other collaborative R&D relationships**
 - (specify as relevant), total active in the FY
 - New, executed in the FY

Invention Disclosure and Patenting

- New inventions disclosed in the FY⁽¹⁾
- Patent applications filed in the FY⁽²⁾
- Patents issued in the FY

Licensing Activity

Profile of Active Licenses

- **All licenses**, number total active in the FY⁽¹⁾
 - New, executed in the FY
- **Invention licenses**, total active in the FY
 - New, executed in the FY
 - Patent licenses,⁽²⁾ total active in FY
 - New, executed in the FY
 - Material transfer (inventions), tot active in FY
 - New, executed in the FY
 - Other invention licenses,⁽³⁾ total active in FY
 - New, executed in the FY
- **Other IP licenses**, total active in the FY
 - New, executed in the FY
 - Copyright licenses (fee bearing)
 - New, executed in the FY
 - Material transfer (non-inv.), total active in FY
 - New, executed in the FY

- Other ⁽⁴⁾
 - New, executed in the FY
- All income bearing licenses, number
 - Exclusive
 - Partially exclusive
 - Non-exclusive
 - Invention licenses, income bearing
 - Exclusive
 - Partially exclusive
 - Non-exclusive
 - Patent licenses,(1) income bearing
 - Exclusive
 - Partially exclusive
 - Non-exclusive
 - Other IP licenses, income bearing
 - Exclusive
 - Partially exclusive
 - Non-exclusive
 - Copyright licenses (fee bearing)
 - Exclusive
 - Partially exclusive
 - Non-exclusive
- All royalty bearing licenses,(2) number
 - Invention licenses, royalty bearing, number
 - Patent licenses,(1) royalty bearing
 - Other IP licenses, royalty bearing
 - Copyright licenses (fee bearing)

Appendix B: Data Dictionary

Data Element	Variable Name	Availability	Source
CRADA's - Total Active	CRADA_TOT_ACT	1987-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
CRADA's - New in Fiscal Year	CRADA_NEW	1997-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
New Inventions Disclosures	INV_DISC	1987-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
Patent Applications filed in Fiscal Year	PAT_APP	1987-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
Patents Issued in Fiscal Year	PAT_ISS	1997-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
Invention licenses, active in the FY	INV_LIC_ACT	1997-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
Invention Licenses New, executed in the FY	INV_LIC_NEW	1987-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
Income from invention licenses	TOT_INC_LIC_INV	1987-2009	<u>Federal Laboratory (Interagency) Technology Transfer Summary Reports, various years, available at http://www.nist.gov/tpo/publications/index.cfm</u>
R&D Obligated for Intramural and Extramural Research	RD_OBLIG	1982-2009	National Science Foundation, Division of Science Resources Statistics. 2010. Federal Funds for Research and Development: Research and development - obligations,

			by agency and performer Detailed Statistical Tables NSF 10-305. Arlington, VA, , various years . Available at http://www.nsf.gov/statistics/fedfunds/
R&D Obligated for Intramural Research	RD_OBLIG_INT	1982-2009	National Science Foundation, Division of Science Resources Statistics. 2010. Federal Funds for Research and Development: Research and development - obligations, by agency and performer Detailed Statistical Tables NSF 10-305. Arlington, VA, , various years . Available at http://www.nsf.gov/statistics/fedfunds/
R&D Obligated for Extramural Research at Federally Funded Research and Development Centers	RD_OBLIG_EXT	1982-2009	National Science Foundation, Division of Science Resources Statistics. 2010. Federal Funds for Research and Development: Research and development - obligations, by agency and performer Detailed Statistical Tables NSF 10-305. Arlington, VA, , various years . Available at http://www.nsf.gov/statistics/fedfunds/
GDP Deflator	GDP_DEF	1982-2009	Bureau of Economic Analysis, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product , http://www.bea.gov/national/nipaweb/SelectTable.asp
Federal R&D Input Price Deflator	BEA_RD_INPUT_DEF	1959-2007	Bureau of Economic Analysis, Table 4.1. Aggregate Input Price Indexes for R&D Investment, 1959-2007, http://www.bea.gov/national/newinnovation.htm
Federal R&D Input Price Deflator - Extramural Expenditures	BEA_FED_EXT_DEF	1959-2007	Bureau of Economic Analysis, Table 4.1. Aggregate Input Price Indexes for R&D Investment, 1959-2007, http://www.bea.gov/national/newinnovation.htm
Federal R&D Input Price Deflator - Intramural Expenditures	BEA_FED_INT_DEF	1959-2007	Bureau of Economic Analysis, Table 4.1. Aggregate Input Price Indexes for R&D Investment, 1959-2007, http://www.bea.gov/national/newinnovation.htm