

STAR METRICS

**Science and Technology in America's Reinvestment:
Measuring the Effects of Research on Innovation, Competitiveness and Science**

Research Institution Participation Guide

ABOUT STAR METRICS

Welcome to the STAR METRICS project. This STAR METRICS project guide will provide an overview of the STAR METRICS project and outline how research institutions can get involved with this project. This guide is complemented by further documentation on the STAR METRICS website that outlines the technical specifications for the project and provides guidance to research institutions wishing to participate in STAR METRICS.

STAR METRICS Overview

STAR METRICS is a federal and research institution collaboration to create a repository of data and tools that will be useful to assess the impact of federal R&D investments. The National Institutes of Health (NIH) and the National Science Foundation (NSF), under the auspices of Office of Science and Technology Policy (OSTP), are leading this project. This project has been developed after a successful pilot project was conducted with several research institutions in the Federal Demonstration Partnership (FDP). The STAR METRICS project consists of two implementation phases:

- Phase I: Developing uniform, auditable and standardized measures of the impact of science spending (ARRA and non-ARRA) on job creation, using data from research institutions' existing database records. No personally identifiable information (PII) is collected in Phase I.
Phase II: Developing measures of the impact of federal science investment on scientific knowledge (using metrics such as publications and citations), social outcomes (e.g. health outcomes measures and environmental impact factors), workforce outcomes (e.g. student mobility and employment), and economic growth (e.g. tracing patents, new company start-ups and other measures). Phase II will require the collection of PII.

STAR METRICS Project Beginnings

People have asked important questions about the impact of federal investments in science, particularly with respect to job creation and economic growth. It is important to collect and analyze data so that such questions can be answered in a credible fashion. There is currently no data infrastructure that systematically couples science funding with outcomes. There are also no mechanisms that currently exist to engage the public with scientific funding.

However, there are obvious ways to leverage existing data. Federal agencies already collect data on federal investments at the individual, award, and institutional levels for the purposes of managing awards. Research institutions collect data on all individuals working on projects in their financial and human resources systems. Academic researchers have collected large bodies of data on such scientific and innovation outcomes as citations, patents, business startups and IPOs. And there is a large body of knowledge about creating measures of job creation and the associated earnings drawn from the experience of Longitudinal Employer-Household Dynamics program at the Census Bureau. Finally, there has been substantial investment in visualization and other tools that convey complex information about science to a lay audience. The existence of these and other resources motivates the STAR METRICS approach to studying the impact of science funding and disseminating the information to the public.

The STAR METRICS project is anticipated to be a broad collaboration of federal science and technology funding agencies with a shared vision of developing data infrastructures and products to support evidence-

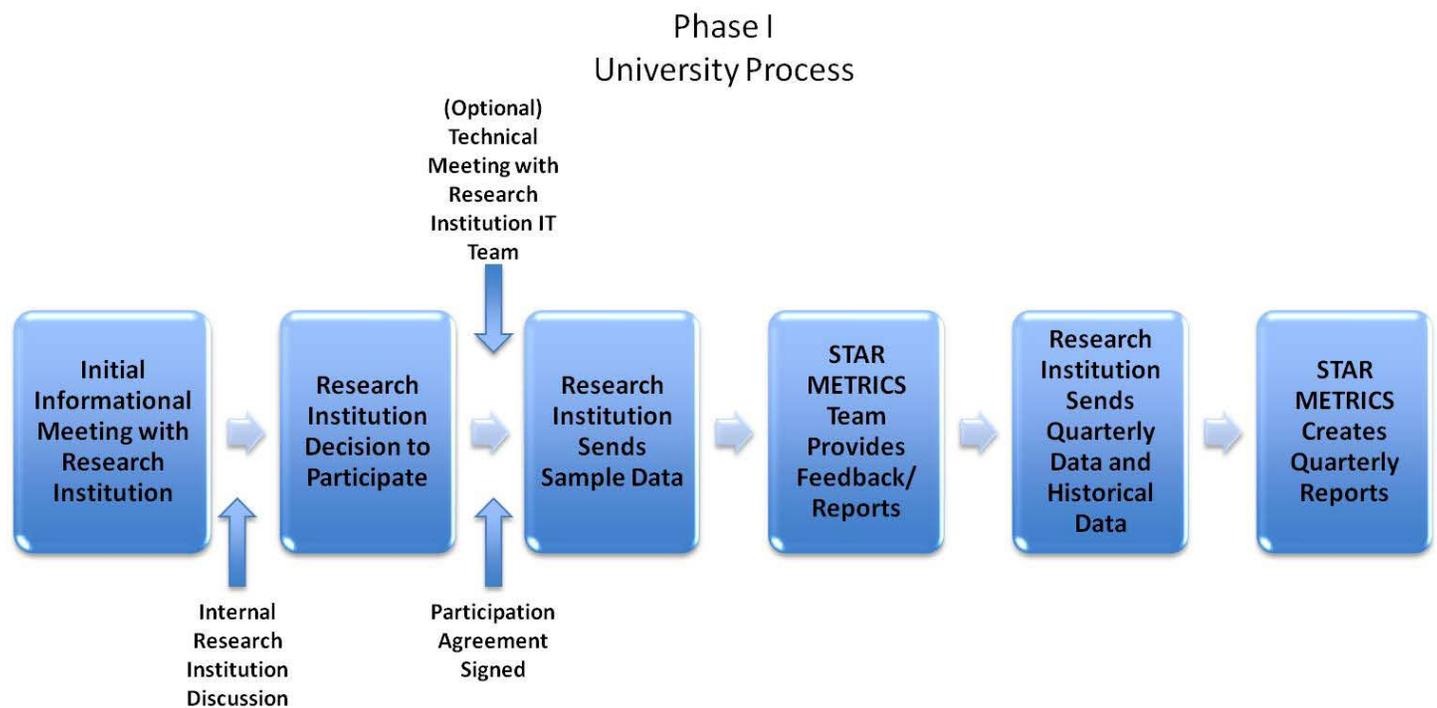
based analyses of the impact of science and technology investment. The goal of the STAR METRICS project is to utilize existing administrative data from federal agencies and their grantee institutions, and match them with existing research databases on economic, scientific and social outcomes.

STAR METRICS is being created in direct response to the White House Office of Management and Budget (OMB) and Office of Science and Technology Policy (OSTP) request that federal agencies develop outcome-oriented goals for their science and technology activities. It is also in direct response to the reporting requirements of the American Recovery and Reinvestment Act (ARRA), and aims to provide American taxpayers with precise information on the value of their investments.

Getting Started

Partnering with Research institutions

As a voluntary program, the STAR METRICS team relies on research institutions for the project to be successful. Therefore, the STAR METRICS approach was designed to be as easy as possible for participating institutions. The STAR METRICS team works with research institutions during each step to provide information, guidance and support. The process for Phase I and development of Phase II is outlined in this section. The diagram below outlines the steps for Phase I.



Step 1: Initial Meeting with Research Institution

The first step in the STAR METRICS data gathering process is to schedule an introductory meeting, usually in the form of a webinar/videoconference, to introduce the research institution to the basic approach of STAR METRICS and to the participation requirements. In this first meeting, which lasts about one hour, we review the details of the project and discuss the information that will be collected, the process for collection and the reports that will be generated from the data.

Research institution representatives in the meeting should include a primary IT person, primary contract finance person and a primary contact HR person. It is often useful to have someone from the Office of the Vice President for Research in attendance as well.

Step 2: Decision to Participate

After the initial meeting with the STAR METRICS team, a Memorandum of Understanding (MOU-Participation Agreement) needs to be signed between the research institution and the National Institutes of Health (NIH) – the data custodians for the STAR METRICS project. A proposed sample of the MOU can be downloaded on the left hand side of the Participate page on the STAR METRICS website. Note that data cannot be accepted until the MOU has been signed and sent to the NIH.

Additional technical meetings can be set up to provide additional information and support on collecting the requested data elements before the MOU is received.

Step 3: Research Institution Sends Sample Data

As part of phase I of the STAR METRICS project, research institutions are asked to provide information drawn from their administrative systems housing data on human resources, indirect costs, vendors, and sub-awards. The table below outlines the data elements we are requesting in Phase I.

The STAR METRICS team works with the research institution to send baseline quarterly data. Depending on the research institution, data can be accurately pulled from as far back as seven years or as few as 2 quarters. Multiple years of data permit long trend lines to be generated in the analytical reports.

The Data Dictionary and Technical Specification Guide provides further explanation of the data elements, the requested formats, and details on how to submit data. Typically, sample data represents the last quarter’s worth of research institution data.

Table 1- Data Elements Requested in Phase I

| | Data Element | Definition |
|-----------------------------------|----------------------------------|---|
| Information on Awards | Unique Award Number | The unique federal number as defined by concatenating the 6 position CFDA code with the assigned award id from the awarding Federal Agency (such as the federal grant number, federal contract number or the federal loan number) with a space in between the two numbers. Format example: 47.074 AGS-0120950 where "47.074" is the CFDA and "AGS-0120950" is the Federal Award ID. |
| | Recipient Account Number | Research institution's internal number for the award. |
| | Overhead Charged | Actual Overhead dollars charged to the award in the specified period. |
| Information on Individuals | Unique Award Number | The unique federal number as defined by concatenating the 6 position CFDA code with the assigned award id from the awarding Federal Agency (such as the federal grant number, federal contract number or the federal loan number) with a space in between the two numbers. Format example: 47.074 AGS-0120950 where "47.074" is the CFDA and "AGS-0120950" is the Federal Award ID. |
| | Recipient Account Number | Research institution's internal number for the award. |
| | De-identified Employee ID Number | Unique Employee ID (not Social Security number) of grant funded personnel |
| | Occupational Classification | Occupational classification / Job description of the funded personnel (ex. Faculty, Undergrad Student, Grad Student, Post Graduate Researcher, Research Support, Technician/Staff Scientist, Research Analyst/Coordinator, Clinicians) |
| | FTE Status | Designation of the status of the funded personnel (full time = 1.0, half time = .5) |

| | | |
|--------------------------------------|---|---|
| | Proportion of Earnings Allocated to award | Calculated portion of earnings charged by funded personnel to the award in the specified period. |
| Information on Indirect Costs | Overhead Salary +Fringe to Total Ratio | Proportion of overhead dollars that goes to pay salaries and fringe benefits. The calculation used is (Salary \$ + Fringe \$) ÷ Total Overhead Dollars. For more information, see the Indirect Cost Proposal Example. |
| Payments to Vendors | Unique Award Number | The unique federal number as defined by concatenating the 6 position CFDA code with the assigned award id from the awarding Federal Agency (such as the federal grant number, federal contract number or the federal loan number) with a space in between the two numbers. Format example: 47.074 AGS-0120950 where "47.074" is the CFDA and "AGS-0120950" is the Federal Award ID. |
| | Recipient Account Number | Research institution's internal number for the award. |
| | Vendor DUNS Number | The Vendor's 9 digit DUNS number. If DUNS is unavailable then substitute zip code with "Z" prefix so as to distinguish it from the DUNS number. |
| | Vendor Payment Amount | The funds charged to the award by the vendor in the specified period. |
| Sub-Awards | Unique Award Number | The unique federal number as defined by concatenating the 6 position CFDA code with the assigned award id from the awarding Federal Agency (such as the federal grant number, federal contract number or the federal loan number) with a space in between the two numbers. Format example: 47.074 AGS-0120950 where "47.074" is the CFDA and "AGS-0120950" is the Federal Award ID. |
| | Recipient Account Number | Research institution's internal number for the award. |
| | Sub-Award Recipient DUNS Number | The sub-recipient organization's 9- digit DUNS number. If DUNS is unavailable then substitute zip code with "Z" prefix so as to distinguish it from the DUNS number. |
| | Sub-Award Payment Amount | The charged to the award by the sub-awardee in the specified period. |

Step 4: STAR METRICS Team Provides Feedback and Reports

Once initial sample data is received, the STAR METRICS team will analyze the data and provide reports on job creation, retention, and changes from the previous quarter. In addition, the team assesses the general structure of the files and the specific data elements and provides recommendations on any changes needed to match the data formatting specifications. Appendix A provides more details on the job calculations the STAR METRICS team uses to generate reports.

Step 5: Research Institution Sends Recent and Historical Data

After the research institution receives confirmation that their sample submissions are in the correct format and reports can be generated from their data, research institutions are asked to send data as far back as is feasible without any additional burden. In order for the STAR METRICS team to provide a detailed analysis of historical data, it is preferred that historical data is submitted at the transactional level.

Step 6: STAR METRICS Team Creates Quarterly Reports and Maps

The final step is to process the information that has been loaded into the STAR METRICS database, produce and review the reports and return them to the research institution. The STAR METRICS team will run the processes that will create both quarterly reports and maps. These reports include one set of tables which report direct jobs and positions supported by federal science funding. Additional reports provide estimated jobs generated from funds sent to sub-awardees, purchases from vendors, and research support provided by

overhead expenditures. These reports and maps will be delivered to the research institution for their review and comment.

Phase II

The STAR METRICS team will be engaging in a consultation process with all stakeholders and Phase I-participating institutions during the fourth quarter of 2010 to begin the formal first step of conversations on for Phase II. All research institutions in Phase I will have the opportunity to provide input into the structure and design of Phase II.

Questions?

Please look at the FAQ's, Data Dictionary, Technical Specifications Guide, and Data Samples on the STAR METRICS website for further information.

Appendix A: Employment Calculations

STAR METRICS can be used to help support the employment calculations associated with ARRA spending. The calculations are consistent with ARRA reporting requirements in Section 1512 of Public Law 111-5, which requires:

- A. "A narrative description of the employment impact of the Recovery Act funded work. This narrative is for each calendar quarter and, at a minimum, will address the impact on the recipient's or federal contractor's workforce (for grants and loans, recipients shall also include the impact on the workforces of sub recipients and vendors).
- B. Provide a brief narrative description of the types of jobs created and jobs retained in the United States and outlying areas. This description may rely on job titles, broader labor categories, or the recipient's existing practice for describing jobs as long as the terms used are widely understood and describe the general nature of the work."

Source: Recipient Reporting Data Model - for quarter ending 12/31/2009 (www.recovery.gov)

Direct Jobs Calculated from Individuals Employed

| Information Requested | Required for element calculation |
|--|-------------------------------------|
| De-identified Employee ID Number | Parts A and B below |
| Unique Award Number | Verification and data quality check |
| Recipient Account Number | Verification and data quality check |
| Occupational Classification | Part B below |
| Proportion of Earnings Allocated to Award | Parts A and B below |
| FTE status | Parts A and B below |
| Calculation for Part A: $\sum_{n=1}^N \text{proportion of individual } n\text{'s time on stimulus awards} \times \text{FTE}_n$ | |
| Calculation for Part B is the same as Part A | |

This approach is identical to that discussed in Peter Orszag's memo of Dec 18 2009.

Estimates of Employment Resulting from Purchases made from Vendors

| Information Requested | Required for element calculation |
|--------------------------|----------------------------------|
| Unique Award Number | Validation |
| Recipient Account Number | Validation |
| Vendor DUNS Number | Calculation |
| Vendor Payment Amount | Calculation |

The vendor DUNS Number will be used to derive an industry code and geographic location¹. Economic Census data are used to generate estimates of the amount of salaries paid as a result of the grant

¹ The vendor zip code can be used (with the prefix "Z") if the DUNS number is unavailable.

revenues earned by the vendor². This is in turn divided by the average earnings of workers in that industry and geographic location to generate employment estimates derived from Economic Census data. As the project expands, these calculations can be directly generated from the administrative records of the respondents themselves.

Estimates of Employment Resulting from Sub Awards

| Information Requested | Required for element calculation |
|---------------------------------|---|
| Unique Award Number | Validation |
| Recipient Account Number | Validation |
| Sub-Award Recipient DUNS Number | Calculation |
| Sub-Award Payment Amount | Calculation |

The vendor DUNS Number will be used to derive an industry code and geographic location³. Economic Census data are used to generate estimates of the amount of salaries paid as a result of the grant revenues earned by the vendor⁴. This is in turn divided by the average earnings of workers in that industry and geographic location to generate employment estimates derived from Economic Census data. As the project expands, these calculations can be directly generated from the administrative records of the respondents themselves.

Estimates of Employment Resulting from Overhead

Estimates will be calculated using information from each research institution’s Indirect Cost Proposal. Please see the Indirect Cost Proposal Example on the STAR METRICS website for further information.

² <http://www.census.gov/econ/census07/>

³ The vendor zip code can be used (with a prefix of “Z”) if the DUNS number is unavailable.

⁴ <http://www.census.gov/econ/census07/w>