

Implementation Plan to Increase Public Access to Results of USDA-funded Scientific Research

November 7, 2014



United States Department of Agriculture

Revision History

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I. Introduction

This plan describes USDA's approach to increase access to scholarly publications and digitally formatted scientific data resulting from unclassified research results supported wholly or in part by USDA funds, to the extent feasible and consistent with law; agency mission; resource constraints; and U.S. national, homeland, and economic security. The plan is consistent with all policies and requirements set forth in the OSTP Public Access memorandum (February 22, 2013), and makes provisions to ensure that implementation of the plan:

- Contributes, in the long run, to raising the profile and reputation of the food, agricultural, and natural resources as providers of significant contributions to many areas of scientific innovation and value to society;
- Proceeds in close coordination with other science agencies and partnering organizations;
- Maintains the highest level of effective funding for science that resource constraints, agency mission, and consistency with the law allow;
- Minimizes the burden on the scientific community, including researchers, professional societies, and publishers;
- Allows flexibility in pursuit of disparate agency missions, operating models, stakeholder needs, and meeting the evolving expectations in the scientific community regarding access to scientific results;
- Provides public access to scientific results, without charge;
- Supports governance of and best practices for managing scientific results across USDA;
- Ensures effective access to and reliable preservation of scholarly publications resulting from USDA funds for research, development, and education; and
- Preserves and increases the use of research results to enhance scientific discovery.

Four categories of tasks will be carried out in a logical and practical manner:

- Policy
- Business processes, procedures, and resources
- Information systems and automation
- Outreach, education and training

Some of the above tasks are incremental extensions to programs already in place at USDA. Each category of tasks will be implemented in three phases: Phase I (2015), Phase II (2016), Phase III (2017 and beyond).

II. Public Access to Scholarly Publications

This section of the plan describes USDA's approach to increase public access to scholarly publications resulting from unclassified research results supported wholly or in part by USDA funds. As noted in the Introduction, the plan is consistent with all policies and requirements set forth in the OSTP Public Access memorandum (February 22, 2013).

A. Policy

The development of a departmental policy on public access to scholarly publications is USDA's first step to ensure compliance with federal laws, executive orders, directives, and policies. The policy enhances innovation and competitiveness by maximizing the potential to create new business opportunities. It will accelerate scientific breakthroughs and innovation as well as enhance economic growth and job creation. The policy serves as a roadmap for mission area and/or individual USDA agency compliance, and sometimes serves as a charge for mission areas and/or USDA agencies to undertake their own implementation.

In 2011, the Chief Scientist of the USDA established a Scientific Data Management Committee (SDMC) under the USDA Science Council. The USDA Science Council provides direction and guidance to the SDMC. The SDMC:

- Provides a platform for USDA agencies to collaborate through meetings, workshops and working groups.
- Reviews scientific data management policies and strategies of other Federal agencies to gain insight into scientific data management issues and practices that are relevant to USDA.
- Surveys USDA agencies' scientific data management policies, strategies, and plans.
- Develops a USDA public access policy to guide the creation, collection, organization, management, dissemination, and preservation of scholarly publications resulting from USDA funds.
- Establishes a USDA implementation plan for public access to research results, including scholarly publications and digital scientific datasets.
- Periodically assesses progress and determines whether course corrections are needed.

The USDA adopts a systematic approach to develop and implement a public access policy for scholarly publications that includes:

- Establishment of an iterative process of policy design, planning, implementation, evaluation/impact assessment, and policy redesign.
- Working in full and open consultation with stakeholders, including other federal organizing bodies, to maintain and improve this public access policy.

- Establishing a file download monitoring mechanism, enforcing a practical file download limit, and posting appropriate fair use policies to help prevent, to the extent feasible, the unauthorized mass redistribution of scholarly publications.

The USDA Public Access Policy for scholarly publications will apply to any manuscript that:

- Is peer-reviewed; and
- Is accepted for publication in a journal on or after the USDA approval of a final public access policy; and
- Arises from USDA funds, as defined in relevant OMB circulars A-21 and A-11, on or after the USDA public access policy's effective date. Extramural projects with previously established USDA funding instruments lacking a public access requirement are exempt unless amended, but are encouraged to follow the policy.

The USDA public access policy for scholarly publications will require that authors submit to the USDA public access archive system all final peer-reviewed journal manuscripts that meet the above criteria *once the manuscript is accepted for publication*. In lieu of the final peer-reviewed manuscript, USDA will accept the final published article, provided the author has the right to submit the published version. The USDA will ensure easy search and download of scholarly publications resulting from USDA funds without charge no later than 12 months following publication.

Key Milestones:

Phase I (2015)

- Draft policy – Develop a draft public access policy for scholarly publications resulting from USDA funds. USDA has developed a draft policy that was approved by the USDA Science Council in March 2013.
- Stakeholder inputs – Solicit and collect stakeholder inputs. USDA and other federal agencies participated in a public consultation hosted by the National Academy of Sciences in May 2013. Thirty-nine stakeholders were invited, including the Association of Public and Land-grant Universities, Entomological Society of America, and many others. Additional transparent processes will be established to solicit views from stakeholders including federally funded researchers, universities, libraries, publishers, users of federally funded research results, and civil society groups.
- Approved policy – Finalize the public access policy for scholarly publications and obtain the approval of the USDA secretary.

Phase II (2016)

- Policy in effect in 2016 – The policy will be in effect on January 1, 2016. Implementation will be prospective and, as noted above, unless approved by all of the authors and contributors. Extramural projects with previously established USDA funding instruments lacking a public access requirement are exempt unless amended, but are encouraged to follow the policy.
- Collect comments – Continuously solicit and collect stakeholder inputs and lessons learned.

Phase III (2017 and beyond)

- Revise policy to incorporate comments – Work in full and open consultation with stakeholders to continuously improve the public access policy.

B. Business Processes, Procedures and Resources

The OSTP policy directive will dramatically change the way agencies, other organizations, and individual researchers conduct both business and science. The USDA public access policy for scholarly publications establishes major implementation requirements to which USDA programs, offices, and procedures will adhere when addressing the planning, submission, management, access, and preservation of scholarly publications. USDA will adopt a systematic approach to implement the public access policy that will:

- Explore new approaches and partnerships with authors, federal agencies, publishers, publishing organizations such as CrossRef¹ and FundRef², and other stakeholders to obtain final peer-reviewed manuscripts or published articles.
- Ensure that the public can read, download, and analyze in digital form final peer reviewed manuscripts or final published documents without charge no later than 12 months following publication.
- Establish terms of use that require anyone downloading a publication or other documents agrees to properly attribute any subsequently used reference or quotation. The agreement will include reference to the appropriate legal consequence of non-compliance.
- Provide a mechanism for stakeholders to petition for changing the 12 month embargo period for a specific field by presenting clear evidences demonstrating that the USDA implementation plan would be inconsistent with the objectives articulated in the OSTP memorandum. Evidences can be emailed to the National Agricultural Library. Evidence presented will be weighed against the benefits of public access. The USDA will work with

¹ <http://www.crossref.org/>

² <http://www.crossref.org/fundref/>

other Federal agencies that also fund research in that field to coordinate consistent cross-agency policies.

- Ensure that publications be stored for long-term preservation while remaining publicly accessible for discovery, retrieval, and analysis.
- Adopt sound, non-proprietary preservation standards and archival formats for publications and associated content.
- Develop practical backup, migration, and technology refreshing strategies.
- Partner with other appropriate scholarly publication archives across the federal, academic, and business communities.
- Develop a business plan that details a sustainable funding model for approval by the USDA Science Council no later than January 2016. An initial PubAg system development effort was supported by a working capital fund through the National Agricultural Library. The recurring operating and maintenance costs will be supported by existing research budgets.

Key Milestones:

Phase I (2015)

- Implementation team and structure – Establish a virtual public access implementation team and proper management structure to develop an implementation plan, execute the plan, and carry out the implementation effort.
- Publisher negotiation – Negotiate with publishers to establish agreements for automatic article ingestion, preprocessing, and access. In 2012, USDA’s researchers published papers in more than 1,700 journals with more than 400 publishers.
- Submission flow and structure – Develop a robust submission flow and establish proper organizational structures to process, organize, and manage article submissions for review and publication.
- Quality assurance mechanisms – Establish systematic quality assurance processes and allocate proper resources to review and curate article submissions to ensure high quality.
- Compliance mechanisms – Establish proper mechanisms (e.g., Digital Object Identifiers, PubAg ID, FundRef interfaces, and APIs) to facilitate compliance. Current oversight of grants and other financial assistance allows for withholding or adjustment of funds at the end of each performance period. Failure to comply will negatively influence future funding opportunities.

Phase II (2016)

- Cost model – Develop a practical cost model to record and report the operational cost of implementing public access to scholarly publications. The cost model could be publication- or annual-based and will be developed and determined by the USDA Science Council.

- Operation funding mechanisms – Develop practical and sustainable funding mechanisms to ensure the permanent operation, preservation and long-term accessibility of USDA’s scholarly publications.
- Terms and conditions – Develop proper copy right languages for grant terms and conditions.
- Publisher agreements – Establish agreements for automatic article ingestion, preprocessing, and access with major publishers and journal titles.
- Submission flows and mechanisms – Establish flexible flows for manuscript submission. Accept manuscripts in a range of common electronic formats.
- Compliance reporting – Develop processes to collect and report compliance information.

Phase III (2017 and beyond)

- Collaboration arrangements – Collaborate with partners to maximize the potential for interoperability between public and private platforms and creative reuse to enhance value to all stakeholders, and thereby maximize the impact of the Federal research investment.
- Publication and dataset linkage – Define processes and identify resources to facilitate the linkage between scholarly publications and corresponding scientific datasets.

C. Information Systems and Automation

USDA plans to leverage its existing investments in public access tools and repositories of full-text scholarly publications (e.g. Agricultural Online Access Database, NAL Digital Collections, Automatic Indexing System, and NAL Thesaurus) to create the foundation for an expanded repository suitable for achieving the objectives of the new public access policy. NAL’s Agricultural Online Access Database currently holds more than 5 million citation records and Digital Collections currently house more than 90,000 scholarly articles. USDA also plans to collaborate with public and private partners on the implementation of parts of this expanded and enhanced repository system in order to avoid unnecessary costs to USDA’s science enterprise. This system will:

- Store, organize, and manage the publications collected or submitted under the public access policy for scholarly publications.
- Be established using an open architecture and follow industry standards to facilitate open government, enable integration, and promote interoperability.
- Have the capacity to integrate scholarly publications with appropriate scientific databases.
- Integrate easily into USDA science agencies’ websites.
- Apply best practices, advanced technologies, and industrial standards to provide access for persons with disabilities consistent with Section 508 of the Rehabilitation Act of 1973.
- Adopt common standards to enable integration and interoperability with other federal public access archival solutions and other appropriate archives.

- Implement an agency strategy and establish mechanisms for measuring and enforcing compliance.

An analysis of alternatives was conducted in early 2013 to compare the costs, benefits, feasibility, risks, and issues related to various approaches. A modular and hybrid approach was recommended to develop the desired system solution. A conceptual view of the system called PubAg is illustrated in Figure 1. This design leverages existing USDA investments and software modules, open source software tools, private sector products, and reusable modules produced by the National Library of Medicine, Data.gov and other organizations.

A beta version of the PubAg system (<http://pubag.nal.usda.gov>) has been developed and became publicly available October 1, 2014. The current PubAg system supports the submission of articles from authors, data management, article indexing, search and discovery of articles, and preservation mechanisms. Further enhancements are planned to enable article ingestion from publishers, to support text mining and discovery, and to interface with USDA project tracking systems to monitor and enforce public access policy compliance.

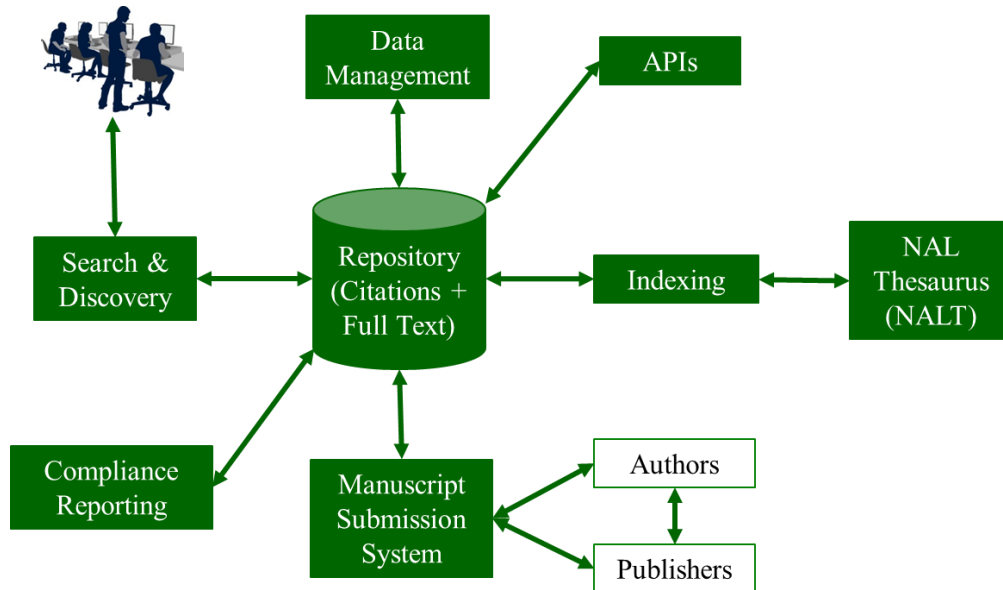


Figure 1 – PubAg: Public Access to Agricultural Scholarly Publication System Architecture

Key Milestones:

Phase I (2015)

- Standards and formats – Adopt industrial metadata standards and full-text formats for manuscripts and final published articles. Ensure full public access of publications’ metadata without charge upon first publication in a data format that ensures interoperability with

current and future search technology. Where possible, the metadata will provide a link to the location where the full text and associated supplemental materials will be made available no later than the 12 month embargo period.

- Technical approach – Analyze the pros and cons among central, distributed, and hybrid approaches. Select a practical approach for the implementation.
- Preservation approach – Evaluate and adopt best practices and open technologies for long-term preservation.
- System architecture – Develop system architecture to serve as a blueprint for system implementation and deployment.
- Manuscript submission system module – Develop a manuscript submission system to accept both final peer-reviewed manuscripts and published papers from authors or publishers.
- Data management module – Develop capabilities to manage metadata generation, acquisitions, quality control, and auditing.
- Search and discovery module – Develop a web-based user interface for searching, browsing, and accessing citations and full-text articles.
- Compliance reporting protocols – Define formal protocols for collecting and reporting compliance information.
- Information exchange Application Program Interface (API) protocols – Define formal protocols to facilitate machine interface with external systems and to enable the implementation of compliance tracking.

Phase II (2016)

- Multiple input formats – Accept manuscripts in a range of common electronic formats.
- Publisher interface module – Facilitate access or upload of full-text articles from publishers.
- Preservation and curation standards – Use standards, widely available and, to the extent possible, nonproprietary archival formats for text and associated contents. Provide for long-term preservation and access to the content without charge.
- Compliance reporting module – Develop a system module to automate the collection and report of necessary compliance information based on the defined protocols.
- Information exchange APIs – Develop various APIs to facilitate machine interface with external systems.

Phase III (2017 and beyond)

- Partner exchange modules – Develop robust modules to harvest and share repository contents and system services with partners.
- Preservation and curation modules – Develop system modules to facilitate permanent preservation and long-term accessibility of peer-reviewed scholarly publications.

- Publication and dataset linkage – Develop system modules to facilitate and automate the linkage between scholarly publications and corresponding scientific datasets.

D. Outreach, Education and Training

Public access to federally-supported research results presents a new challenge for many USDA science professionals, awardees, and other stakeholders. As such, outreach to these stakeholders that includes proper education and training are critical to the success of public access implementation. Major stakeholders include:

- USDA science support professionals – These professionals will undertake the mechanics of writing requests for applications, ensuring policy compliance, collecting and compiling project reports that will measure success, and developing systems to track compliance. Collaborate with FundRef to add funding agency identifiers to manuscript/article metadata. A combination of FundRef, Digital Object Identifier (DOI), compliance reporting Application Program Interfaces (APIs), and article metadata will be used for compliance reporting and enforcement.
- Partners' administrative professionals – Support professionals at universities and other science organizations ensure project director and organizational compliance, are heavily involved in the research reporting process, and oversee business processes that will be affected by the implementation of the policy.
- Leaders in scientific societies, professional organizations, and other affected stakeholder groups – Because these individuals advocate for scientific fields and their members, complete USDA transparency to this group is a must.
- USDA intramural and extramural Scientists – Scientists will need to learn how to submit scholarly publications and relevant metadata to the PubAg system.

Outreach activities will take several forms:

- Awareness presentations and electronic communications to staff, professional organizations and scientific societies:
 - USDA scientists and support personnel will undertake these activities during the early implementation phases. Already, 300 people have received training on manuscript submission; 50 have received training on compliance tracking. These experiences help inform planning for large-scale outreach.
 - Changes to extramural award terms and conditions and other policy and procedural requirements will be communicated to stakeholders in coordination with other science agencies.
- Collection of stakeholder input via:
 - The Federal inter-agency working groups

- Outreach meetings and presentations
- Other feasible methods

Key Milestones:

Phase I (2015)

- Talking points – Develop a standard set of talking points to describe the policy and implementation plan of public access to scholarly publications.
- Outreach plan – Develop a comprehensive outreach plan to enable a full and open consultation with all stakeholders to continuously improve the public access policy and implementation.
- Training plan – Develop a training plan to analyze target audiences; identify training needs; outline training methods; describe training materials; outline training modules; define training roles, responsibilities and requirements; plan training schedule; as well as sketch evaluation methods.

Phase II (2016)

- Training modules – Develop training curricula that include the course title, course design, contents, delivery methods, potential instructors, and required associate course materials.
- Online training modules – Develop training modules with proper technology for online delivery.
- Workshops – Develop workshop plans that include objectives, target audiences, activities, handouts, facilities, feedbacks and evaluation mechanisms.

Phase III (2017 and beyond)

- AgLearn training module – Develop a training module to be delivered through AgLearn, the USDA online learning university.
- Expanded training modules – Continue to revise, improve, and expand training modules.

III. Public Access to Digital Scientific Data

This section describes USDA's approach to increase public access to digitally formatted scientific data as defined in the OSTP Public Access memorandum (February 22, 2013). In addition to the overall objectives described in section I, this section of the plan makes provisions to ensure that implementing access to digitally formatted scientific data:

- Preserves publicly accessible digitally formatted scientific data for search, retrieval, and analysis;
- Recognizes proprietary interests, business confidential information, and intellectual property rights, and avoids significant negative impact on intellectual property rights, innovation, and U.S. competitiveness; and
- Protects confidentiality and personal privacy

A. Policy

The development of a departmental policy on public access to digital scientific data is USDA's first step to ensure compliance with federal laws, executive orders, directives, and policies. The policy enhances innovation and competitiveness by maximizing the potential to create new business opportunities. It will accelerate scientific breakthroughs and innovation as well as enhance economic growth and job creation. The policy serves as a roadmap for mission area and/or individual USDA agency compliance, and sometimes serves as a charge for mission areas and/or USDA agencies to undertake their own implementation.

A portion of the data that will be affected by this policy falls under the implementation of OMB M-13-13. Therefore, part of the departmental policy will promote consistency between agencies and across intramural and extramural research programming. Implementation of M-13-13 is currently proceeding. This includes the enterprise data inventory required in Section III.3.a of OMB Memorandum M-13-13 ("Open Data Policy – Managing Information as an Asset", May 9, 2013). More information about USDA M-13-13 efforts can be found on [USDA's web site](#). Extramural programs are in various states of adoption of open data best practices. The departmental policy, coupled with the publication of this plan, will ensure that USDA agency open data efforts proceed in a coordinated fashion.

Upon final acceptance of the USDA Public Access to Data plan by OSTP and OMB, USDA will begin authorship of such departmental policy for approval by the Secretary. The departmental policy will take into account the OSTP and OMB review of this draft plan, past and current stakeholder input, and experience with existing efforts in the Department that provide science value-added access to

scientific data.³ This policy will contain, at a minimum, the following elements that address internal and external research:

- Scope of the policy and definitions from relevant OMB circulars, as they relate to the Department;
- Responsibilities of parties within the Department for data access implementation, to include: the Office of the Secretary, Subcabinet officials, the Chief Scientist of the Department, Chief Information Officer of the Department, intramural and extramural research agency Heads, and additional officers vested with authority and responsibilities for implementation;
- Formation of a USDA Science Output Access Policy (SOAP) Council, which will be co-chaired by the USDA Chief Scientist (or SES designee) and the USDA Chief Information Officer (or SES designee), with representation from key intramural and extramural science Agencies in the Department;
- A process for periodic review and revision of the science output access plan, as well as the policy itself.

In the interim, the Chief Scientist of the Department, working with other Agencies and Mission Areas through the USDA Science Council, will lead USDA Public Access to Scientific Data policy development until the SOAP Council is in place.

Tasks of the USDA Science Output Access Policy (SOAP) Council

After approval of this implementation plan, either the SOAP Council or its Science Council predecessor will conduct the following activities to the extent feasible and consistent with law; agency mission; resource constraints; U.S. national, homeland, and economic security:

- Establish policies and strategies that will result in compliance with the OSTP Public Access memorandum in the following areas:
 - Meeting Public Access goals and objectives;
 - Business Processes, Procedures, and Resources;
 - Information Systems and Automation; and
 - Outreach, Education, and Training
 - Development of an agency strategy for measuring and enforcing compliance for both intramural and extramural research activities

The SOAP Council will establish an overall USDA leader in each of the five areas, foster synchronization among these areas and across the department, and ensure close

³ Existing science value-added efforts within the Department to promote public access to digital scientific data include USFS Research Data Archive, NIFA/NSF iPlant initiative, ARS National Plant Germplasm System, and NRCS Geospatial Data Gateway.

coordination with other science agencies and partnering organizations. Milestones and their target dates, as described in this document, may be altered because of these efforts.

- Seek robust, ongoing, and high-level feedback from internal and external stakeholders, including:
 - Federally funded researchers,
 - Universities,
 - Libraries,
 - Publishers,
 - Users of Federally funded research results, and
 - Civil society groups

- Compile an inventory of intramural and extramural research activities that will be affected by the OSTP Public Access memorandum. This inventory will serve as a baseline, and will categorize the current state of intramural and extramural research activities as:
 - Category 1: In full compliance with the directive;
 - Category 2: In partial compliance with the directive and share some data in some fashion, with an explanation of the shortfall;
 - Category 3: Do not currently share data; and
 - Category 4: Likely to be excluded from the scope of the directive, including the reasoning for that exclusion

This inventory will serve as the basis for measurement of departmental compliance with the OSTP directive. Intramural and extramural work on this inventory is already proceeding. However, final categorizations will be informed by the aforementioned departmental policy, as guided by stakeholder input. The inventory will identify existing activities that might serve as model programs. Inventory information on research activities in Categories 2 and 3 will be used to prioritize implementation efforts, recognizing that some research activities will face significant adoption challenges given near term systems and resources. For Category 4, agencies will identify barriers for activities that face significant adoption challenges and propose possible solutions where appropriate.

Additionally, this inventory will provide a broad overview of the significant intellectual property, attribution, security, and other crosscutting challenges that are likely to be encountered during implementation of the plan.

- Periodically review data set citation recommendations. While current departmental approaches for identifying and providing appropriate attribution to scientific data sets represent modern best practices, this element of the plan recognizes that the science community's approach to data set attribution may evolve over time.

- Cooperate in the authorship of the IT and Business Plan study described later in this document.
- Author and submit to the Science Council an option memo that provides Agencies with guidance on the strengths and weaknesses of the following strategic IT policy options:
 - Development of a USDA data repository for all federally supported research data;
 - Contribution to a single federal wide data repository;
 - Encouragement of a highly interoperable federal, academic, private hybrid system

This memo will be informed by the aforementioned inventory as well as the in-depth study discussed in the information technology section of this document. It will assess and take into account the long-term needs for the preservation of scientific data in the food, agricultural, and natural resources fields, probable implementation costs, and additional Agency and Mission Area policy requirements needed to measure and enforce compliance with each respective option. Further, these options should include alternative funding requirements and business models that will contribute to a final business plan.

The SOAP Council will develop and present action and policy recommendations, complete with a recommended business plan that details a sustainable funding model, for approval by the USDA Science Council no later one year after approval of this implementation plan based on these options. This sustainable funding model will identify resources within the existing agency budget to implement the plan.

Key milestones (2015 – 2016):

- OSTP and OMB approve USDA’s implementation plan for access to digital scientific data
- USDA convenes SOAP Council and begins drafting departmental policy
- Complete inventory of affected programs and their categorization
- USDA publishes departmental policy
- Provide option memo with guidance for Agencies and Mission Areas

B. Business Processes, Procedures and Resources

While some programs and Agencies have significant experience with providing public access to scientific data, the OSTP Public Access memorandum will dramatically change the way that all USDA Agencies, partner organizations, and individual researchers do their work. A phased implementation is necessary to secure the benefits of increasing access to federally funded research without causing undue disruption to the research system that the public relies on for new discoveries. Implementing long-term preservation of and public access to digital scientific data will require substantially more training and acculturation than improving public access to scholarly publications, as relatively few USDA scientists or research agreement awardees have practical experience with this activity. The scientific community’s delivery infrastructure for digital scientific

data is also much less mature than the analogous infrastructure for scholarly publications. Portions of USDA-funded scientific data sets reside on scientists' computers, and data set documentation resides primarily in the heads of the scientists working on the individual research projects.

Phase 1 (Learning and Expansion: 2015 - 2016)

As previously discussed, several programs are already substantially in compliance with the Public Access memorandum, and others can serve as pilots for expansion. Affected agencies will form implementation teams to facilitate learning from existing programs and to oversee the success of pilots for expanding implementation of the policy. These agency teams should coordinate business process, procedures and resources with their counterparts across the department and report regularly to the SOAP Council. The SOAP Council will be responsible for coordinating activities of implementation teams with efforts by science agencies outside the Department to implement the Public Access to Scientific Data policy. However, agency teams might need to work directly with agencies in other departments to coordinate activities. Agency implementation teams and the SOAP Council will solicit and evaluate stakeholder input. Based on this input, the following are likely steps that will foster compliance with the new departmental policy:

- Performance standard and element modification;
- Agency and/or Mission Area intramural research project management guidelines;
- Award terms and conditions;
- Request for application templates;
- Grants.gov and agency grant preparation instructions (general instructions, FAQs, application checklist, lengthening minimum page standards to accommodate data management plans, etc.);
- Guidance for the inclusion of appropriate costs for data management and access in extramural funding proposals;
- Project data management plan evaluation rubrics to ensure proper assessment of plan merits;
- Encouraging scientific journals to require data availability as a condition of publishing research articles; and
- Other steps as necessary

For internal researchers, the key steps will include building open data-related compliance into performance standards and elements, ideally including the Research Grade Evaluation process. Data management plans for extramural research will be evaluated as a part of grant applications and periodically verified as part of reporting. Non-compliance will jeopardize current and/or future agency funding. The approach created by USDA Forest Service and the Joint Fire Science Program (JFSP) to track compliance with data preservation and access components of JFSP awardees' data

management plans can inform the development of compliance mechanisms for USDA research grants and contracts.

USDA science and science support employees who participate in pilots and teams will be seen as forward-looking leaders. Activities may include the following recommended best practices:

- Publishing intramural data through existing public sites and data repositories;
- Presenting in-service best practice workshops for USDA colleagues;
- Authorship of research project data access plans;
- Leadership of extramural programs calling for data management plans;
- Creation of discipline-based data standards and/or repositories;
- Conducting outreach activities for external scientists;
- Developing IT or business process infrastructure to manage increased public data access;
- Service on an agency public data access implementation team; and
- Participating in Public Access to Data policy development

In 2015, the USDA-level working group will solicit information about pilot participation from affected agencies as one measurement of compliance. This information will be reported to the SOAP Council no later than 60 days after the solicitation is distributed to affected USDA agencies.

Phase 2 (Mainstream Implementation: 2016 - 2017)

The Learning and Expansion phase will inform the Mainstream Implementation phase, in which policy implementation is extended throughout the Department's science enterprise. Performance guidance will include increased public data access as a standard for USDA scientists and support staff. Changes to extramural award terms and conditions and other policy and procedural requirements will be communicated to stakeholders in coordination with other science agencies. USDA will also notify awardees and other federally funded scientific researchers of their obligations via requests for applications, federal register notices, and changes in award terms and conditions, as necessary. Extramural research program requests for applications will begin to require data management plans as a part of new proposals; similarly, new intramural research studies will require data management plans. These data management plans will, at a minimum, describe how the researcher(s) will provide for long-term preservation of, and access to, the digital scientific data created by the proposed study. Alternatively, researchers can explain in their data management plans why long term preservation and access cannot be justified, if applicable. USDA will reserve the right to review and disallow the researcher's argument against long-term preservation and access and require conformance to the access policy for digital scientific data as a condition of funding. New extramural research programs and intramural research projects will begin as Category 1 (in full compliance) beginning in 2016.

All USDA-funded researchers will be required to comply with USDA's policy for making the digital data underlying the conclusions of peer-reviewed scientific research publications freely available in public repositories in machine readable formats. USDA will ensure that data management plans include clear plans for sharing research data. USDA will also ensure new awards to researchers are not made unless the researcher has successfully satisfied all terms of completed previous awards from USDA, including making digital data produced in the course of previous USDA-funded research freely available in compliance with the relevant data management plans for the previous awards.

In 2016, Agencies and Mission Areas will report to the SOAP Council on intramural and extramural Category 2 & 3 science programs that are not prepared to expand public access to research data. Reports will describe barriers to expansion and plans to improve adoption.

Phase 3 (Sustainable Adoption: 2018 and beyond)

Agencies will be expected to make substantial progress to improve data sharing, while preserving the balance between the: 1) relative value of long-term preservation and access; and 2) associated cost and administrative burden. Post award compliance mechanisms will be perfected and added to award terms and conditions. Progress will be reported to the Directors of OSTP and OMB regularly through the SOAP Council or its designated successor organization. It is important to note that some research, due to feasibility; privacy; consistency with law; business confidential information and other proprietary interests; agency mission; resource constraints; and/or U.S. national, homeland, and economic security will not afford public access to data. This could be the case for entire research programs, including the Small Business Innovation Research program and some research capacity funding programs.

Key Milestones:

Phase 1 – Learning and Expansion (2015 – 2016)

- Pilot programs identified
- Agency implementation teams formed
- Draft updates to performance standards and elements completed
- SOAP Council solicits progress reports
- Agencies submit progress report to SOAP Council

Phase 2 – Mainstream Implementation (2017)

- Final publication of new award terms and conditions, which have cleared the required federal register process, as well as concomitant grant and agreement documents and other resources (post award compliance mechanism work ongoing)
- Fiscal year performance plans incorporate new performance standards
- Agencies report non-early adopting projects and programs

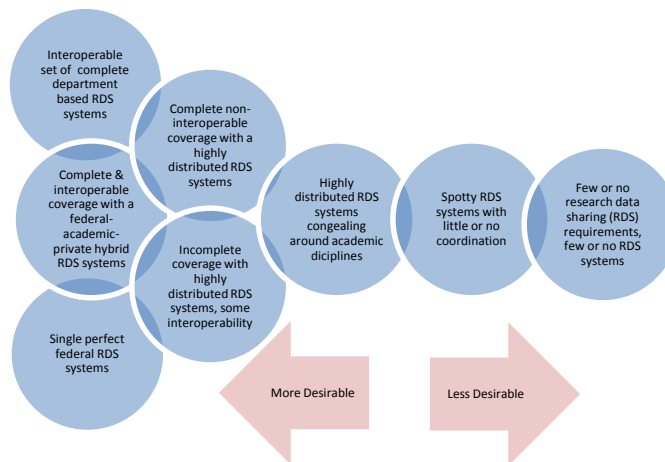
- Projects and programs broadly adopt public access protocols; on-going redirection of internal resources to support phased adoption; intramural and extramural research may follow different tracks
- Experience provides feedback on the public access protocols – semi-annually throughout the phased adoption process
- SOAP Council solicits progress reports
- Agencies submit progress report to SOAP Council

Phase 3 – Sustainable Adoption (2018 and beyond)

- Adoption across USDA’s science enterprise is completed and supported by sustainable systems – 6 years after initial plan approval and decades into the future
- SOAP Council solicits progress reports – annually throughout phased adoption; possibly biannually for up to four years after adoption is completed
- Agencies submit progress report to SOAP Council – not more than 30 days after solicitation
- Cultural shift in USDA science community successfully implemented – 2025 and beyond

C. Information Systems and Automation

The graphic below shows a desirability continuum of research data sharing information systems.



- An IT and Business Plan study will be submitted by the SOAP Council during Phase 1 that discusses findings and recommendations in the following areas, at a minimum:
 - An inventory of appropriate, available, and/or developing federal and non-federal data repositories, which are currently or are poised to receive research data consistent with the requirements of new federal open data access policies;

- Potential public-private partnerships with foundations and other research funding organizations, including the new Foundation for Food and Agriculture Research as proposed in the President’s 2015 Budget;
- Data standards common to single and multiple disciplines in the food, agriculture, and natural resources sectors;
- Recommended near-term modifications to the CRIS system and REEport to allow accommodation of data management plan information, more robust metadata, and new compliance tracking;
- Potential for REEIS and other existing systems to serve as public metadata portals;
- Identify ways to optimize search, archival, and dissemination features, and ensure long-term stewardship of the results of federally funded research. For example, the Forest Service Research Data Archive (FS RDA) participates in CrossRef, science.gov, and Thomson-Reuters Data Citation Index to improve search. In addition, FS RDA data sets are considered permanent Federal records, ensuring long-term stewardship by the agency and NARA; and
- Strategies being pursued by the largest science agencies (NIH, NSF, others) to increase public data availability

This study should be informed by previously identified Category 1 and pilot programs that are leading departmental efforts. As part of Phase 1, the SOAP Council will use this study to develop near-term action recommendations for approval by the USDA Science Council.

- Encourage development of discipline-based data management standards and data repositories by scientists who are undertaking pilot program activities. As soon as possible after the aforementioned data repository inventory is made available, key portions should be made available to all USDA scientists.
- Prototype first round of changes to the CRIS system and REEport to accommodate data management fields by the end of Phase 1.
- Develop a catalog of data sets generated via USDA-sponsored research to enable researchers to locate and cite data sets and to link those data sets to the scientific literature. This catalog is expected to be part of the comprehensive public listing of agency data that is required by the 2013 May 9 Executive Order and OMB Memorandum M-13-13. The USDA data catalog will serve not as a repository of study data, but as a registry that will have information describing the data set (i.e. metadata) and information about where and how to access the data. The metadata in the catalog will be able to provide both scientific metadata and the Federal government’s common core metadata scheme (available at <https://project-open-data.cio.gov>).
- USDA will explore the development of a research data commons, a federated system of research databases, along with other Departments and Agencies for storage, discoverability, and reuse of data with a particular focus on making the data underlying the

conclusions of peer-reviewed scientific publications resulting from federally funded scientific research available for free.

Key Milestones (2015 – 2016):

- SOAP Council receives working group study that includes an inventory of existing data repositories, potential public-private partnerships, prospective changes to reporting systems, and other near-term action recommendations
- USDA Science Council decides near-term action recommendations
- Strategic options memo presented to the SOAP council
- Pilot data standards and repository development undertaken by USDA are summarized
- USDA Science Council decides strategic data management directions and long term action recommendations
- Initial changes to REEport are prototyped to accommodate data management reporting, in coordination with other science agencies that use Research Performance Progress Reporting standards

D. Outreach, Education and Training

Public access to federally supported research data is a new concept for many USDA science professionals, awardees, and other stakeholders. USDA needs to provide training, education, and workforce development related to data management, analysis, storage, preservation, and stewardship, in coordination with other agencies and the private sector. This will include:

- USDA Intramural and Extramural Scientists – Scientists will need to learn how to develop high quality data management plans, the most effective avenues to make data public, and best practices to facilitate re-use of the data.
- USDA Intramural and Extramural National Program Leaders – National Program Leaders will need to become informed about the current state of public data access in their fields in order to provide the best possible science leadership.
- USDA Extramural Program Panelists and Panel Managers – Panelists and panel managers will need to learn how to evaluate data management plans. USDA will examine current best practices in this area and develop guidance for program panelists and panel managers during the pilot year. USDA Forest Service’s experience with Joint Fire Science Program’s implementation of data management plans in 2011 is expected to provide insight.
- USDA Science Support Professionals – These professionals will undertake the mechanics of writing requests for applications, ensuring policy compliance, collecting and compiling project reports that will measure success, and developing systems to track compliance. Researchers must report on execution of their data management plan in their final reports to the agency. For intramural program staffs, the key step to ensuring this will include building data access-related compliance into performance reviews. Data management

plans for extramural research will be evaluated as a part of grant applications and periodically verified as part of reporting; extramural program staffs will play a key role in this process. Non-compliance will jeopardize current and/or future agency funding, a process that will be implemented by extramural program staffs.

- Partnering Administrative Professionals – Support professionals at universities and other science organizations ensure project director and organizational compliance, are heavily involved in the research reporting process, and oversee business processes that will be affected by the implementation of the policy.
- Leaders in scientific societies, professional organizations, and other affected stakeholder groups – Since these individuals advocate for their scientific fields and membership, complete USDA transparency to this group is critical.

Outreach activities will take several forms:

- Awareness presentations and electronic communications to existing professional organizations, scientific societies;
 - USDA scientists and support personnel will undertake these activities during the pilot and early implementation phases
- Collection of stakeholder input via:
 - Applicable Federal Advisory Committees
 - Presentations and outreach activities
 - Non-formal methods
- Formal training and job aid development and delivery, including job aids to facilitate panelist evaluation of data management plans.

The SOAP Council Outreach, Education, and Training group will coordinate these activities.

In 2015, this working group will publish a set of official USDA-wide talking points for use by USDA scientists and other leaders to use at existing venues where stakeholders gather. These talking points will be approved by the USDA Office of Communications and the USDA Science council by this date. Based on these talking points, this group will conduct an internal USDA webinar to create awareness among USDA scientists and support personnel.

The working group will coordinate with Federal Advisory Committees to assess the knowledge needs of the stakeholders outlined above. It will poll the affected agencies to determine the sorts of stakeholder questions that are being received and the types of training being requested. In 2015, the working group will compile an inventory of all existing, planned, and unplanned but required training based on individual agency needs. The working group will coordinate the development of this training within USDA to reduce duplication, as well as facilitating adaptation of existing training published by other agencies, universities, and other organizations. The majority of these resources required for the implementation phase will be complete by 2016. With

guidance by the working group, agencies will develop and share these resources utilizing the most appropriate medium for the audience and message.

Key Milestones (2015 – 2016):

- Official USDA-wide talking points developed and approved
- Conduct webinars for USDA science and support personnel; make available for viewing
- Meet with applicable Federal Advisory Committees and poll agencies to assess training needs
- List of existing, planned, and unplanned but required training created
- Complete coordinated agency efforts to make future training available

Key Milestones (2016 and beyond):

- Institutionalize the provision of regular and ongoing training and outreach information regarding increasing access to publically funded research data for internal and external scientists and stakeholders.
- Refine training and outreach materials as needed.