**USDA Cooperative State Research, Education, and Extension Service**

**One Solution Initiative**

Business Case

April 28, 2005

# CONTENTS

## Executive Summary

The Cooperative State Research, Education, and Extension Service (CSREES) provides national program leadership and Federal assistance to advance knowledge for agriculture, the environment, human health and well-being, and communities.  The agency accomplishes this mission by providing program leadership and funding for research, education, and extension work within the land-grant university system and among other partner organizations.

Because CSREES accomplishes its mission through grants and other Federal funds provided to partners, reporting is critical to the agency's activities.  CSREES collects reporting data to manage programs, ensure proper use of Federal funds, and to assess progress, outcomes and impacts of Federally-funded activities.  However, current reporting processes often do not enable CSREES and its partners to effectively manage reporting data in support of the agency's mission, do not include key aspects of the agency's work, and prevent the agency from demonstrating the impacts and outcomes of its programs to the public.  Further, inefficiencies in current reporting processes have created a significant time burden for partners in completing reporting and for staff in managing incoming data and creating oversight and accountability reports.  These issues have developed due to CSREES' history as two separate agencies, the separate evolution of the agency's 60 programs (many with independent processes not integrated with other agency reporting), and a number of disconnected agency-wide and program-specific IT systems used to support reporting.

> *Partners currently face differing processes for submitting the nearly 100 data collections required by CSREES*

These reporting issues and inefficiencies are exacerbated by the increasing demands for accountability data placed upon CSREES and its partners.  Congress, OMB, and others are increasingly looking to the agency to provide data linking program inputs, outputs, and outcomes to the agency's strategic goals, through the Budget and Performance Integration initiative and the Program Analysis Rating Tool (PART) process.  Although the agency and its partners have worked hard to provide the necessary data, a lack of agency-wide reporting capabilities and insufficient data collected (particularly regarding extension work) has resulted in increasing workloads requiring consultation with multiple sources and manually calculated results.

### One Solution: An Integrated Approach to CSREES Reporting

One Solution seeks to address the shortcomings of the existing reporting environment through an integrated approach that ties together reporting systems and processes across all CSREES programs.  One Solution will fulfill three major goals:
- Simplify reporting and reduce burdens for grantees;
- Improve the quality of accountability data and better equip the agency to meet increasing performance and budget reporting expectations; and
- Reduce effort required to complete reporting-related processes, allowing staff members to focus on program leadership and active, portfolio-based management.

One Solution provides a single approach to improving reporting for the agency and its partners, recognizing that the many programs, activities, and processes at CSREES require reporting capabilities that are flexible and take into account the unique needs of research, education, and extension. This approach encompasses both improvements to information technology systems and processes and procedures governing reporting at the agency:

*One Solution is a focused, integrated business approach, not a new computer system*

- ***Information technology improvements.*** To enable agency-wide collection, storage, and analysis of reporting data, One Solution will enhance existing reporting systems (such as REEIS), with data coordinated across systems by a central data repository and with all users (internal and external) accessing CSREES reporting systems through a single Web-based reporting 'portal.' New components will support a restructured Plan of Work and collect financial and compliance forms, enable capabilities for automated notifications of key events (such as reports received by the agency or report deadlines for partners), and allow electronic routing, review, and approval of reports. Finally, advanced analysis tools will allow for automated generation of key reports and display customized information for each system user on its reporting home page.

- ***Business process and data improvements.*** Because new technology and analysis features are not useful without processes to ensure that all necessary data is collected and appropriately managed, One Solution includes a number of business process and data improvements. Many of these focus on the development of data standards and structures to ensure that data can be consistently used across the agency's programs, eliminating the need to collect the same information multiple times and ensuring that data can be aggregated across programs to provide a truly agency-wide view of CSREES' activities. Further improvements focus on standardizing forms and processes across programs, minimizing the need for program-specific forms by developing forms and processes that can serve the needs of as many programs as possible.

An implementation approach that leverages existing systems, one of three options studied, will provide CSREES and its partners with all desired capabilities while minimizing cost and ensuring flexibility. This vision, to be implemented over a four-year period, has been carefully designed to rapidly provide key functionality (such as a system to enable collection and analysis of the new Plan of Work) in time to meet regulatory deadlines and to ensure that CSREES staff and partners begin realizing system benefits within the first year of implementation. Governance structures for managing reporting at the agency, identification and mitigation of risks, and establishment of performance metrics and targets will further support One Solution's success.

**Value for Staff, Partners, and the Public**

One Solution's new features and capabilities will have significant effects for all key CSREES stakeholders:

- CSREES **national program leaders and staff** will be able to more easily access and navigate reporting data and will have access to analysis tools that integrate data currently stored in disparate locations.
- **Land-grant universities and other partners** will face a reduced reporting burden, have access to more meaningful reports and analysis tools for managing their programs and reporting to state legislatures, and encounter an improved user experience.
- **Congress, OMB, other oversight bodies, and the public** will receive higher-quality, more accurate accountability data that more effectively demonstrates how CSREES' activities support its mission and goals.

In addition to improving the experiences and capabilities of CSREES' stakeholders, One Solution will support the agency's overall strategic, operational, and financial performance. Specifically, One Solution will benefit CSREES by enabling the agency to better support the President's Budget and Performance Integration, Management Agenda, and eGovernment initiatives, as well as the Agricultural Research, Education, and Extension Reform Act of 1998 (AREERA) and the Government Paperwork Elimination Act of 1998 (GPEA). The initiative will further improve agency operations by reducing the effort required for both partners and staff to create oversight and accountability reporting and significantly improving report quality.

**Financial Value**

One Solution will create significant financial value for CSREES and its partners. The initiative is conservatively estimated to generate over $20 million in benefits over seven years, including savings to both the agency and its partners.

> *For every $100 invested in One Solution, CSREES*
> *and its Partners will receive $189 in benefits*

These benefits are split across three major areas:

- **Technology savings**, including reductions in IT spending for both CSREES and its partners through improved coordination of IT activities and reduced need to enhance existing systems or build new ones;
- **Productivity benefits and time savings,** as both staff and partners will save significant time in reporting and administrative tasks that can be devoted to more mission-oriented program leadership or research, extension, and education work; and
- **Materials savings,** including reductions in printing, mailing, and storage costs enabled by migration from paper-based to electronic processes.

System design and implementation activities are estimated to cost approximately $7.25 million over four years, with an additional $1.1 million in transition costs across the partnership. This cost includes purchase of required hardware and software, effort required to implement new components and integrate existing systems, data standards and process development, training and communications, and program management costs. Not all of this $7.25 million investment is likely to represent new costs to the agency. Approximately $1.76 million represents CSREES

staff time and as funding, and some staff and financial resources may be able to be redirected from existing reporting-related IT projects to One Solution.

With the initiative's significant benefits and limited costs, One Solution will provide a significant financial return to the agency and its partners.  It will generate net present value of $8.0 million and return on investment of 89%, indicating that the investment will add significant financial value to CSREES.  The initiative's financial analysis is summarized in the table below.

**One Solution Financial Summary**

| METRIC | CSREES | PARTNERS |
|---|---|---|
| **Benefits** | **$9.30 Million** | **$10.79 Million** |
| *- Technology Savings* | $2.00 Million | $0.18 Million |
| *- Productivity and Time Savings* | $7.25 Million | $10.39 Million |
| *- Materials Savings* | $0.06 Million | $0.22 Million |
| **Costs** | **$7.25 million** | **$1.1 million** |
| **Net Present Value (NPV)** | $8.0 million | |
| **Return on Investment (ROI)** | 89% | |
| **Payback Period** | 3 Years | |

# 1 Introduction: The One Solution Opportunity

The Cooperative State Research, Education, and Extension Service (CSREES) advances knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the land-grant university system and other partner organizations. It accomplishes this mission by providing national coordination and program leadership and by providing Federal financial assistance to land-grant universities and other partners to perform research, education, and extension activities. These funds are distributed through three funding mechanisms:

- *Competitive funding*, awarded based on panel review and recommendation of proposals submitted by eligible participants;
- *Formula programs*, distributed among cooperating institutions including land-grants on the basis of statutory formulas; and
- *Congressional line-item funds*, administered as special and competitive grants.

For each type of funding provided to universities, research laboratories, and other partners, CSREES collects reporting data to manage programs, ensure proper use of Federal funds, and to assess progress, outcomes and impacts of CSREES-funded activities. Among other purposes, these data are used to assess compliance with the regulations, terms, and conditions of each grant or allocation of formula funds, as well as to demonstrate to Congress, the Office of Management and Budget (OMB), and citizens the impacts of CSREES activities and how funded activities are helping to achieve the agency's and the United States Department of Agriculture's (USDA) missions.

Reporting is critical to achieving the agency's mission. Collecting appropriate data from grantees ensures that funds are being used correctly, that funded activities support CSREES' goals and the purposes for which funds were awarded, and enables CSREES to better provide coordinated, national program leadership. Reports created for Congress and others demonstrate the impacts of CSREES funding and allow the public to understand how their funds have been used to advance knowledge for all Americans.

However, current reporting processes often do not enable CSREES and its partners to effectively manage reported data in support of the agency's mission, do not include key aspects of the agency's work, and prevent the agency from demonstrating the impacts and outcomes of its programs to the public. One of the more pressing needs facing the agency is the need to more directly tie together programmatic and financial reporting processes. The last two Farm Bills and current appropriation process provide greater flexibility while presenting new fiscal management and reporting challenges. Further, inefficiencies in current processes create a significant time burden for partners in completing reporting and for staff in managing incoming data and creating oversight and accountability reports.

One Solution proposes to address such issues through an integrated approach to improving reporting at CSREES. Specifically, the initiative includes technology improvements to reduce staff and partner reporting burdens and enable creation of integrated reports reflecting all of the agency's activities, report process changes to improve and standardize forms and reporting

requirements across programs, and development of data management strategies and structures to enable agency-wide reporting and analysis.  Together, these efforts will not only address specific issues, but enable the agency to use reporting to better fulfill legislative requirements and support achievement of its mission.

# 2   The Current and Future Environment

Reporting is a major component of CSREES' activities.  Because one of the agency's core activities is to coordinate and fund its partners' research, education, and extension activities, collection of performance and financial reporting data is a critical component of ensuring that these funds are appropriately and effectively used to advance the nation's knowledge.  Further, CSREES must be accountable for its administration of funds through its creation of reports for OMB, Congress, other oversight bodies, and the public.

One Solution will bring major change to reporting at CSREES.  More than addressing individual reporting issues, it will take an integrated approach to reevaluating reporting and addressing the inefficiencies that have resulted from the independent development of reporting processes and systems across agency programs.  This section includes a discussion of the current reporting environment and the issues stakeholders presently face, as well as the improved reporting environment proposed under One Solution.

## 2.1   Current Environment

Because of the independent evolution of CSREES' 60 programs and the agency's history as two separate organizations, data collection and reporting processes have often been developed for specific program needs and without agency-wide coordination.  Further, as new reporting requirements have developed over time, such as the Plan of Work mandated by the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA), the burden on land-grant university partners to provide accountability data to CSREES has significantly increased over time.  As the burden on partners has increased, so have demands from Congress, OMB, and others for CSREES to provide more detailed and accurate accountability information, and to integrate financial, program, and other data to demonstrate how activities across the agency support its strategic and performance goals.  CSREES has been meeting a portion of these demands through manual calculation of agency-wide reporting data by national program leaders, budget and accountability staff, and other personnel, resulting in increasing workloads.  There are many financial and fiscal requirements for CSREES, and the agency has been audited by the USDA Office of Inspector General for the last three years with increasingly stringent accountability standards.  There are insufficient linkages between the data received by the Funds Management and the data submitted in programmatic reports, although CREEMS is currently being enhanced in order to support better financial management of carry-over and multi-year funds.

To more specifically examine the current reporting situation at CSREES, this section includes a discussion of the following aspects of the agency and its reporting activities: customers and stakeholders, reporting-related processes, and IT systems supporting reporting.

### 2.1.1   CSREES Stakeholders

CSREES' staff fulfills the agency's mission by partnering with land-grant universities and others in the research and education community to perform innovative work in extension, research, and

education.  Further, CSREES works closely with OMB and Congress to provide accountability and financial information documenting the successes and impacts of the agency and its partners. The roles of CSREES staff and the agency's two main external stakeholder groups (cooperating institutions and Congress/OMB/citizens) are described in further detail below, followed by a discussion of the challenges facing each group (as identified through questionnaires, conference calls, focus groups, and other interactions).

| Stakeholder Group | Major Reporting-Related Activities |
|---|---|
| *CSREES Staff* | • As CSREES' main function in the agency's partnership is to provide federal financial assistance and national leadership in USDA-related extension, education, and research, the main role of national program leaders and other agency programmatic staff is to work with universities to coordinate programs and to distribute funding to address areas of local, State, regional, or national interest or priority.<br><br>• Many staff activities center on the application and award processes, including the creation of funding announcements and peer review of applications[1].<br><br>• After awards are made for competitive programs, and for all formula-funded programs and line-item funding, staff activities focus on:<br>  o Monitoring progress of each funded project or program;<br>  o Ensuring compliance with financial and technical requirements; and<br>  o Analyzing data collected to manage programs and report to oversight officials. |
| *Cooperating Institutions (and other grantees)* | • 108 land-grant universities, and numerous other public universities and other extension-, education-, and research- oriented partners, receive agency funds to perform education, extension, and research activities.<br><br>• To address performance, all grantees are required to complete technical reporting forms at least annually (although the amount of information provided or requested may vary by program). |
| *Congress, OMB, and Citizens* | • OMB and Congress request significant amounts of accountability information, including funding and budget data, activities and outputs, and outcomes and impacts.<br><br>• As the end recipients of the knowledge, advancements, and innovations produced through the land-grant partnership, and as taxpayers providing the agency's funding, citizens look to obtain both general information about CSREES' activities, impacts, and stewardship of Federal funds. |

---

[1] As the One Solution initiative focuses on post-award reporting, these activities—although critical to fulfilling the agency's mission—are beyond the scope of this business case.

- Interest groups and other citizens also seek more specific data on CSREES activities; for example, a local citrus' growers association may be looking for agency-funded activities related to tangerines in Florida.

### Stakeholders' Current Reporting-Related Challenges

**CSREES' staff** also face a number of reporting-related challenges. First, current reporting formats cannot be efficiently reviewed and require a significant amount of effort simply to check for compliance. For example, dozens of Annual Reports of Accomplishments are received each year, including separate reports for research and extension services at many institutions. The Annual reports must be reviewed by a panel of NPLs, many of which are over 100 pages. This task has become a significant effort for many NPLs.

**Grantees** face an ever-increasing burden to provide reporting data to CSREES. Partners currently face differing processes for submitting the nearly 100 data collections required by CSREES, including some reports submitted via paper and others via a variety of IT systems with inconsistent interfaces. This results in an often-confusing maze of processes, forms, and systems to navigate, as illustrated in Figure 2.1.1.

#### Figure 2.1.1: Current Data Collection/Reporting Processes
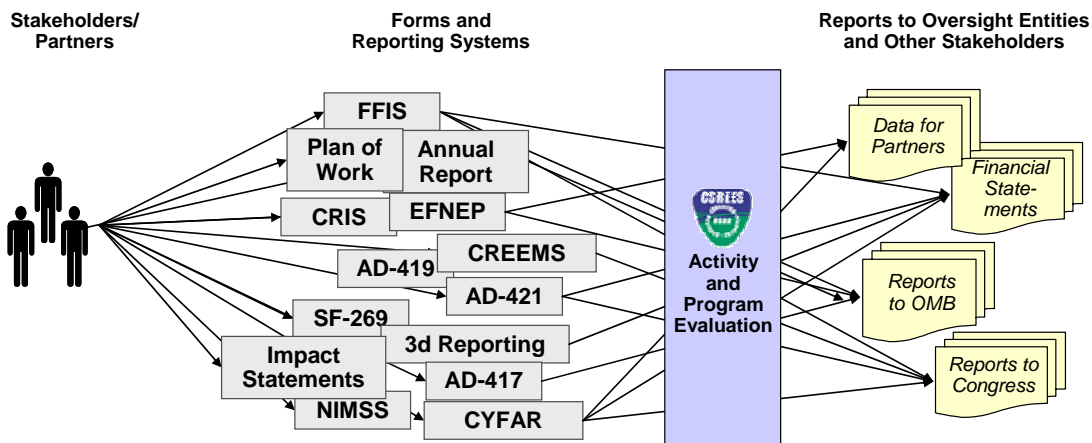


Further, because reporting across programs has not been coordinated, much of the data partners must provide is duplicative. For example, much of the data submitted in progress reports for Hatch Act research projects is duplicated in the Annual Reports of Accomplishments that accompanies states' Plans of Work; in some cases, data for over 200 projects in a state must be duplicated across the two report formats. This causes grantees to devote large amounts of time to reporting that could otherwise be spent on research, education, and extension activities that more directly support CSREES' mission of advancing knowledge. Moreover, many partners feel they do not have a complete understanding of CSREES-required reporting, especially how the data they submit is used at the agency; this makes it more difficult for them to select data to include in reports and to understand the importance of complete, timely reporting. Finally, there

is data that cooperating institutions would like for CSREES to collect on their behalf so that performance benchmarking of programs could be conducted.

Similarly, reporting data provided by partners regarding extension activities is limited and does not specify key information on the activities for which funding is used. As a result, development of topic-specific budget calculations (referred to as crosscuts), and other information required to create financial reports or answer Congressional questions, requires National Program Leaders (NPLs) to individually contact universities or extrapolate important information. Even for research programs, where funding data is available by project and for which calculations can be made, NPLs and the CSREES budget office must often sift through hundreds of individual project reports to identify those that will be included in the crosscut and manually tabulate the required information.

**Congress, OMB, and citizens** continue to demand increasing accountability data from CSREES. Congress submits more than one thousand questions to the agency each year, one of the largest amounts of questions submitted to any USDA agency; further, many of these questions require calculation of very specific data and include multiple sub-questions. Researching and answering these questions requires enormous effort by CSREES staff. Not only is the sheer volume of questions daunting, but because there is no single, means for housing reported data within at the agency, staff must often consult multiple sources and manually calculate data to compile responses.

In addition, OMB and the USDA budget office require CSREES to create budget and financial reports that analyze data according to a number of criteria to enable both bodies to include CSREES data in the annual budget process. As OMB moves toward performance-based budgeting and conducts more detailed performance assessments through the BPI (Budget and Performance Integration) and PART (Performance Assessment Rating Tool) processes, CSREES must increasingly calculate funding for its activities by strategic goal and other mission-oriented categories. Although data to enable such calculations is available for research and higher education programs, the agency must sometimes rely on informed estimates by executives to calculate such data for extension programs; the lack of extension data has been specifically mentioned by OMB and reviewers for the PART process as an area CSREES should address.

## 2.1.2  Current CSREES Reporting Processes

A number of divisions within CSREES are involved in reporting-related processes. Each of these groups faces a number of inefficiencies and challenges in managing its reporting activities.

**National Program Leaders**, as the personnel most directly supporting the activities and achieving the outcomes of CSREES-funded activities, both review and evaluate reporting materials submitted by grantees and coordinate accountability and budget reporting for their programs. Specifically, NPLs formally review and approve project initiation reports (submitted via the Current Research Information System, or CRIS) for new formula-funded research projects; many also review other incoming reports from grantees to ensure that each project or program they oversee is suitably progressing. However, NPLs are not notified when reports are submitted to CRIS, requiring them to manually check the system for new reports; this results in

some reports not receiving a review. The process for approving new formula-funded research projects is manual and cumbersome, requiring the CRIS staff to print copies of project summaries, route paper copies for the proper CSREES unit, coordinate with the unit to identify the appropriate NPL, follow up with NPLs to obtain their review and sign-off, and wait for the paper document to be returned. Often, this manual process results in lost or misrouted project summaries and delays in project approval, creating difficulties for universities. Further, because many CRIS reports are not required to be reviewed and approved by NPLs before being finalized, some reports are not of adequate quality. It would be helpful for NPLs if formula calculation and census data were stored electronically, as opposed to the existing practice of using spreadsheets and hardcopy documents. Finally, NPLs who would like to use the data they received in CRIS reports to create program overviews or accountability documentation often cannot get follow-up data on completed projects, even if those projects have recently generated impacts such as new inventions or academic publications, or reported as the foundation for some new discovery.

NPLs also participate as members of review panels in reviews of Plans of Work and Annual Reports of Accomplishments. Because of the current narrative format of the reports, and the large number of reports and volume of information provided in them, most NPLs face a significant burden in assessing these documents for compliance. Further, program leaders would often like to use the information submitted in Plans of Work and Annual Reports in their program planning and management activities but find the volume of data and narrative format difficult to manage.

The **Office of Extramural Programs (OEP)** has a major role in reporting, both in ensuring overall compliance with reporting requirements and in managing financial reporting for all programs. OEP's Awards Management Branch, although focusing mainly on pre-award and award processes, uses reporting data to ensure that grantees have submitted an acceptable report that has been approved by an NPL before additional funds are obligated. To verify that all appropriate reports have been received, Awards Management staff members work both with NPLs (to check that progress and technical reports have been received and are adequate) and with the OEP Funds Management Section (to ensure that financial information has been received and report accurately). Because there are no automated notifications or workflow features, Awards Management staff must manually search for and contact the appropriate NPL and coordinate with Funds Management to verify reporting compliance. These final reports must be obtained by OMB before each award can be closed out.

OEP's Funds Management Branch collects and reviews Federally-required financial reports for all projects and programs, administers and authorizes CSREES formula grant programs, and maintains official accounting records for the agency. Among other uses, OEP and the CSREES budget office use this financial and accounting information to create annual federal budget documentation. All financial reports, other than transaction reports and funds transfer requests, are currently paper-based; thus, they require significant effort by Funds Management staff to process, enter into the C-REEMS system, and maintain official records. Of note, financial data is not currently sufficiently tied to programmatic data. While the two most recent Farm Bills have provided the agency with the benefit of increased flexibility in how it awards funds, this

flexibility has also made more difficult the process of mapping outcomes to funding within a reasonable degree of accuracy.

The **CSREES Budget Office** and the **Planning & Accountability** unit use data collected from grantees to create numerous financial and accountability reports. The Budget Office uses agency-wide financial data from OEP, as well as additional data from several programs requiring specific reporting, to create legislatively-required budget documentation for the USDA Budget Office, OMB, and Congress. Further, to meet new budget reporting requirements defined by OMB as part of the Budget and Performance Integration initiative, the CSREES Budget Office must not only create budget data for traditional analysis criteria such as funding mechanism, legislative authority, and expenditure types, but also for new, outcome- and performance-focused criteria such as costs by agency strategic goal and costs by performance objective. Because of the complex nature of the agency's 60 programs, and the multiple topics covered in most, it has been difficult to calculate this data. Subject-focused Problem Areas, identified in CRIS for research and some education projects, have been used to provide this information for many activities; however, because Problem Areas are not identified for extension activities, very little data is available on how extension funds support the agency's strategic goals. Indeed, to provide this required information to OMB, agency personnel have been required to calculate expenditures based on past experience and a limited amount of information reported by grantees. Finally, the hundreds of detailed questions sent to the Budget Office from Congressional appropriators (in addition to the standard budget documentation submitted to OMB and the USDA budget office) are often very difficult and time-consuming to answer, requiring budget staff and NPLs to manually calculate data and often contact grantees for additional information.

Planning and Accountability (P&A) works closely with the Budget Office in determining strategies for providing required Budget and Performance Integration data. It also coordinates the Plan of Work, multi-state research and extension activities, and performance analyses (such as portfolio reviews conducted for OMB's Program Assessment Rating Tool--PART process). P&A faces many of the same issues as NPLs in managing the Plan of Work process, including the large amount of effort required to review and approve documentation and the significant variations across submissions that make analysis and aggregation difficult. Further, P&A has faced the same lack of detailed activity information as the budget office, which makes reviews of CSREES' performance for the PART process difficult, and results in lower performance scores for the agency from independent reviewers.

### 2.1.3  Current Technology

As illustrated in the diagram below, CSREES operates (or interacts with) a large number of information technology systems focused both on the application/award process and post-award management. Some of these systems serve many activities across the agency, while others serve single programs. Several of these systems pre-date CSREES in its current form, developed specifically to focus on the research activities of the former Cooperative State Research Service (CSRS).

**Figure 2.1.3:  Current Technology Landscape**
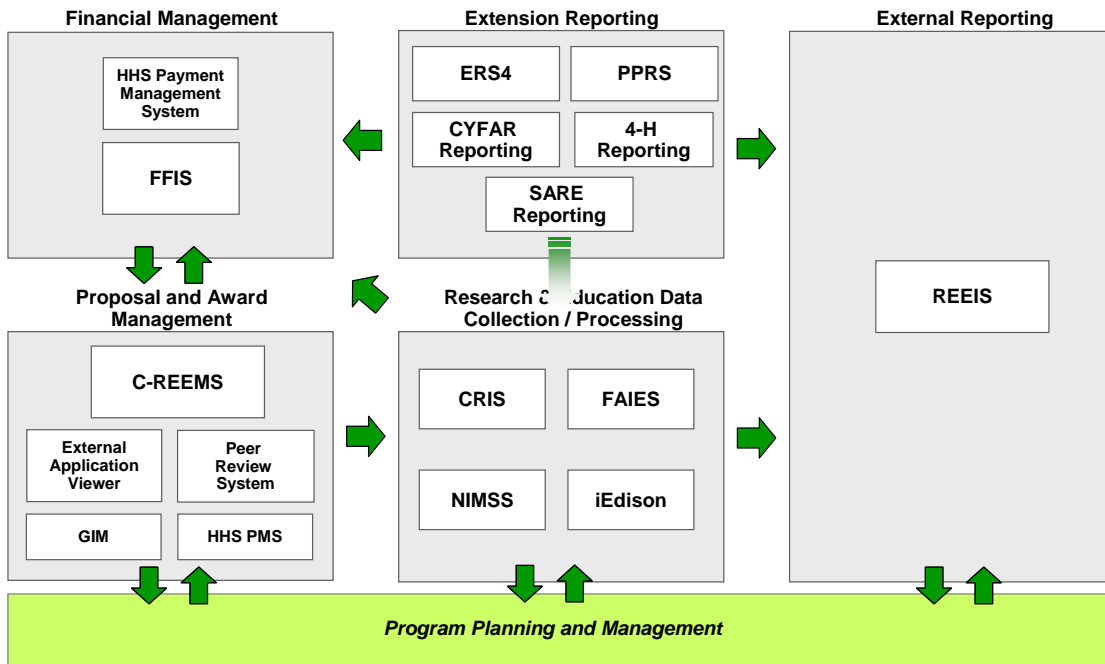


Because many systems include data only for a specific program, or manage only one type of data (such as financial information), it can be difficult for staff to obtain complete data representing all of the agency's activities and investments, or even to gather all data relevant to a single project or state.  Further, data conventions differ across systems, making integration of data across programs difficult.  Across all of these systems, a lack of processes to collect post-award management data limits system effectiveness.

In addition to these broad information technology challenges, staff and system managers face challenges when using and maintaining many systems, as further detailed below.

*Proposal and Award Management Systems*
In order to facilitate the review of proposals received, make grant awards, and manage funds provided to partners (whether through formula-based, competitive, or line-item programs), CSREES maintains a number of award and grant management systems.

- o **C-REEMS (Cooperative Research, Education, and Extension Management System)** is the agency's main system for tracking the grant proposal, generating the award, and managing by funds management process.

- o The **Peer Review System (PRS)** helps staff manage the peer review process, allowing internal and external reviewers to obtain and enter information online, streamlining review.

- o **Grants Interface Module (GIM),** an interface allowing the agency to extract CSREES proposals submitted via the government-wide Grants.gov system.

- o **Enterprise Application Viewer (EAV)** is an application allowing users to view data from GIM and other systems directly within another system (for example, viewing a proposal in C-REEMS or PRS).

- o **Payment Management System (PMS)** is a system managed by the Department of Health and Human Services used to process payments to grantees and collect cash transaction reports.

Although many of these systems focus on post-award management, they have several important impacts on reporting. First, C-REEMS is used to track whether required reports have been received from grantees (although the system does not store the information submitted in most reports) to ensure that grantees comply with reporting requirements before receiving additional awards. As discussed above, the process used by staff to track report submission status and approval is cumbersome and requires significant manual tracking and coordination by staff in OEP. Further, many NPLs do not have ready access to data stored in C-REEMS that may be relevant to projects or programs they lead.

### *Research & Education Data Collection / Processing*
CSREES maintains (or otherwise uses) four systems to collect data for research, education, and competitive programs.

- o **CRIS** (Current Research Information System) is USDA's main system for tracking agricultural research and higher education projects, including extramural projects funded by CSREES as well as intramural research at the Economic Research Service (ERS), Forest Service (FS), and Agricultural Research Service (ARS). CRIS is used by grantees to submit project summary and classification information at the initiation of a research or higher education project (whether competitively awarded or undertaken as part of a formula funds allocation), as well as to provide annual and project-end progress and funding/staff reports. The system also makes this information available to the public. CRIS is currently based on the legacy architecture first implemented in 1970 but is scheduled to be transitioned to a modern database platform within the next year.

- o **NIMSS** (National Information Management and Support System), a system created and managed by the four State Agricultural Experiment Station (SAES) regional associations, is used to manage and document multistate research portfolios (and may also include contributions from Extension, ARS, and ERS). The system includes both project approval and management features, including proposal entry and approval, annual reporting and collaboration (annual meeting coordination, picture library, and "ask the expert"). Although not directly a CSREES system, NIMSS is used by the agency to approve and gather data on multistate projects and allows access to CRIS staff who manually copy data to the CRIS system.

- o **FAEIS** (Food and Agricultural Education Information System) is a legislatively-mandated system used to collect information on student graduation data and faculty appointments in agriculture-related fields.

- o **iEdison** is a government-wide system (operated by the National Institutes of Health) used by CSREES partners to notify the agency of new inventions developed as a result of agency funding. This data is provided both to support accountability and impact reporting and to assist in ensuring the proper assignment of intellectual property rights.

These reporting systems present staff and partners with a number of significant challenges. Although CRIS has been successfully used to manage reporting for research for many years, the system's platform has become somewhat antiquated and has begun to limit the features that can be incorporated to the system. For example, some programs require the submission of supplemental charts, graphics, or other material, while others collect proprietary data that must remain confidential; CRIS is currently unable to be modified to incorporate these features. Further, NIMSS duplicates much of the information stored in CRIS, as each of the multistate research projects stored in the system is supported by state-specific projects for which researchers must report both to CRIS and NIMSS. Finally, the information collected by CRIS, NIMSS, and other systems is often also stored in universities' internal management systems; however, there is no capability to transfer such information directly into CSREES systems. Rather, information must be individually re-keyed for each project, placing a significant burden on university staff.

*Extension Reporting*
In addition to its grant management systems, CSREES also manages numerous systems which assist in the coordination and oversight of several extension programs. None of these systems manages extension reporting as a whole or collects or manages data on the Smith-Lever 3(b)/(c) and 1890s Extension programs that comprise the majority of CSREES' extension funding. Rather, each of these systems collects focused data for topic-specific programs (such as Smith-Lever 3(d) funds) or for specific topics within general Extension funding (such as 4-H). Specifically, CSREES' extension-focused systems include:

o **EFNEP Reporting System 4 (ERS4)**, a system created by CSREES for use at the Federal, state, and local levels. At the local level, the system can be used for case management and to capture demographic and outcome data for each participant. Participant data is then aggregated and sent to the state, which can use the software to analyze its data and send state-level data to CSREES. The Federal-level system in turn aggregates and analyzes the data provided by states.

o **4-H Reporting** is managed through multiple systems. State and local extension services use commercial software to manage their 4-H programs; this software generates tables to create all participation data and crosscuts requested by the national 4-H program. Historically, the creator of the dominant commercial 4-H software program has been contracted to tabulate data from each state annually and produce a national participation database.

o **CYFAR Reporting** uses a Web-based interface to collect annual impact summaries and demographic data on participants for use by CSREES staff. The CYFAR database can be searched by state, community, program subject matter and/or delivery method, and for impact statements from the university and community programs. Demographic data can be aggregated for national annual reports.

o **PPRS (Planning and Performance Reporting System)** allows CSREES to obtain data from institutions and others participating in the Integrated Pest Management and Pesticide Safety Education Program extension programs. This data is used for program management, as well as creation of national program overviews and accountability reports.

- o **SARE (Sustainable Agricultural Research and Education)** reporting is collected through a SARE Web site maintained in cooperation with CSREES' state partners. Specifically, the site is used to collect annual progress reports and project-end reporting, allows for submission of proposals, and includes a searchable database of SARE projects.

Because many of these systems collect only a limited amount of demographic data from states, focusing on program activities and outputs, data available on program outcomes is sometimes limited. Further, because states participating in these programs provide only aggregated data, information necessary to answer detailed queries received from Congress and others often cannot be generated. For example, the agency sometimes receives questions such as "how many Latino boys between 12 and 16 studied horticulture in Arizona as part of 4-H last year," and data currently received by CSREES cannot provide that level of specificity (even if such data is available at the state or local level). Further, program-specific systems such as PPRS have been developed in response to a lack of agency-wide tools to support extension program reporting—many NPLs would much prefer to use a centrally-managed system, letting them focus directly on leading their programs instead of managing reporting processes or IT systems.

## *External Reporting*
CSREES manages two major systems that allow for the creation of external reports.

- o **REEIS** (Research, Education, and Economics Information System) is intended to be the agency's main system for data reporting and analysis, making data from an increasing number of sources available to the public to run their own queries and reports.

- o **Science and Education Impacts Database** is a system, maintained by CSREES' communications staff, that collects annual impact statements on extension and research from each land-grant university for use in the agency budget, communications materials, and accountability reporting.

REEIS has fulfilled a legislative mandate to create a reporting system and provides a central location to analyze much of CSREES' data; however, the lack of data collected by the agency for extension programs, limited availability of outcome data for many programs, and the separate storage of data across programs has limited the usefulness of the system.

## *Financial Management and Reporting*
Finally, USDA manages two systems that assist in financial management and reporting.

- o **Foundation Financial Information System** (FFIS) provides all core accounting and financial management functions at USDA, including detailed account reporting and integrated accounting tools. CSREES' official accounting data is stored in the system and is updated via a regular feed from C-REEMS (as well as manual data review and revision by CSREES financial management personnel). FFIS is managed by USDA's central National Finance Center.

- o **DHHS Payment Management System (PMS),** managed by the Department of Health and Human Services is used to make payments to grantees (generally using electronic funds transfer). Grantees also submit cash transaction reports (SF-272) and other related payment processing forms to the system.

## 2.2  Future One Solution Environment

One Solution envisions an integrated approach that ties together currently disparate reporting systems and processes to simplify reporting for CSREES staff and partners and improve the usefulness of reporting data.

One Solution has been designed to fulfill four major goals:
- Simplify reporting and reduce burdens for grantees;
- Improve the quality of accountability data, better equip the agency to meet increasing performance and budget reporting expectations, and improve AREERA compliance (particularly through development of a more structured Plan of Work);
- Improve linkages between financial and programmatic data reporting; and
- Reduce staff effort required to complete reporting-related processes, allowing staff members to focus on program leadership and active, portfolio-based management.

One Solution does not propose a single, monolithic IT system for all reporting at the agency. Rather, the initiative is intended to provide a single *approach* to improving reporting for the agency and its partners, recognizing that the many programs, activities, and processes at CSREES require a system that is flexible and takes into account the needs of research, education, and extension.

This approach encompasses both improvements to the information technology systems supporting reporting as well as business processes and procedures governing reporting at the agency.  Addressing both areas will enable staff and partners to gain benefits not available from a more limited focus.  Information technology changes will enable improvements to reporting processes to reduce staff effort, improve quality and accuracy, and improve partners' experience. Process streamlining and standardization, including data standards such as a consistent agency-wide taxonomy, will ensure that the agency is able to collect appropriate data and successfully analyze it across all research, education, and extension programs.  The technical and process aspects of this approach, as well as the capabilities envisioned for One Solution, are discussed in more detail below.

### 2.2.1  One Solution Capabilities

One Solution's broad scope and integrated approach will bring significant capabilities to staff, partners, and the public.  By enhancing the current, uncoordinated set of reporting systems and processes to become an integrated, agency-wide approach to reporting, CSREES stakeholders will be able to perform current activities significantly much more easily and more effectively and will be able to do things not previously possible.  This integrated approach, illustrated in Figure 2.2.1, will bring significant capabilities to staff, partners, and the public.

**Figure 2.2.1: One Solution Concept**
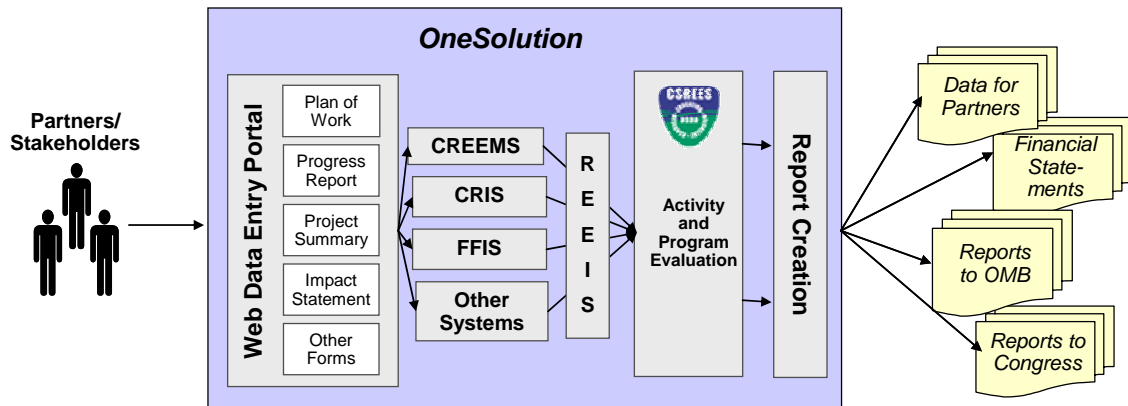


Specifically, through One Solution **CSREES NPLs and other staff** will be able to:

- Access a single location to obtain and generate information to manage programs;
- Readily access up-to-date financial information for CSREES-funded programs and projects;
- Opportunity to gain much better insight into partners' formula-funded activities, particularly extension work, through a new, database-driven Plan of Work that will provide more structured and detailed program and activity information;
- Actively review, edit, and comment on incoming reports, thereby improving the quality of reporting data;
- Streamline reviews of Plans of Work and Annual Reports of Accomplishment through use of a structured, standardized format for these reports, as well as automated validation and completeness checks performed as institutions submit them;
- More quickly create budget crosscuts and other accountability reports;
- Create reports that integrate data from across all CSREES reporting and project management systems, enabling staff to instantly get a full picture of all activities related to, e.g., a project, program, funding line, institution, or individual;
- Receive automatic notification of reports submitted by an awardee;
- Streamline report review processes through the use of electronic routing and approval features; and
- Use standardized, streamlined, agency-wide processes and systems to eliminate the effort and frustration many staff members currently face in managing their own, program-specific reporting processes.

CSREES' **land-grant university partners** (and other grantees) will be able to:

- Provide all CSREES-required reporting through a single, password-accessible Web-based reporting 'portal';
- Reduce effort required to complete the Plan of Work and Annual Report through use of a more structured, standardized format;
- Streamline data provided to the agency through pre-population of reports, reuse of common data (such as institution name, address, and point of contact) in all reports, and linking of key information across reports to eliminate redundant data requests (for example, using Hatch project data currently submitted via CRIS for the Annual Report of Accomplishments);

---

- Have more flexibility in submitting many reports, such as abilities to include attachments and include some confidential data in reports, as well as potential elimination of some character/formatting limits and potential re-designs of forms to better capture project or program data;
- Be automatically notified of upcoming reports due, overdue reports, follow-up requests for information, report approvals, and other key event information;
- Receive quicker approval of new Hatch research projects (and other projects requiring approval);
- Check status of report receipt, review, and approval processes online, eliminating the need to manually call or e-mail CSREES staff;
- Use XML-based data transfer to submit bulk data directly from internal project- and program-tracking systems;
- Access, analyze, and download extensive institution-specific information, as well as many cross-institution reports; and
- Receive automated assistance in classifying project and programs, simplifying use and increasing understanding of Problem Areas.

**Congress, OMB, and the public** will be able to:
- Receive improved accountability information, with data that better links program activities to strategic and performance goals, and budget items;
- Search for data across all CSREES programs specific to their needs and interests (for example, allowing citrus growers to instantly locate all research, extension, and education activities related to citrus fruit); and
- Obtain greater value from research, education, and extension funds, as CSREES staff and partners will be able to reduce time spent on administrative tasks and focus more on program management and advancing knowledge.

### 2.2.2  Future Reporting Processes

New technology capabilities will improve the experiences of staff and partners and better enable CSREES to provide an agency-wide view of its activities.  However, the success of the technology features described in the next section will require the agency to re-examine its reporting processes.  Standardization of reporting processes will be necessary to ensure all agency programs are included in One Solution and to achieve the goal of minimizing burden on staff and partners.  Development of agency-wide data management processes will be critical to enable CSREES to aggregate and integrate data across IT systems and agency programs.  Finally, technologically-enabled process improvements will allow the agency to further improve the experiences of staff and partners by developing reporting-related processes that take advantage of One Solution's new capabilities.

*Reporting Standardization.*  CSREES currently collects nearly 100 different types of data from partners and other members of the public, both for post-award reporting and other purposes.  With this large number of data collections, partners face a significant burden to provide data.  Staff members face a similar burden in processing incoming reports, and information technology systems cannot support the varying data and processes for each.  More fundamentally, a lack of

standard performance reporting processes for some programs prevents agency-wide data analysis.

One Solution will resolve these issues by streamlining current reporting processes, including incorporation of program-specific reporting into agency-standard processes (when practicable) and streamlining and synchronizing processes that have developed independently (such as CRIS reporting and the Plan of Work). Many of these process changes will be enabled through new technology; for example, new research reporting features that allow programs to add additional form fields will enable those programs currently using their own reporting forms to collect their supplemental data through standard reporting processes. Further, programs that have not traditionally participated in agency-standard reporting processes, such as Smith-Lever 3(d) programs, will be incorporated into appropriate activity classification and performance reporting processes (such as a standard agency-wide activity classification form and the new Plan of Work/Annual Report format). The goal of report standardization is not to prevent programs from collecting data important to their management or reporting, but rather to reduce the burden on staff and partners by collecting needed data only once and developing standards that will allow comparison and use of data across programs. Indeed, standardizing the reports collected across programs, and collecting reporting data for all CSREES programs and projects, will ensure that CSREES and its partners can create accurate reports covering all CSREES-funded activities.

The One Solution team has created a report inventory to serve as the basis for report evaluation and consolidation. Once reports have been combined or otherwise streamlined, an updated report inventory will serve as the document of record listing all agency-standard reporting processes. (Additional information on oversight and governance for report standardization is included in Section 4.2).

Another aspect of standardization is the development of a consistent set of staff responsibilities. Currently, reporting-related staff responsibilities and actions differ between programs, and even between staff members. Some NPLs and program specialists actively review CRIS forms and other incoming reports, while others do not. Further, some NPLs have developed innovative practices, such as sending follow-up requests to principal investigators on completed projects to obtain up-to-date impacts and outcomes; such processes would benefit programs across the agency. Developing a standard set of responsibilities as well as a mechanism to act upon these responsibilities for NPLs, program specialists, and other program staff will ensure that best practices are used across all programs and will provide needed guidance to NPLs (who must currently understand reporting responsibilities on their own). Further, a reporting governance committee (described in Section 4.2) will manage the standard procedures to incorporate new innovations, best practices, and lessons learned as they are identified.

Lastly, standardization of reporting responsibilities will include clarification of staff roles in providing reporting assistance to partners. Some personnel at partner institutions feel they do not receive sufficient guidance or assistance when completing reports; the national program leader (or other appropriate staff member) coordinating each activity is best suited to provide program- or project- specific guidance to partners, supplementing the technology and system support to be provided by a One Solution help desk. As such, responsibilities related to providing

programmatic support for reporting will be clarified and incorporated into the design of One Solution's help and support features.

*Data management.* In addition to standardizing the forms and reports collected, a successful agency-wide approach to reporting will require consistent data standards across systems and data collections, as well as a method for linking programmatic and financial data. In the current environment, data formats differ across information technology systems and data collection processes, making aggregation of this information across programs and systems much more difficult. For example, a number of CSREES programs collect age and other demographic information on participants, yet standards for collecting this data vary; some programs collect specific ages (such as 14 or 16), while others use differing categories (such as '12 to 17' and '16 and older'). At best, such data can be aggregated with significant effort; however, in many cases these differences make comparing and combining data impossible. Such issues are common across CSREES data collections and have made the creation of agency-wide reports extremely difficult.

Further, comparing and aggregating activities across programs is currently difficult, as key classification data (such as type of work, subjects or topics related to the activity, and commodities related to the activity) is not consistently collected across programs and IT systems. The Problem Area Classification System is currently used to collect some such data for research and education programs, but no such data is collected for extension work. Further, classification data is collected through different systems (including CRIS and C-REEMS), each using different structures to classify key project/activity characteristics. With no consistent way to identify and analyze the characteristics of CSREES work, staff members must manually review hundreds of projects to create budget crosscuts, create Budget and Performance Integration reports, and other reporting documentation.

To standardize the agency's use of data, One Solution includes the development of three key management structures:

- A standard, agency-wide **taxonomy** for use in classifying multiple dimensions of programs, projects, and activities. A standardized taxonomy, used across CSREES, will be the key structure enabling agency-wide analysis of CSREES-funded activities by providing a common set of categories that can be used to "slice and dice" projects and programs and provide meaningful analysis of inputs, outputs, and outcomes across all programs. The current Problem Area Classification System (or a similar structure) will be used as the basis for this agency-wide taxonomy through its consistent application across all research, education, extension, and integrated activities.

  However, as the Problem Area Classification system was designed to support only one aspect of program classification and has mainly supported budget reporting, the taxonomy will include a number of other classifications to enable further analysis of the agency's activities in support of the agency's emerging portfolio-based program management approach. First, the taxonomy will incorporate other project and program classification data currently collected, such as basic vs. applied research, applicable crosscuts, or extension audience, into its standard format; standardizing this data, collected somewhat differently between CRIS, C-REEMS, and other systems and processes, will allow for much better agency-wide analysis

of data currently available. Further, the taxonomy will also include other classification data necessary to create crosscuts, complete other program and budget reporting, and undertake analysis necessary to conduct portfolio reviews and manage programs. This may include such aspects as the activity's audience (for extension and education programs), methods used (types of instruction or extension work, research activities, etc), and any other classifications deemed necessary by program staff and agency management.

- A "**data dictionary,"** detailing all data elements collected in CSREES reports, including key characteristics of each element, such as type of data collected, unit of measure, and report (or reports) where data is collected. Because One Solution aims to integrate data currently managed separately across IT systems and agency programs, the agency must first establish standards for how each data element is collected, as well as a standard definition (to avoid differing and incompatible interpretations).

  As such, the data dictionary will be a central set of standards for all data collected by, or otherwise used at, CSREES. It will serve as the foundation for consistent data collection and analysis practices at the agency, ensuring that all systems, processes, and people at the agency use a single format to collect each data element and that each element can be collected once for use in all appropriate systems. Further, it will ensure that all terms used in reporting are consistently defined across programs and processes. (For example, the data dictionary will specify a standard for the collection of age and other demographic data, including whether specific definitions of each age category are to be used, or if raw, uncategorized ages will be collected.) The data dictionary will also be designed to identify each use of all data elements, so that multiple uses of the same element can be noted to enable integration; for example, each use of institution names and addresses can be identified to link this information between systems (enabling pre-population of form fields or eliminating the need to ask for some data).

- A standard, **XML-based data exchange format** will allow transfer of data between CSREES systems, with external systems (such as NIMSS), and with partners. This format will greatly benefit CSREES and external stakeholders by providing a foundation for standardized, Internet-based information sharing that will reduce the costs of collecting, sharing, and using reporting data. Specifically, partners will be able to submit data directly from their own internal project tracking and accountability systems to CSREES systems without the need to re-enter data into Web forms.

These structures will integrate closely with report design and standardization processes, with data structures updated whenever new reports and forms are added, and with all new forms and modifications conforming to data consistency guidelines. Further, these processes will help the agency to both define the data needed to support its mission and report creation needs and ensure that this data is collected and maintained in the most effective and consistent manner.

*Business process improvements.* In addition to the foundation provided by consistent reporting processes and data standards, One Solution will include more specific process improvements enabled by new information technology tools. These process improvements will focus on two areas:

- *Business process streamlining and work reduction.*  Many improvements will automate currently manual or paper-intensive processes, such as Hatch project approvals or creation of budget crosscuts.  This will reduce the effort staff members expend on administrative tasks, enabling them to focus on program leadership.  Such improvements will also improve partners' experiences by reducing wait times for approvals and allowing additional time for staff interactions with partners and program leadership.

- *Enabling more active reporting review and management.*  Many technology features of One Solution are designed to allow NPLs, program specialists, and other staff to more actively review and manage reports as they are received; this includes review of reports, ability to make direct changes (such as correcting typographical errors), approval of reports (or requests for partners to revise them) before they are finalized, and ability to add keywords, comments, or additional data as reports are received.  Review and approval of all reports received will ensure that the agency has high-quality data it can use in creating accountability reports, reducing the effort needed to clarify large amounts of information when a report must be created for Congress, OMB, or others.  Further, adding key information to reports as they arrive allows for significantly improved searching and analysis of reports later on; for example, reports related to a particular budget crosscut or other priority can be identified, or general keywords assigned when a report is received, to ensure it is included in crosscuts or searches.

### 2.2.3  Future Technology

To achieve One Solution's vision and capabilities, CSREES will leverage and enhance existing systems, with data coordinated across systems by a central data repository and with all users (internal and external) accessing CSREES reporting systems.  These systems will be complemented by additional new components delivering specific functionality not currently available through the enhancement of existing systems.  As further discussed in Section 5.1, this approach will produce the greatest benefit to the agency, allow for maximum flexibility, and minimize cost.

Under One Solution, all user interaction will occur through a new one-stop reporting Web site.  This 'portal' will be the single point of access for all CSREES reporting tools, will be integrated with the main CSREES web site, and will present customized content for each major audience (staff, partners, and the public).  Through the portal, users will be able to access all reporting data entry systems, including a research and extension reporting component (built on CRIS' foundation) as well as new components (described in more detail below).  Users will also have access to data analysis tools and systems, including REEIS and additional reporting tools.  A standard 'look and feel', and USDA's single username and password, will be implemented throughout the agency's reporting systems, enabling seamless transition between systems.  Over time, as the agency's existing reporting systems are integrated into the portal, differences between CRIS, REEIS, FAEIS, and other systems will disappear to the end user, appearing only as functions within a single, Web-based reporting capability.

Through the portal, and through standardized Web interfaces, users will enter reporting data into the Research and Education Reporting database as well as two new components enabling electronic collection of the Plan of Work and of compliance/financial reporting data.  (C-REEMS

data, as a staff-only system, will continue to be input through its current interface; however, as described below, staff will be able to access the system's data much more easily.)  Maintaining separate data entry systems will allow the agency to leverage existing and planned investments in CRIS and C-REEMS, particularly the major redevelopment of CRIS currently underway. (However, as these individual components will be invisible to the end user, users will not experience any separation between systems.)  Further, these systems can be focused solely on data entry and storage, eliminating overlap of reporting and analysis features with other systems.

Data from across these systems will be integrated through a new data repository—the core of One Solution and the component that will enable truly agency-wide reporting.  Through improved capabilities and the data management strategy described above, the repository will intelligently match related database records from across systems, linking data from CRIS, NIMSS, C-REEMS, iEdison, and other systems for each project or program.  With complete data for each project and program, incorporating all information available to the agency, the data repository will be able to aggregate individual activities to provide a complete picture of the agency's and partners' work.  Further, the data repository will enable CSREES to improve how it stores historical/archival data, allowing ready access to past years' reporting data.

The data held in the repository will enable advanced reporting and analysis capabilities. Through significant enhancements to REEIS, new transactional reporting capabilities allowing for up-to-date access to information on individual reports, and management views closely integrated with the portal, staff and partners will be able to look at data across all agency programs and locate all relevant agency data for individual projects.  Integration of programmatic and financial project data will allow for more complex analysis of programs.  Data reporting and analysis tools will be accessed through the portal, with the same single point of access and 'look and feel' as for all other reporting activities.

This approach is demonstrated in Figure 2.2.3a on the following page.  (A comparison of this approach and other potential implementation scenarios is included in Section 5.1.)

**Figure 2.2.3a: One Solution Technical Architecture Approach**
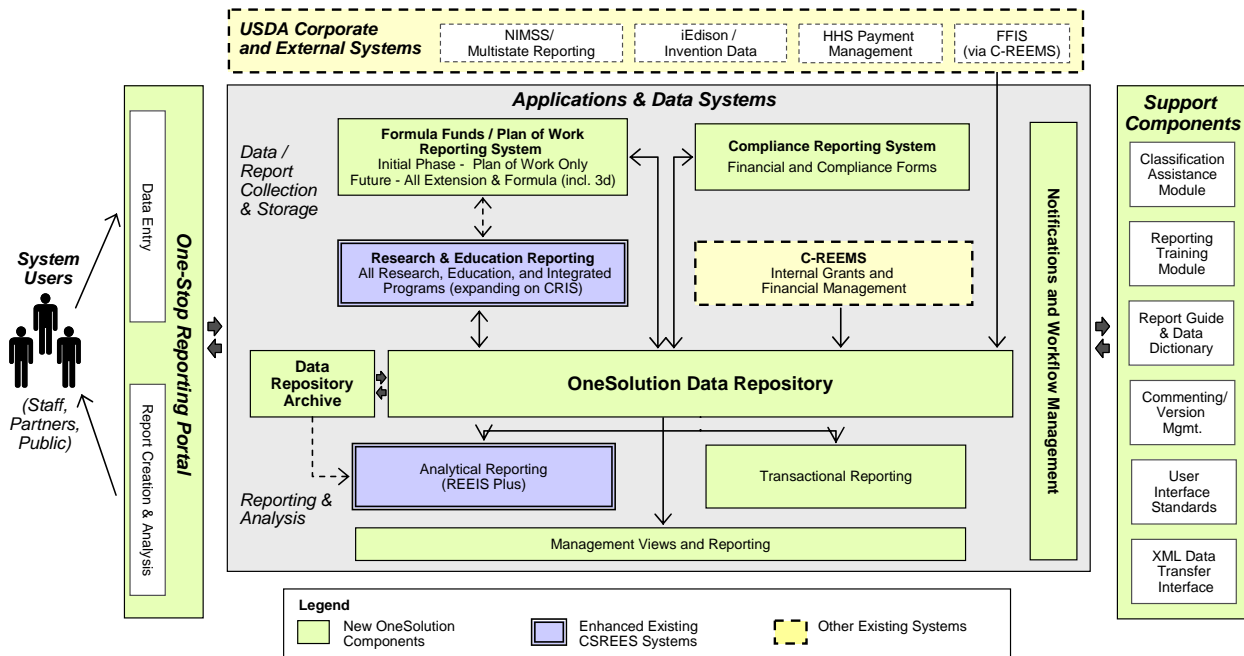


Specific aspects of the above technology architecture include:

- A new **reporting portal** presenting customized home pages for each major agency audience (staff members, grantees, and the public), including customized home pages for individual users showing all reports requiring completion or review. This portal will allow access to all reporting systems via a single location and with a single 'look and feel', including systems not directly modified as part of One Solution (such as FAEIS). As One Solution is developed, distinctions between systems such as CRIS and REEIS will fade as each becomes integrated into the agency's single reporting environment.

- **Significant enhancements** to existing systems. Enhancements to CSREES' Research and Education Reporting component (using CRIS as a foundation) will enable enhanced data entry capabilities (such as file attachments and linking of multistate umbrella projects to their individual Hatch project components); these previously-impossible features will soon be feasible with CRIS' pending migration from a legacy system to a modern database structure. Significant REEIS enhancements will enable improved data analysis and reporting (including abilities to analyze data across all programs and projects, automated generation of key budget crosscuts and other regularly-used reports, and cross-database search and data aggregation capabilities). Enhancements to CREEMS' Funds Management module (being pursued separately from One Solution) will allow for improved integration of financial and programmatic data analysis.

- A new **Plan of Work and Formula Funds reporting system**, closely integrated with the reporting portal and other One Solution components. This system will enable collection and analysis of the new Plan of Work, as well as management of work plan and progress report submission for other extension and formula-funded research programs (such as the Smith-Lever 3(d) programs, McIntire-Stennis forestry research, and Renewable Resources

Extension). This system will allow the agency to standardize reporting across all extension and formula-funded programs, simplifying processes for partners and staff.

- A new **compliance and financial reporting** component enabling the agency to collect budgets, financial status reports, and other compliance and financial reports (currently collected in paper form) via a secure, electronic system that meets all appropriate electronic signature guidelines. Because these forms do not involve complex data structures, and the agency may be able to reuse other components when developing an electronic method of collection for them, this system component may be developed as a module of C-REEMS, the Research and Education Reporting component, or the Plan of Work system if appropriate and cost effective.

- A central **One Solution Data Repository** enabling data from across currently-separate databases to be integrated for viewing and analysis. The repository will synchronize with Research and Education Reporting component, the Plan of Work system, and other components regularly (likely once per day), combining their individual information into a single data store. The repository will also be able to hold data for significantly longer than the agency's current reporting systems (such as CRIS), allowing easy access to reports for completed projects and enabling time series and trend analysis not currently available through CRIS and other systems.

- Across systems (and potentially through the use of separate workflow management tool), **workflow and notification capabilities** to support critical reporting-related business processes (such as Hatch project approvals and review of incoming AD-421 forms). As described above, these workflow features will be designed to benefit both staff and partners, with notifications to each action required and other key events, and the ability for partners to check on the status of reports and required approvals online.

- **Leadership views for NPLs and institutions,** enabled through new analysis and presentation capabilities and integrated with the reporting portal, will allow agency staff to view all projects and programs with which they are associated, review and approve reports, and perform other common reporting tasks. Institutions will be able to view all reports due, display summary information about the institution's activities, and provide access to institution-specific reporting tools.

- A training module will assist staff and partners to create user reports that are consistent, meaningful, and provide sufficient detail and context.

- Additional support modules including a program and project classification assistance 'wizard', XML data transfer tools, and commenting and versioning tools.

Further, One Solution will operate in concert with other CSREES and USDA information technology systems to provide an optimal user experience and make the best use of Federal resources. As discussed above, One Solution's portal component may leverage the USDA Portal Service to allow rapid system development and support a seamless user experience across USDA systems. Further, One Solution will closely integrate with USDA's eAuthentication service, allowing staff and partners to access all reporting components with the same username and

password used to access all other Web-accessible USDA systems. One Solution's components will also be designed to be extensible to other uses at CSREES and to leverage existing CSREES technology investments. This may include use of existing database software when possible, as well as design of workflow and document management capabilities to support additional agency business processes. Finally, support modules will be available to multiple systems and will leverage other USDA systems such as AgLearn (for training). One Solution's potential relationships to external systems are illustrated in Figure 2.2.3b below.

**Figure 2.2.3b: Potential Relationships of One Solution and External Components**
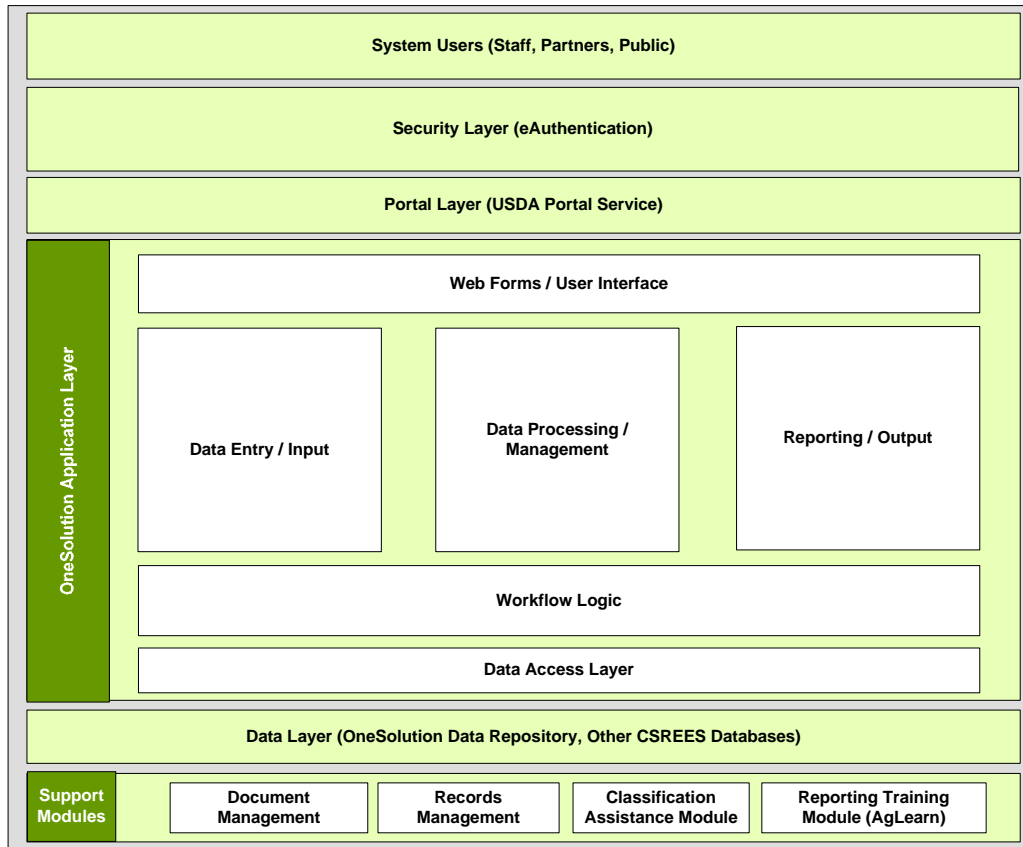
# 3   Value Proposition

In developing One Solution, CSREES will address the shortcomings of existing reporting systems and processes. Burdens on partners to provide data will be reduced, agency personnel will be able to more efficiently aggregate and analyze data to create accurate and insightful reports, NPLs will be enabled to provide higher-quality program leadership and better link program outcomes and impacts to funding and appropriations, and CSREES will be able to better meet increasing demands to provide integrated, agency-wide accountability data linked with strategic goals and performance outcomes. Each of these improvements will further the agency's ability to fulfill its mission and support the education, extension, and research work being performed by its partners.

Specifically, the enhancements provided by One Solution will benefit CSREES staff, partners, and other stakeholders:

- **CSREES' partners**, including land-grant universities and other grantees, will face a reduced reporting burden, have access to more meaningful reports and analysis tools for managing their programs and reporting to state legislatures, and encounter an improved user experience. A single point of access for all reporting and a unified look and feel will simplify provision of data to CSREES, as will streamlining the reports requested of partners (through combining similar reports, pre-populating reports with relevant data, and using technology to customize forms to capture relevant data only once). New features, such as XML-based data transfer options that allow partners to bypass Web-based data entry screens to submit data in bulk, will provide greater flexibility to partners and further reduce reporting effort. Support and training modules, such as a classification aid guiding selection of Problem Areas for program and project, will also benefit partners.

- **CSREES national program leaders and staff** will be able to more easily access and navigate reporting data and will have access to analysis tools that integrate data currently stored in disparate locations. This will significantly reduce the effort required to review data collected from partners, minimize the amount of time required to complete budget crosscuts and other necessary reports, and enable staff to more accurately demonstrate the outcomes and impacts of CSREES programs. Current processes requiring manual review of hundreds of reports and estimation of key accountability data will be simplified and streamlined. Further, features such as automated notifications, and routing/review/approval, will both allow staff to more efficiently manage reporting data and eliminate the need for manual routing of paper forms and enable more active review of partners' progress reports to ensure that CSREES funds are being properly used.

- **Congress, OMB, other oversight bodies, and the public** will receive higher-quality, more accurate accountability data that more effectively demonstrates how CSREES' activities support its mission and goals. Current processes requiring estimation of accountability data for extension programs—representing 40% of CSREES funds—will be eliminated, with CSREES instead calculating this data based on specific information provided by grantees. Further, an increased focus on outcome and impact data in reporting will tie together data currently collected, such as progress reports and invention disclosures, with new outcome-oriented data in AD-421 reports (or their future

replacement) and other forms to demonstrate both specific, project-level outcomes and the overall impacts of CSREES' programs.

Together, One Solution's enhancements and benefits will have a broad effect on the way in which CSREES and its grant recipients work together to fulfill the agency's goals. With the reduction in redundant administrative tasks that are currently necessary of staff and partners, both will be able to devote more time to value-added, mission-delivery tasks instead of administrative tasks. For example, staff will be able to spend time evaluating program impacts and developing program priorities and strategies instead of researching past projects to answer Congressional questions or to produce reports for OMB.

## 3.1   Strategic Benefits and Drivers

One Solution will enable the agency to better fulfill its mission of advancing knowledge. By allowing CSREES to collect improved data on the outcomes and impacts of its activities, and by integrating currently-available data to further enhance analysis, the agency will better understand the results of its current funding and plan future activities to achieve its strategic goals. Specifically, One Solution supports the emerging portfolio-based planning, analysis, and management processes at the agency aligned to its strategic goals. For example, the One Solution system will allow NPLs and Planning and Accountability staff to analyze activities by Problem Area and portfolio to assess achievement of goals in each area, identify areas where the agency has not yet achieved its goals, and select project or program focuses to achieve these remaining objectives.

In addition to its overall support of improved planning and achievement of the agency's mission, One Solution will support key initiatives and legislation, as detailed below.

### 3.1.1   Support of the President's Management Agenda

The President's Management Agenda (PMA) outlines a series of initiatives, to be implemented across the federal government, designed to improve efficiency and achieve a goal of citizen-centered government. One Solution will support several of the PMA's initiatives.

Most importantly, One Solution will support the PMA's goal of expanding electronic government. The single point of access for all reporting directly aligns with the PMA's goal of processes based on the needs and perspectives of citizens rather than agency organizational structures. One Solution will reduce the reporting burden on partners by streamlining reports and using technology to reuse data when possible, again directly supporting one of the goals of this PMA initiative. Streamlining internal processes, such as review and approval of inbound reports and automated analysis to assist creation of outbound reports, further supports the PMA's goal of using technology to enhance government efficiency.

Additionally, the close coordination of program activities and strategic goals enabled by One Solution supports the PMA objective of improved **budget and performance integration**. Specifically, One Solution will enable CSREES to fully and accurately report on its activities by strategic goals and performance metrics, in line with the performance budget guidelines recently

introduced by OMB. Further, One Solution's reporting capabilities will enable the agency to move toward the use of a holistic "logic model" in assessing programs, focusing on the outcomes and outputs generated by partners in addition to the spending and other inputs directly coordinated by the agency.

One Solution will also support the PMA objective of **improved financial management.** The initiative will provide better, more integrated financial and programmatic reports, as well as a better tool for the management of financial resources. Further, NPLs make their decisions regarding the direction of program areas based upon this information, and will be better equipped to make these decisions moving forward with One Solution.

Finally, One Solution's consolidation and streamlining of data collection and report creation processes supports the PMA's objective for agencies to conduct **strategic management of human capital**. With tasks such as report tracking, receipt notification, and initial report verification handled automatically by One Solution, agency staff will be able to spend less time on such administrative tasks. Instead, personnel will be able to focus on more directly mission-focused tasks such as program leadership, planning, and coordination of projects across institutions.

## 3.1.2  Support of CSREES and USDA Strategic Plans

The US Department of Agriculture has laid out five strategic goals that broadly define its mission of serving the American public. Through its work in funding education, extension, and research efforts, CSREES seeks to advance the nation's knowledge and capabilities across these strategic goals. One Solution assists CSREES in supporting USDA and agency strategic goals by more directly linking the agency's activities to these goals and supporting the agency's emerging approach to planning and managing activities according to goal-centered portfolios. Further, the Problem Area Classification System and the One Solution reporting approach are designed to be flexible as the agency's priorities and strategic goals evolve, ensuring that the initiative's components will continue to support the agency planning in the future.

## 3.1.3  Support of Legislation and Key Initiatives

One Solution will enable CSREES to improve its implementation of AREERA, particularly provisions surrounding reporting and tracking of formula-funded programs. To enable the agency to better track and manage these programs, the act established a Plan of Work that land-grant institutions are required to complete to obtain their annual formula fund allocations (for several major agency programs), as well as an Annual Report of Accomplishments documenting the use of formula funds. One Solution will enable the collection of a vastly improved Plan of Work and Annual Reports that use a structured, database-driven format instead of the current unstructured, narrative format. This will improve the quality, specificity, and consistency of data collected and allow CSREES to analyze and integrate data to provide a clearer picture of formula-funded activities at land-grant institutions.

One Solution further supports the Government Paperwork Elimination Act of 1998 (GPEA) goal of providing electronic options for the submission of data to the Federal government. Although

CSREES has been a leader in meeting GPEA's goals though its use of CRIS and other electronic reporting systems, One Solution will enable the agency to achieve full GPEA compliance by allowing grantees to provide forms to the agency electronically, including such submissions as the Plan of Work and financial reporting forms that do not currently meet GPEA's objectives. Further, as new forms are developed and current forms are streamlined or otherwise redesigned, One Solution will provide a platform for collecting and managing all reporting data electronically.

## 3.2   Operational Benefits and Drivers

One Solution will produce significant benefits for the management and operation of CSREES programs.  First, the initiative will significantly reduce the amount of time that partners spend creating reports and CSREES staff members spend reviewing them.  Pre-population of forms with relevant information, consolidation of existing forms to eliminate redundant data requests, technology allowing fields to be dynamically appended to standard agency-wide forms as needed (eliminating the need to collect that information on program-specific forms), and other features will significantly reduce land-grant partners' reporting burden.  Similarly, automated report validation and completeness checks, streamlined reporting formats, and other features will markedly reduce the time necessary for staff to review reports while improving their quality. Staff effort will be further reduced through automated workflow, routing and approval functionality that will replace uncoordinated, manual processes.

One Solution will further improve agency operations by reducing the effort required for staff to create oversight and accountability reporting and significantly improve report quality.  Budget crosscuts and other reports that currently involve searching hundreds of program reports and manual calculation of spending information will be automated, requiring much less effort to define criteria and complete analysis.  Responses to Congressional questions and creation of reports will be streamlined as well, with all data available in a single location and without the need to follow up with state partners or to conduct other research.  Further, the system will enable CSREES to track data on extension programs not currently available to the agency, eliminating the need for executives to manually determine key data used in creating reports for OMB, Congress, and others.

With less time spent on reporting and compliance tasks, grant recipients can dedicate more of their time advancing their research, education, and extension work, and NPLs can focus on national program leadership, planning, and coordination.

## 3.3   Financial Benefits and Drivers

Through reduced effort for partners and staff, improved report quality, and better coordination of IT systems that support reporting, One Solution will produce financial benefits for the agency. These benefits (discussed in more detail in Section 5.2) include:

- Better coordination of information technology used to support reporting.  CRIS, C-REEMS, REEIS, and other systems that support reporting will be better aligned through One Solution, allowing future enhancements of each to be focused on the specific purpose of that system

(such as data collection and storage, management of internal processes, and reporting and analysis) and avoiding a portion of future upgrade and enhancement costs. Further, individual programs that currently operate independent reporting systems because no agency-wide system was available for their use will be able to migrate to One Solution and eliminate their maintenance costs, and programs that would otherwise develop such systems will avoid both development and operations costs.

- A reduction in time required for stakeholders to complete reporting and for agency staff to review incoming reports, analyze data, and create outbound reports. This time savings creates a "workforce multiplier" effect, allowing stakeholders to further advance their research, education, and extension work and allowing staff to better meet the increasing demands being placed upon them.

- Moving from paper-based to electronic processes will reduce costs for printing, distribution, mailing, and storing paper-based reports. Further, eliminating paper reports will reduce data entry costs and vastly reduce data entry errors (by eliminating re-keying of paper reports).

# 4 Project Implementation and Management

Successful implementation of One Solution will require active project planning and management. Specifically, a project timeline must be carefully constructed to meet key deadlines and provide benefits early in implementation; project risks must be identified and mitigated to minimize their potential impact; and performance metrics must be developed to enable the agency to demonstrate the value One Solution provides to partners, staff, and the public.

## 4.1 Project Timeline

One Solution will be developed over a four year period, with implementation tasks currently planned to begin in FY 2005. Developing One Solution in several one-year phases will best position CSREES to successfully implement the initiative, especially given its complexity, broad scope, and critical support of agency business processes.

Further, careful project phasing and timeline development enables key features to be released in the early stages of project development. This allows CSREES both to meet key program deadlines (such as for the Plan of Work) and to gain quick wins that bring important benefits to staff and partners (such as a new reporting home page and 'look and feel').

An initial implementation schedule, incorporating such considerations, is presented in Figure 4.1.

**Figure 4.1: One Solution Implementation Timeline**
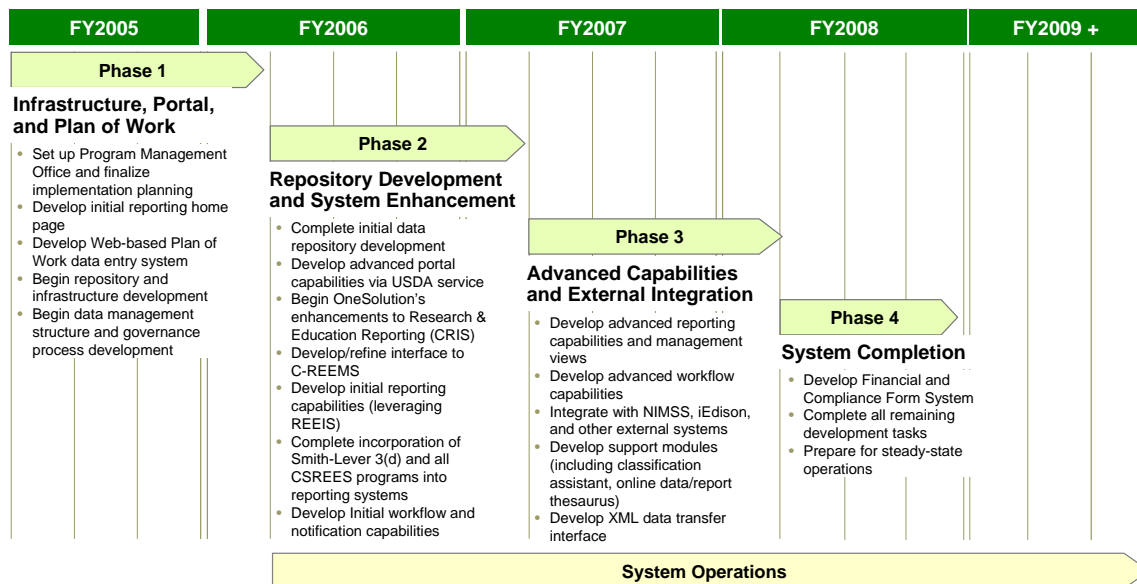


As shown in the above graphic, Phase 1 focuses on development of the Plan of Work system and an initial reporting home page, to ensure that the Plan of Work is available for grantees to complete by the end of 2005. It also includes initial development of the data repository and other

technical infrastructure, as well as the development of data management structures that provide a foundation for the system.

Phase 2 includes the majority of repository and portal development, as well as integration with agency systems. This includes enhancements to research and extension reporting capabilities (that will be possible once the current CRIS system is migrated from a legacy application to a modern database in FY2005), as well as development of an interface to C-REEMS. This phase also includes development of initial reporting and analysis capabilities (through enhancement and expansion of REEIS), as well as initial workflow and notification capabilities. Finally, this phase includes integration of activity classification and appropriate progress reporting for Smith-Lever 3(d) programs, and other programs not currently using agency-standard processes or systems, into agency-standard processes (as practicable).

Phase 3 expands the system's capabilities, providing advanced reporting and analysis capabilities and additional workflow features. This phase includes integration with NIMSS, iEdison, and other external systems, as well as development of an XML data transfer mechanism to allow partners to submit data directly from their systems, bypassing data entry. Finally, this phase includes the development of support modules, such as a project/program classification assistant and report training modules.

The final phase of One Solution focuses on development of a component to accept financial and compliance forms (such as the SF-269 and formula funds budgets), as well as completion of additional support modules and all other remaining development tasks. This phase will include work to ensure all aspects of the system are fully stable.

### *4.2 Governance*

Ensuring successful implementation of the One Solution initiative, and continued use of the standardized reporting processes and data that are critical to its success, will require three major types of governance processes:
- Project management and governance for One Solution's technology implementation and business process changes;
- Establishment of a governance structure for standardizing post-award management and formula-funds reporting processes; and
- Establishment of an agency-wide data governance structure to develop and maintain data consistency standards.

An initial model for these governance structures is presented below. Each of these governance structures will be created as part of the One Solution initiative, with the specific parameters of each structure approved by agency executives before it is implemented.

### 4.2.1  One Solution Project Management

Effective project management is one of the most critical elements to One Solution's success. Because of the initiative's broad scope, including the creation and modification of multiple systems, project management for the initiative will coordinated by a central office, with

oversight from agency executives, ISTM, and the One Solution Task Force and Executive Committee. This structure is illustrated in the graphic below.

**Figure 4.2.1: One Solution Management Structure**
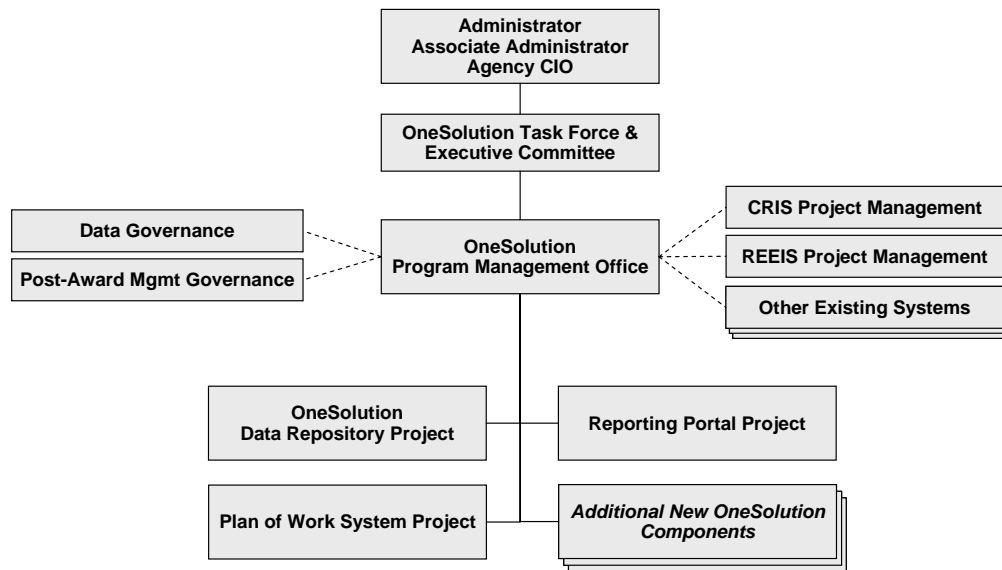


A **One Solution Program Management Office (PMO)** will be created to manage the overall One Solution initiative and coordinate its individual components. Overall program coordination responsibilities include leading overall project planning, managing contracts, coordinating the development of individual components to ensure that they support the overall vision, reporting to agency executives on One Solution's progress, and leading communication and change management efforts.

The PMO will require a wide range of processes to support One Solution, including:
- Contract and vendor management;
- Communications management;
- Financial/budget management;
- Issue and risk management;
- Performance management and reporting;
- Configuration management;
- Quality management; and
- Release management.

Members of the Program Management Office will provide both leadership and support to the project implementation team. The Program Management Office will also be responsible for coordinating One Solution tasks with the Project Managers for individual One Solution projects/components. Further, the PMO will coordinate with executives, new and existing governance committees (such as those described in Sections 4.2.2 and 4.2.3 below), and other agency staff to ensure that all standard agency-wide processes, policies, and procedures necessary to support One Solution are developed in line with the initiative's goals.

Individual **project managers** for One Solution components will be responsible for development and implementation of the IT systems supporting One Solution, with input and direction from the PMO. This includes both development of new components (such as the Data Repository) and enhancement of existing systems (such as Research and Education Reporting/CRIS and REEIS). Project management and implementation for new One Solution components will be directly coordinated by project managers reporting to the One Solution PMO. Management of existing systems related to One Solution will remain separate but will require close cooperation with PMO staff, to ensure that all requirements are met and that design and implementation of system enhancements supports the overall One Solution vision.

The One Solution Program Management Office will coordinate regular meetings of project team members, project managers for CRIS, REEIS, and other related systems, and key program personnel involved in One Solution's implementation. The **One Solution Task Force** and **Executive Committee**, along with the agency's leadership, will provide continued guidance for the initiative, make key decisions on reporting policies and processes, and receive regular status and performance updates from the PMO. CSREES' Chief Information Officer, Associate Administrator, and Administrator will provide guidance and oversight to the PMO as necessary.

### 4.2.2 Reporting and Post-Award Management Governance

As one of One Solution's major goals is streamlining and standardizing the agency's reporting processes, a structure must be established to develop the agency-wide approaches the agency will use to collect and manage reporting data, and maintain the integrity of these processes over time.

CSREES will establish a Reporting and Post-Award Management Committee to accomplish these purposes. The Committee will be responsible for:

- **Development and oversight of report formats:**
  - Reviewing both new and existing reporting forms and data collection processes (as listed in the One Solution Report Inventory or as otherwise identified) to assess the need for each report and the burden placed on grantees in completing it;
  - Developing new reporting formats that merge redundant or program-specific data collections into streamlined, standard data collections whenever possible;
  - Working with the Data Management Committee to ensure that all data necessary for creation of analysis and accountability reports is collected;
  - Identifying changes to standard, agency-wide forms to enable collection of more specific outcome data (including potential requirements to include proposed outcomes in proposal responses and/or project summaries and report on these outcomes in progress reports);
  - Developing guidelines for use of standard, agency-wide reporting formats across all programs;
  - Developing a process for review of RFAs to ensure compliance with data collection guidelines;
  - Modifying agency data collection formats in response to government-wide, USDA, OMB, or other external initiatives (such as the Office of Science and Technology Policy's Research Business Models Initiative); and

- Guiding the development of training content, report content guidelines, and other resources for partners to ensure that they can create accurate, meaningful, consistent reports that provide sufficient detail and context.

- **Development and oversight of report review processes**
  - Development of guidelines for the active review, editing, and approval of incoming reports by NPLs, program specialists, or other appropriate agency staff; and
  - Development of guidelines for addition (by report reviewers) of keywords, comments, categories/classifications, or other supplementary information required for effective report usage.

- **Development of standard report creation processes**
  - Identifying needs for creation of internal analysis and outbound accountability reports; and
  - Developing standard processes and set of NPL/staff procedures for creating internal analysis and outbound accountability reports, such as budget crosscuts and PART portfolio reviews.

The members of this committee will represent all of the agency's units, including Information Systems and Technology Management, Office of Extramural Programs, and Planning and Accountability, and will be appointed by the Administrator in consultation with the Executive Council. The committee should also ideally include representatives from the land-grant university partnership as *ex officio* members to provide the perspectives of those who must complete reporting data (and ensure that new processes and tools meet their needs). The Administrator, Deputy Administrators, and Executive Council will provide executive sponsorship for the committee and will be required to review and approve substantive changes to the agency's business processes.

### 4.2.3  Agency-Wide Data Governance

Integrating data from across multiple programs, IT systems, and purposes into a single data repository, for use in agency-wide reporting and analysis, is a major component of One Solution. Successfully accomplishing this integration will require the development and continued use of data standards, such as guidelines for the consistent application of a standard classification system and specifications for the format of each type of data collected, to ensure consistent collection and storage of data that can be used across the agency. (The specific data management tools and structures proposed for One Solution are discussed in Section 2.2.2.)

A Data Management Committee will be responsible for directing the creation and oversight of CSREES' data management tools, guidelines for their use across the agency, and for ensuring that data integrity and consistency is maintained across all agency activities. Specifically, the responsibilities of the Data Management Committee will include:
- Overseeing and providing input to the development of an agency-wide data dictionary, in consultation with agency staff and partners as needed;
- Ensuring consistent application of the standards defined in the data dictionary, including working with NPLs, IT system owners, and other staff to develop plans for any actions

necessary to adhere to new standards (such as changes in forms or in IT system data structures);

- Coordinating the development of the agency-wide taxonomy and overseeing its agency-wide use (initially focusing on the Problem Area Classification System and expanding to other dimensions of classification as appropriate);
- Coordinating the development of an XML schema and information exchange standard in consultation with IT and program representatives from land-grant universities and other grantees;
- Ensuring that all new CSREES IT (including One Solution) systems, and modifications to existing systems, meet the standards of the data dictionary, taxonomy, and XML schema;
- Developing guidelines, policies, and procedures for the incorporation of these standards into programs and business processes; and
- Developing plans and strategies to inform agency staff and partners of these data standards, their benefit, and actions to support their use.

This committee will be chaired by CSREES' Chief Information Officer (or his or her designee). The members of the committee will represent all appropriate agency units, including Information Systems and Technology Management, Office of Extramural Programs, and Planning and Accountability, and will be appointed by the Administrator in consultation with the Executive Council. The committee will include representatives from the land-grant university partnership as *ex officio* members to provide partners' perspective, particularly regarding the development of XML data transfer standards. The Administrator, Deputy Administrator, and Chief Information Officer will provide executive sponsorship for the committee and will be required to review and approve relevant changes to the agency's policies or processes.

### *4.3   Performance Management*

Performance management is a key aspect of One Solution's success, enabling the agency to measure the positive effects of the initiative and demonstrate its value once implemented. This section describes the performance measurement and management process to be used for One Solution, as well as an initial set of performance metrics that will measure One Solution's outputs and outcomes.

### 4.3.1   Performance Management Process

Performance measurement is an iterative process that spans the lifecycle of the initiative. As depicted in the figure below, the process includes the following steps:
- Create goals and metrics;
- Identify baseline values;
- Collect data;
- Evaluate data; and
- Adjust metrics iteratively.

The baseline consists of the as-is state of the environment before the implementation of the system. Subsequent to the creation of this business case, baseline numbers must be collected to

ensure accurate calculation of performance improvements for each metric. After One Solution is implemented, actual data must be collected, and these results will be compared with baseline data and performance goals.

Analysis of the performance goals will be completed through measuring the difference between the baseline or initial amounts and the newly collected data. The One Solution project management team will identify and undertake corrective action when any performance goal is missed by 10% or more, including an explanation of what tasks the project will pursue to ensure that it will performance measure will achieve the original goal.

**Figure 4.3.1: One Solution Performance Measurement Process**
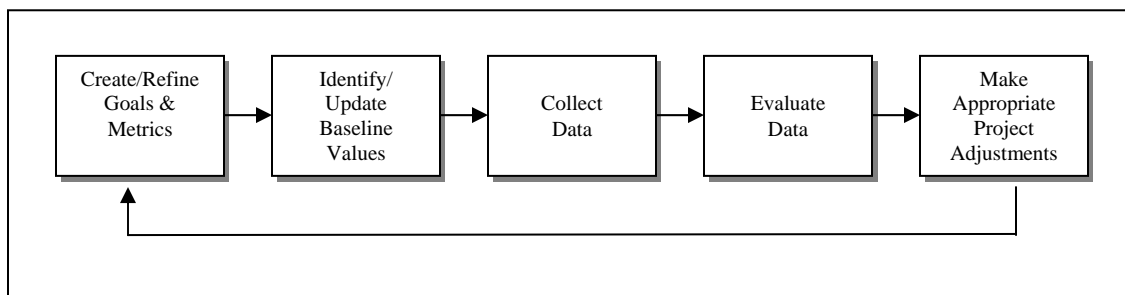


### 4.3.2 One Solution Performance Measures

The performance measures for this project are based on the Federal Enterprise Architecture Performance Reference Model (PRM), in line with OMB guidelines for projects involving information technology. The PRM specifies the creation of performance measures for each year of an initiative's development and through implementation. Metrics in four Measurement Areas ensure that important outcomes and outputs are identified from a strategic, customer, process, and technology perspective, with more detailed standard Measurement Categories and project-specific Measurement Indicators providing specific details about the metrics to be used in each Measurement Area. The PRM defines each metric based on a baseline amount and an improvement to the baseline (based on either a percentage change or absolute change).

The PRM, particularly through its Mission & Business Results measurement area, can help align One Solution's outcome measures to desired strategic goals and is designed to support the annual agency performance management process governed by the Government Performance and Results Act (GPRA).

**Table 4.3.2:  One Solution Performance Measures**

| PHASE/ YEAR | MEASURE- MENT AREA | MEASURE- MENT CATEGORY | MEASUREMENT INDICATOR | EXISTING BASELINE | IMPROVE- MENT TO BASELINE |
|---|---|---|---|---|---|
| Year 1 | Mission and Business Results - Support Delivery of Services | Controls and Oversight | Program Evaluation and Monitoring: Collection of classification information (and other data necessary to enable analysis) across CSREES programs | Project classification and progress reporting collected for all research and higher-education programs, comprising 44% of the agency's formula funds budget. Only limited, unstructured narrative data, without classifications, collected for programs comprising 56% of formula funds. | Classification and progress reporting data collected for all formula-funds programs included in the Plan of Work process (Smith-Lever 3(b)/(c), Hatch Act, 1890s Extension, Evans-Allen), as well as all other research and higher education projects (comprising approximately 85% of the agency's FY04 funding). |
| Year 1 | Customer Results | Customer Burden | Reduction in burden-hours for Plan of Work and Annual Report of Accomplishments | 1367 hours per institution for Plan of Work; 167 hours per institution for the Annual Report of Accomplishments. | 10% overall reduction in burden-hours for both Annual Report and Plan of Work. |
| Year 1 | Processes and Activities | Productivity and Efficiency | Reduction in CSREES staff review time for Plan of Work and Annual Report of Accomplishments | TBD based on estimates of review time per NPL and average number of reviewers. | 15% reduction in staff review time for Plans of Work and Annual Reports of Accomplishments. |
| Year 1 | Technology | Data Standardization | Percentage of CSREES data collections reviewed and standardized | No agency data currently standardized. | 25% of CSREES data collections standardized and included in new data management processes. |
| Year 2 | Mission and Business Results - Support Delivery of Services | Controls and Oversight | Program Evaluation and Monitoring: Collection of classification information (and other data necessary to enable analysis) across CSREES programs | Project classification and progress reporting collected for all research programs, comprising 44% of the agency's formula funds budget. Only limited, unstructured narrative data, without classifications, collected for programs comprising 56% of formula funds. | Classification and progress reporting data collected for all formula-funds programs included in the Plan of Work process (Smith-Lever 3(b)/(c), Hatch Act, 1890s Extension, Evans-Allen), as well as all other research and higher education projects (comprising approximately 85% of the agency's FY04 funding). |
| Year 2 | Mission and Business Results - Support Delivery of Services | Legislative Relations and Public Affairs | Increase in Congressional questions for which a full answer (without manual calculations) can be provided | Approximately 1800 questions (and sub-questions) received each year; amount estimated TBD. | 10% reduction in answers provided as estimates (vs. actual data). |

| PHASE/ YEAR | MEASURE-MENT AREA | MEASURE-MENT CATEGORY | MEASUREMENT INDICATOR | EXISTING BASELINE | IMPROVE-MENT TO BASELINE |
|---|---|---|---|---|---|
| Year 2 | Customer Results | Customer Satisfaction | Improvement in grantees' satisfaction with reporting processes and tools (based on ACSI or other satisfaction index) | TBD based on initial baseline customer satisfaction survey. | 5% improvement in customer satisfaction (based on relative change from initial score to new score). |
| Year 2 | Processes and Activities | Productivity and Efficiency | Improvement in time spent routing and reviewing inbound reports | TBD based on CSREES estimates of per-employee review and routing time. | Continued 15% reduction in staff review time for Plans of Work and Annual Reports of Accomplishments; 10% reduction in time devoted to routing and approval of other inbound reports. |
| Year 2 | Technology | Data Standardization | Percentage of CSREES data collections reviewed and standardized | No agency data currently standardized. | 50% of CSREES data collections standardized and included in new data management processes. |
| Year 2 | Technology | Data Sharing and Data Standardization | Percentage of CSREES program / project data stored in central data repository | As the One Solution repository is being created through this project, no data is currently stored in it; data for a subset of programs included in separate REEIS databases. | 80% of project and program data (based on size of program and project funding) incorporated into repository. |
| Year 3 | Mission and Business Results - Support Deliver of Services | Controls and Oversight | Program Evaluation and Monitoring: Collection of classification information (and other data necessary to enable analysis) across CSREES programs | Project classification and progress reporting collected for all research programs, comprising 44% of the agency's formula funds budget. Only limited, unstructured narrative data, without classifications, collected for programs comprising 56% of formula funds. | Classification and progress/ performance reporting data collected for 100% of CSREES programs. |
| Year 3 | Mission and Business Results - Support Deliver of Services | Legislative Relations and Public Affairs | Increase in Congressional questions for which a full answer (without manual calculations) can be provided | Approximately 1800 questions (and sub-questions) received each year; amount estimated TBD. | 15% reduction in answers provided as estimates (vs. actual data). |
| Year 3 | Customer Results | Customer Satisfaction | Improvement in grantees' satisfaction with reporting processes and tools (based on ACSI or other satisfaction index) | TBD based on initial baseline customer satisfaction survey. | 10% improvement in customer satisfaction (based on relative change from initial score to new score). |

| PHASE/ YEAR | MEASURE-MENT AREA | MEASURE-MENT CATEGORY | MEASUREMENT INDICATOR | EXISTING BASELINE | IMPROVE-MENT TO BASELINE |
|---|---|---|---|---|---|
| Year 3 | Processes and Activities | Productivity and Efficiency | Improvement in time spent routing and reviewing inbound reports | TBD based on CSREES estimates of per-employee review and routing time. | Continued 15% reduction in staff review time for Plans of Work and Annual Reports of Accomplishments; 20% reduction in time devoted to routing and approval of other inbound reports. |
| Year 3 | Technology | Data Standardization | Percentage of CSREES data collections reviewed and standardized | No agency data currently standardized. | 90% of CSREES data collections standardized and included in new data management processes |
| Year 3 | Technology | Data Sharing and Data Standardization | Percentage of CSREES program / project data stored in central data repository | As the One Solution repository is being created through this project, no data is currently stored in it; data for a subset of programs included in separate REEIS databases. | 80% of project and program data (based on size of program and project funding) incorporated into repository. |
| Year 4 | Mission and Business Results - Support Delivery of Services | Controls and Oversight | Program Evaluation and Monitoring: Collection of classification information (and other data necessary to enable analysis) across CSREES programs | Project classification and progress reporting collected for all research programs, comprising 44% of the agency's formula funds budget. Only limited, unstructured narrative data, without classifications, collected for programs comprising 56% of formula funds. | Classification and progress/ performance reporting data continue to be collected for 100% of CSREES programs. |
| Year 4 | Mission and Business Results - Support Delivery of Services | Legislative Relations and Public Affairs | Increase in Congressional questions for which a full answer (without manual calculations) can be provided | Approximately 1800 questions (and sub-questions) received each year; amount estimated TBD. | 20% reduction in answers provided as estimates (vs. actual data). |
| Year 4 | Customer Results | Customer Satisfaction | Improvement in grantees' satisfaction with reporting processes and tools (based on ACSI or other satisfaction index) | TBD based on initial baseline customer satisfaction survey. | 15% improvement in customer satisfaction (based on relative change from initial score to new score). |
| Year 4 | Processes and Activities | Productivity and Efficiency | Improvement in time spent routing and reviewing inbound reports | TBD based on CSREES estimates of per-employee review and routing time. | Continued 15% reduction in staff review time for Plans of Work and Annual Reports of Accomplishments; 20% reduction in time devoted to routing and approval of other inbound reports. |

| PHASE/ YEAR | MEASURE- MENT AREA | MEASURE- MENT CATEGORY | MEASUREMENT INDICATOR | EXISTING BASELINE | IMPROVE- MENT TO BASELINE |
|---|---|---|---|---|---|
| Year 4 | Technology | Data Standardization | Percentage of CSREES data collections reviewed and standardized | No agency data currently standardized. | 100% of CSREES data collections standardized and included in new data management processes. |
| Year 4 | Technology | Data Sharing and Data Standardization | Percentage of CSREES program / project data stored in central data repository | As the One Solution repository is being created through this project, no data is currently stored in it; data for a subset of programs included in separate REEIS databases. | 100% of project and program data (based on size of program and project funding) incorporated into repository. |

## 4.4  Risk Management

For CSREES to successfully implement One Solution, it is critical that the project team is aware of and can actively manage the risks involved.  Indeed, given the complexity of implementing One Solution and the importance of reporting to the agency and its partners, it is critical to assess all areas of risk prior to implementation, and to develop strategies to manage these risk factors if and when they do arise.  Actively identifying risks, and taking steps to mitigate them, reduces the possibility of issues arising either during system development or operations.

### 4.4.1  Risk Analysis

To identify all potential project risks, this analysis includes risks across a broad, standardized set of categories.  These 19 categories, developed by OMB for use in IT projects across the Federal government, include risks related to:

- Project management and resources;
- Information technology, data, security, and privacy; and
- Business, strategy, and agency finances.

Each identified risk is analyzed based on two key dimensions, probability and potential impact, to determine its overall importance and priority.

Risk *probability*, the likelihood that a particular risk will occur, has been assessed based on the following criteria:

> *High Probability* – This risk is fairly likely to occur, with a greater than 50% chance of occurrence.
> *Medium Probability* – This risk is somewhat unlikely to occur, with a chance of occurrence between 25 and 50%.
> *Low Probability* – This risk is unlikely to occur, with a chance of occurrence less than 25%.

Risk *impact,* the potential effect a risk would have if realized, has been assessed based on the following criteria:

> *High Impact* – These risks could have a broad effect on the initiative's implementation or operations, affecting two thirds or more of activities.
> *Medium Impact* – These risks would have a significant effect on the initiative's implementation or operations, affecting one third to two thirds of activities.
> *Low Impact* – These risks would have a limited effect on implementation or operations, affecting less than one third of activities.

Risks have been prioritized based on these two criteria, with those determined to have the greatest impact or be most likely to occur given greatest priority. Specific combinations of probability and impact have been identified in Table 4.4.1.

**Table 4.4.1: Risk Priority Rating Scale**

| IF RISK PROBABILITY IS… | AND RISK IMPACT IS... | THEN RISK PRIORITY IS… |
|---|---|---|
| High | High | |
| High | Medium | Significant |
| Medium | High | |
| | | |
| High | Low | |
| Medium | Medium | Moderate |
| Low | High | |
| | | |
| Medium | Low | |
| Low | Medium | Minimal |
| Low | Low | |

### 4.4.2  One Solution Risks

Risks identified for the One Solution project are included in the table below, organized by priority.

**Table 4.4.2: One Solution Risks**

| AREA OF RISK | DESCRIPTION | PROB. | IMPACT | MITIGATION STRATEGY |
|---|---|---|---|---|
| *Significant Risks* | | | | |
| Data / Information | If data from existing CSREES systems can not be transferred to One Solution's planned central data repository, or data structures and formats complicate efforts to integrate data across multiple sources, the initiative's data integration goals may not be realized. | High | Medium | • Develop and enforce data management standards and governance processes to be used across systems.<br>• Develop plan for normalization or transformation of data stored in each existing system to allow integration as part of One Solution data repository. |

| AREA OF RISK | DESCRIPTION | PROB. | IMPACT | MITIGATION STRATEGY |
|---|---|---|---|---|
| Dependencies and Interoperability | If existing systems and new One Solution components cannot be adequately integrated, the newly launched system may not function properly. | Medium | High | • Develop data management standards and governance structure to support integration.<br>• Develop integration architecture detailing all required links between systems.<br>• Use lessons learned (planning, testing, etc.) from previous database migration efforts to overcome issues associated with dependency and interoperability of multiple systems. |
| Project Resources | If there is high turnover of project team members and other key CSREES or contractor personnel during the One Solution implementation, both staff time and knowledge capital may be lost. | High | Medium | • Identify key resources and skill sets required to maintain One Solution.<br>• Use performance-based contracts or other measures to ensure that contractors deliver adequate staff levels.<br>• Use collaboration and knowledge management system to ensure transition of knowledge capital.<br>• Monitor retirement plans to anticipate needs for new project staff as current staff leave. |
| *Moderate Risks* | | | | |
| Business | If One Solution does not align with CSREES' envisioned business processes, the agency may not achieve its streamlining and standardization goals. | Low | High | • Conduct agency requirements and process analysis to determine the processes with which One Solution must align. |
| Business | If the One Solution implementation lacks sufficient funding, the project may not be delivered on schedule. | Low | High | • Develop support documentation to address all actions and processes required to obtain funding.<br>• Ensure continued support of One Solution vision by agency staff and executives. |
| Capability of Agency to Manage Investment | If the CSREES project manager or team members do not have sufficient project management experience, the One Solution implementation may not be completed according to schedule and quality expectations. | Low | High | • Ensure that implementation is led by a manager with Project Management Professional (PMP) or similar certification.<br>• Define technical expertise requirements in advance of determining team.<br>• Select staff with prior experience, and utilize current CSREES staff to aid transition. |
| Dependencies and Interoperability | If One Solution is not able to interoperate with land-grant partners' systems, many of the system's features will not be used. | Medium | Medium | • Predefine interface protocols and standards, based on standards such as XML, for external systems to work with One Solution.<br>• Define specific integration and legacy system modification requirements.<br>• Use Web-based architecture. |
| Feasibility | If One Solution cannot support staff or partners supporting requirements, then these stakeholders may not be able to utilize the new system. | Low | High | • Conduct a requirements analysis to ensure that One Solution meets the needs of its stakeholders.<br>• Evaluate all architectures, vendor solutions, and system components to ensure that they will deliver required functionality. |

| AREA OF RISK | DESCRIPTION | PROB. | IMPACT | MITIGATION STRATEGY |
|---|---|---|---|---|
| Initial Costs | If there are project delays or other unforeseen circumstances or estimates do not account for the complexity of the effort, initial implementation cost may exceed expectations. | Medium | Medium | • Develop cost estimates for initial deployment planning based on past successful implementations, market research, and other sources.<br>• Seek out best practices based on previous agency experiences migrating to a new system.<br>• Issue Requests for Information (RFIs) to potential vendors seeking cost estimates to confirm agency plans and estimates.<br>• Use performance based contracts, which encourage contractors to complete tasks on schedule and under budget. |
| Lifecycle Costs | If current CSREES systems require more extensive enhancement or modification than estimated, or system operations requires greater effort than estimated, overall system costs may exceed current projections. | Low | High | • Closely examine existing CSREES systems to identify all possible enhancement needs.<br>• Include potential data management complexities in maintenance and operations cost estimates. |
| Overall Risk of Investment Failure | If One Solution loses the support of CSREES staff and partners, or planned enhancements are not completed in a timely manner, the implementation may not be accomplished as planned. | Low | High | • Ensure that CSREES staff and partners are aware of, and committed to, the implementation of One Solution.<br>• Plan system to rapidly obtain high-profile benefits to maintain support. |
| Schedule | If scheduled tasks are not appropriately planned (including hardware / software, staff roles, and knowledge transfer / training), then the transition to One Solution may be delayed or take longer than expected. | Medium | Medium | • Develop realistic timelines for implementation tasks based on past experiences and analysis of agency data, systems, and architectures.<br>• Communicate required tasks to staff.<br>• Assess all prerequisites for implementation and deployment so that all potential sources of delay are identified and addressed. |
| Security | If CSREES does not maintain active security controls within One Solution, then data, content, and documents may be accessed and used improperly by unauthorized users. | Low | Medium | • Use an intrusion detection system (IDS) and the USDA eAuthentication solution to manage roles, permissions, and system users.<br>• Conduct certification and accreditation for the One Solution system.<br>• Continuously review and update the One Solution security plan.<br>• Use best industry practices for data security, and develop robust security mechanisms within the technical architecture. |
| Strategy | If accountability requirements, Federal-wide reporting processes, other external factors, or agency reporting needs change, One Solution may no longer effectively support the agency's mission and operations. | High | Medium | • Use a modern system architecture that separates business rules from core technical components.<br>• Use a modular system design that allows for individual components to be modified or replaced if necessary.<br>• Ensure that developed One Solution system is flexible and scalable to integrate new forms, reports and accompanying business processes. |

| AREA OF RISK | DESCRIPTION | PROB. | IMPACT | MITIGATION STRATEGY |
|---|---|---|---|---|
| *Minimal Risks* | | | | |
| Data / Information | If electronic records, content, or other electronically stored material is erroneously deleted or destroyed, CSREES staff may not be able to utilize One Solution for all of their project management needs. | Low | Medium | • Incorporate sufficient authentication and authorization levels into One Solution, workflow processes, and standards for deletion or destruction of content or documents.<br>• Ensure adequate archiving, backup and recovery mechanisms for business critical data. |
| Organizational and Change Management | If partner institutions are resistant to using One Solution, or if their individuals staffs are not aware of how to properly use the new system, CSREES' reporting processes will not realize planned benefits. | Medium | Low | • Provide frequent communications to partner institutions to ensure their understanding of One Solution and the progress of the transition.<br>• Develop and execute an integrated change management, training, and communications plan.<br>• Provide online help for web applications and a help desk for questions and queries. |
| Privacy | If CSREES does not maintain security controls within One Solution over private or confidential public information, personally-identifiable or other sensitive data could be accessed by unauthorized persons. | Medium | Low | • Conduct a Privacy Impact Assessment (PIA) to identify weaknesses and develop action plans to respond to those weaknesses.<br>• Include rules and guidelines in the system to minimize the possibility of system users performing unauthorized actions. |
| Reliability of Systems | If system does not provide necessary scalability, stability, and uptime levels, critical reporting processes may not be fully completed. | Low | Medium | • Create a continuity of operations plan (COOP).<br>• Maintain regular system backups and redundancy.<br>• Conduct stress testing and load balancing on the system to ensure that it will work to scale and provide durability. |
| Risk of Creating a Monopoly | If One Solution relies on vendor-specific or highly customized technology, CSREES may be tied to one technology, vendor, or system integrator in the future. | Low | Medium | • Avoid the use of vendor-specific or highly customized solutions.<br>• Implement One Solution with industry-standard technologies and a modular design that allows components to be more interchangeable.<br>• Require contractors to thoroughly document design and other activities to enable transition if necessary.<br>• Enter into software and maintenance agreements that include long-term pricing or other vendor controls. |
| Surety and Asset Protection | If CSREES does not maintain appropriate physical security controls and protection for One Solution, hardware and software may be vulnerable to natural disaster, theft, or other loss and damage. | Low | Medium | • Use physical site protections for server and network hosting centers.<br>• Maintain off-site backup system and data backups. |

| AREA OF RISK | DESCRIPTION | PROB. | IMPACT | MITIGATION STRATEGY |
|---|---|---|---|---|
| Technical Obsolescence | If One Solution is not implemented based on modern technologies, systems may become obsolete or may be unable to continue meeting agency needs. | Low | Medium | • Develop One Solution with modern, industry-standard technology.<br>• Migrate existing systems, such as CRIS, to modern platforms and technologies.<br>• Regularly evaluate each system component for potential version upgrade or platform migration considerations. |
| Technology | If CSREES does not implement One Solution with sufficient flexibility necessary to upgrade and/or replace its components with modern technology, the system may become unreliable and/or may not be able to continue to fulfill the needs of the stakeholders over time. | Low | Medium | • Migrate existing systems, such as CRIS, to modern platforms and technologies.<br>• Use a modular implementation approach, allowing some system components to be replaced as necessary (while maintaining other components). |
| Technology | If One Solution is implemented without conforming to CSREES or USDA Enterprise Architecture standards, it may become necessary to make costly system modifications. | Low | Medium | • Define One Solution system architecture to meet Enterprise Architecture standards and requirements. |

# 5 Cost-Benefit and Alternatives Analysis

To document the expected financial impact of One Solution, and ensure that it will generate a sufficient return for its use of CSREES financial and staff resources, planning for the initiative includes a Cost-Benefit and Alternative Analysis (CBA). The CBA allows project management to identify several alternative paths for achieving desired system capabilities and compare the costs and benefits of each. This ensures that the system will be financially feasible—that is, the amount of financial benefits the system provides will exceed the total amount of its costs—and that the most efficient option is selected for implementation.

## 5.1 Implementation Alternatives

To ensure that the One Solution initiative is implemented in the most efficient and effective manner, several implementation scenarios—featuring varying scopes, levels of complexity, and technical approaches—were assessed:
- A limited system focused on the Plan of Work and a Reporting Home Page;
- A full-featured system leveraging existing components; and
- A brand-new, full featured system replacing all current reporting components.

Based on an assessment of the advantages, disadvantages, risks, and cost/benefit drivers of each scenario, the second alternative offers the best return on investment while minimizing risk and cost. A full analysis of each alternative is presented below.

### 5.1.1 Alternative 1: Limited, Plan of Work-Focused System

In this alternative, CSREES would implement a limited solution focusing only on the most pressing issues for staff and partners. Specifically, this alternative would include creation of:
- A new, independent system for enabling the agency to collect and analyze the revised, database-driven Plan of Work;
- Reporting home pages for staff and partners, with links to existing reporting systems customized for each audience and more convenient navigation within current systems; and
- Limited report standardization and streamlining, focusing on the incorporation of program-specific reports into CRIS forms and other agency standard data collections (as possible based on existing system capabilities).

Existing systems would not be enhanced or otherwise modified in this alternative; both partners and staff would benefit from the improved structure of the Plan of Work and easier access to reporting systems but would not have access to improved integration or analysis of agency data.

| | |
|---|---|
| **Timeline, Scope, and Complexity** | This alternative has the narrowest aims of the three considered in this business case. As such, it can be implemented quickly, with most functionality available within one year and all implementation tasks complete within 18 to 24 months. |
| **Advantages and** | The main advantage of this alternative is its limited scope, which |

**Disadvantages**

reduces both implementation complexity and cost. Further, even with its limited scope, this alternative would allow the agency to fulfill its pressing need of developing a system to enable the revised Plan of Work.

Because of its limited scope, however, this alternative would not enable CSREES to obtain the many benefits offered by a broader solution that integrates data across systems. Although the new Plan of Work will capture additional data to improve reporting, CSREES staff would still be required to manually integrate this data across the Plan of Work, CRIS, C-REEMS, and other sources. The agency would miss the opportunity to reduce reporting burdens and provide a seamless user experience across systems, and staff would not have access to the workflow, notification, and approval features that they expressed as critical to efficient program leadership and administration.

**Feasibility, Market Analysis, and Risks**

The focused, narrow approach of this alternative and its relative lack of complexity result in a generally low level of implementation risk. However, this approach does expose the agency to the risk of developing a solution that does not fulfill all of the agency's increasing reporting and accountability needs and that would need to be later augmented or replaced with a more full-featured solution. Further, a lack of improvements to existing reporting systems, such as CRIS, may prevent the agency from streamlining and combining many program-specific reports into agency-wide processes.

Creation of both the Plan of Work data entry and analysis system and the reporting home page are feasible. Database software and Web-based front-end packages are available for use in the Plan of Work system, although any commercial off-the-shelf database and front-end modules would require customization to support the data structures and entry screens envisioned for the Plan of Work as well as the required report generation capabilities.

**Cost and Benefit Drivers**

This alternative's narrow feature set would result in both the lowest cost and benefit among the three alternatives. Specifically, because the features and systems developed for this alternative are only a small subset of those for Alternatives 2 and 3, the cost is envisioned to be just over $1 million (based on the Phase 1 costs for Alternative 2, which include a similar feature set and level of effort). Benefits would include a small reduction in reporting burden for the new Plan of Work, as well as some time savings from the improved access to reporting systems enabled by the reporting homepage; the financial value of these limited time savings is likely to be approximately even with system costs.

## 5.1.2 Alternative 2: Solution Leveraging Existing Components

This alternative, selected for implementation, will provide all envisioned features of One Solution through a centralized data repository, reporting portal, and additional support modules that tie existing systems into an integrated solution. Partners and agency staff will access all reporting tools through a single location and will experience seamless integration though a single username and password, standard look-and-feel, and data integration across systems.

This vision, described in more detail in Section 2.2, will be achieved through a number of key technology components:

- A new reporting portal presenting customized home pages for each major agency audience (staff members, grantees, and the public), including customized home pages for individual users showing reports requiring completion or review;
- Significant enhancements to the agency's research and education reporting system to enable enhanced data entry capabilities (such as file attachments and linking of multistate umbrella projects to individual Hatch project components) and REEIS to enable improved data analysis and reporting (including advanced analysis tools, automated generation of key budget crosscuts and other regularly-used reports, and cross-database search and data aggregation capabilities);
- A new Plan of Work and Formula Funds reporting system enabling collection and analysis of the new Plan of Work, as well as management of work plan and progress report submission for other extension and formula-funded research programs (such as the Smith-Lever 3(d) programs, McIntire-Stennis forestry research, and Renewable Resources Extension);
- A central One Solution Data Repository integrating data from research and education reporting, the new Plan of Work system, and other internal and external data entry and storage systems;
- Workflow and notification capabilities to support critical reporting-related business processes (such as Hatch project approvals and review of incoming AD-421 forms); and
- Additional support modules including a program and project classification assistance 'wizard', XML data transfer tools, and commenting and versioning tools.

The technology solution will be supported by the development of several data, business process, and governance capabilities. A data architecture for the agency will be developed as part of this alternative, including data formatting and consistency standards, a standard taxonomy (based on the Problem Area Classification System), and XML-based data interchange standards. All existing reporting processes will be evaluated for inclusion into the standard, agency-wide process that One Solution will enable. Finally, governance committees will be created to oversee the development and use of the data architecture, and to coordinate and manage the agency's reporting processes. (Additional information on the design of this alternative is included in Section 2.2.)

| | |
|---|---|
| **Timeline, Scope, and Complexity** | The scope of this initiative is significantly larger than that of Alternative 1, addressing many aspects of reporting (and affecting many more IT systems). Because of the large number of systems to be integrated, and the effort required to integrate differently formatted data from across so many systems, this alternative is fairly complex |

and will require a longer implementation timeline.

Implementation of all features would require approximately four years. Because this alternative leverages existing systems and uses a modular approach, key system components can be developed quickly, both addressing key agency deadlines (such as the completion of the Plan of Work component by early FY2006) and providing other high-value components (such as the reporting portal) within 12 to 18 months. Additional features can be implemented incrementally to ensure continued progress and momentum.

**Advantages and Disadvantages**

Alternative 2 offers several advantages. Its modular approach, leveraging existing systems, will enable agency staff and partners to realize significant benefits while minimizing implementation cost. Further, many benefits will be realized quickly, as this approach would enable key system components to be rapidly developed. A modular approach may be more flexible than a new, integrated system in accommodating process or system changes required either by Congress or as part of new government-wide reporting processes. Finally, the lower cost and shorter timeline of this alternative, compared to other approaches for implementing all One Solution features, will simplify obtaining required funding.

However, this alternative also presents some challenges. Integrating data from multiple existing systems, each designed on a different platform and using different data standards, is more complex than sharing data within one integrated, single-platform system. Further, other aspects of the system, such as workflow capabilities, may be more limited under this approach than a fully integrated approach.

**Feasibility, Market Analysis, and Risks**

Because this alternative is broader in scope and functionality than Alternative 1, it has a somewhat higher overall level of implementation risk. However, the use of existing systems, planning that prioritizes the most critical system components, and modular design of this alternative help to significantly limit this risk. Across both Alternatives 2 and 3, the integration of differently-formatted data across multiple systems can be challenging and involves some risk; this risk is mitigated through development of data standards and the creation of governance processes.

All system components are feasible, with packaged software available to support all core functions of the system. However, all commercially-acquired software is likely to require some customization to support CSREES' unique reporting needs and processes. Further, the modular structure of this alternative, and the different architectures and backgrounds of existing components, may complicate the implementation of workflow processes and other

aspects of the solution that require close integration across systems. Finally, data standardization may require some modifications to existing systems to ensure consistent data structures. With the pending re-development of CRIS' back-end database, modification of data formats is not likely to be difficult to implement in most systems' database software itself; however, conversion of the historical data stored by CSREES may be time-consuming (an issue present in any approach aiming to standardize previously-separate data).

**Cost and Benefit Drivers**

This alternative would leverage existing systems to enable its broad feature set, resulting in a moderate level of system costs. Investments in existing systems would be maintained, while their aspects needing improvement to continue meeting the agency's needs would be addressed. New systems would be created to provide functionality not currently available to the agency, and the role of all systems would be focused on a specific role in the agency's reporting system architecture to avoid overlap and redundant spending.

Because this alternative would enable all features envisioned to be included in One Solution, it would generate a high level of benefits for both the agency and its partners (as further described in Section 5.1.2). These benefits are expected to significantly exceed the solution's lifecycle costs, resulting in a high return on investment.

## 5.1.3 Alternative 3: New System Replacing Existing Components

Similar to Alternative 2, this alternative features a broad scope and implements all envisioned One Solution features. However, this alternative would replace all existing reporting-related systems with a new system designed from the ground up to integrate data across all projects and programs and present a single, streamlined, unified interface to users.

Specifically, this system would encompass all features currently provided by CRIS and REEIS, as well as all One Solution features, and would include the following components:

- Reporting portal (potentially based on the USDA Portal Service) with customized home pages for each major CSREES audience and extensive capabilities to customize presentation of data to individual users;
- Data entry module(s) for research and education reporting forms, the Plan of Work, and all other agency data collections. This would allow users to submit all reporting data though the reporting portal and including advanced features such as pre-population of data on forms, dynamic addition of program-specific form fields when appropriate, and automated validation and error checking;
- Centralized data repository (and additional purpose-specific databases as necessary), enabling integration of previously-separate reporting data;

- Advanced reporting and analysis tools, including online analytical processing (OLAP), to allow users to both run standardized reports for common requests and generate their own queries;
- Workflow and notification capabilities to support critical reporting-related business processes (such as Hatch project approvals and review of incoming AD-421 forms); and
- Additional support modules including a program and project classification assistance 'wizard', XML data transfer tools, and commenting and versioning tools.

These features would most likely be implemented through the use of an enterprise resource planning (ERP) or business intelligence (BI) platform or other customized commercial off-the-shelf software.

Alternative 3 will also include the development of data, business process, and governance capabilities described for Alternative 2 above.

| | |
|---|---|
| **Timeline, Scope, and Complexity** | The scope of this initiative is similar to that of Alternative 2, as it would realize a similar feature set. However, because this alternative includes the replacement of all existing reporting systems with new components, it is significantly more complex than Alternative 2 and would require a longer implementation timeline |
| | Implementation of all features in this alternative is likely to require five or more years. Because this alternative would involve the replacement of all major reporting-related systems, key system components would be developed over a longer initial period than for the other two alternatives. Interim solutions would be developed for short-term use for the Plan of Work and reporting portal to ensure this functionality is available within one year. |
| **Advantages and Disadvantages** | Alternative 3 would allow the agency to use a single, state-of-the-art system for all of its reporting processes, reducing maintenance effort and enabling additional capabilities (particularly in workflow management and data aggregation/analysis). Further, a new solution based on the most current technology may have a longer lifecycle, thus increasing the system's value. |
| | However, Alternative 3 would be the most expensive option, and its staff resource requirements may be prohibitive. A new, integrated system may be more difficult to modify to accommodate process or system changes required as part of new government-wide reporting processes; at a minimum, any investment in those components replaced by a government-wide system would be lost. Finally, a longer timeline would result in system functionality released much later than Alternative 2, with releases concentrated in later years. |
| **Feasibility, Market Analysis, and Risks** | Because this alternative is broadest in scope, and involves the most significant effort and complexity, its overall risk is significantly higher than that of either Alternatives 1 or 2. Entirely replacing |

mission-critical systems such as CRIS and C-REEMS presents a particular challenge if any aspect of implementation is not successful, although an implementation schedule that prioritizes the most critical components can partially mitigate such risk.  Further, the extensive customization often required to implement complex commercial off-the-shelf (COTS) software, such as an ERP package, can lead to significant schedule and cost overruns and can require further effort when vendors release software upgrades.  However, Alternative 3 may result in easier interchange and integration of data (since the system would feature more integrated components and would not require developing links between existing systems), reducing the risks associated with integrating existing systems based on different platforms.

This approach is technically feasible, with packaged software available to support all core functions of the systems.  Based on the features required for a solution replacing all current reporting systems, commercial off-the-shelf software options would likely focus on enterprise resource planning (ERP) or business intelligence (BI) packages.  Any commercially-acquired software is likely to require customization to support CSREES' unique reporting needs and processes.  Although implementation and customization of complex packages can require significant effort, the use of a consistent technology platform may reduce the complexity associated with linking together several independent systems.

**Cost and Benefit Drivers**

Because this alternative would fully replace existing systems such as CRIS and REEIS with an integrated architecture based on a single platform, it would be the most expensive option.  Although some current software licenses hardware might be maintained, should those platforms continue to be used, CSREES would be required to make a significant investment in new technology to accomplish this alternative's scope.

Because this alternative would enable a similar level of features envisioned to those envisioned in Alternative 2, it would generate a similar level of benefits for both the agency and its partners (as further described in Section 5.1.2 below).  Specifically, although the eventual benefits for this alternative would be expected to be slightly higher (as a new platform may support additional workflow, data integration, and portal features), these benefits may take significantly longer to realize.  Because costs for this alternative are expected to be significantly higher than for Alternative 2, while financial benefits would be only slightly higher, this approach would result in a lower return on investment.

## 5.1.4 Alternatives Comparison and Selection

Alternative 2 (a full solution leveraging existing components) has been selected for implementation, as it provides the best combination of cost and benefit (and thus best return on investment), will result in the full functionality envisioned for One Solution, and will enable many features to be implemented quickly. Specifically:

- **Alternative 1**, limited development focusing on the Plan of Work, will enable the agency to better meet some AREERA requirements but will not provide significant efficiency gains or allow the agency to easily provide an integrated snapshot of its activities and impacts. As such, its benefits are limited, just covering the cost of developing and running its new components and producing only an approximately 3% return on investment.

- **Alternative 2**, development of a full solution that leverages existing components, provides an optimal balance of functionality and cost, while delivering features more quickly than Alternative 3. With its high benefits, lower costs, and more rapid implementation, Alternative 2 has the highest return on investment, 89%, and will produce $8 million in financial value for the agency and its partners.

- **Alternative 3**, the development of a new system replacing CRIS, REEIS, and other existing reporting components, will deliver only slightly more benefit than Alternative 2 but at a significantly higher cost. Further, because it is more complex, it will require at least an additional year to implement. As such, its return on investment is lower than that of Alternative 2, at only approximately 12%.

A comparison of the financial returns for the three alternatives is provided in Table 5.1.4 below. Full cost and benefit details for Alternative 2 are provided in the next section. Estimates for Alternatives 1 and 3 below are provided for comparison purposes (based on their likely magnitude), to complement the more detailed analysis completed for Alternative 2. (Details on calculations for Alternatives 1 and 3 are included in Appendix A.)

**Table 5.1.4: High-Level Financial Comparison of Alternatives**

| METRIC | ALTERNATIVE ONE | ALTERNATIVE TWO | ALTERNATIVE THREE |
|---|---|---|---|
| **Total Benefits (Discounted)** | $2.8 million | $17.1 million | $17.6 million |
| **Total Costs (Discounted)** | $2.7 million | $9.1 million | $15.7 million |
| **Net Present Value (NPV)** | $0.1 million | $8.0 million | $1.9 million |
| **Return on Investment (ROI)** | 3% | 89% | 12% |
| **Internal Rate of Return (IRR)** | 8% | 66% | 12% |
| **Payback Period** | 6 Years | 3 Years | 6 Years |

## *5.2 One Solution Costs, Benefits, and Financial Return*

Determination of financial return for One Solution includes three major components:
- Identification of the initiative's major benefits, and development of quantitative estimates of their financial impact;

- Estimation of implementation and operations costs; and
- Calculation of return on investment and other financial metrics.

Each of these components is presented below for the chosen implementation option, Alternative 2.

### 5.2.1  One Solution Financial Benefits

One Solution will generate financial value in three major areas of operation for both CSREES and its land-grant university partners.  These three major areas of operation include:

- Avoidance of technology costs through improved system coordination and integration;
- Time savings for partners and staff from reduced reporting burdens and improved operational efficiency; and
- Reduced materials costs from the elimination of paper-based processes.

These three major benefits categories will produce up to $3.7 million in total financial value each year and over $20 million over the lifecycle of the One Solution project, as shown in the table below. Descriptions of each financial benefit, the methodology for calculation, and a brief discussion of additional qualitative benefits are included in the table below.

**Table 5.2.1: One Solution Financial Benefits for Alternative 2**
*(amounts in thousands of dollars)*

| Benefit | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Total |
|---|---|---|---|---|---|---|---|---|
| **Technology Savings** | | | | | | | | |
| - CSREES | $0 | $126 | $312 | $375 | $390 | $390 | $405 | *$1,998* |
| - Partners | $0 | $12 | $18 | $30 | $40 | $40 | $40 | *$179* |
| | | | | | | | | |
| **Productivity & Time Savings** | | | | | | | | |
| - CSREES | $340 | $630 | $920 | $1,140 | $1,439 | $1,439 | $1,439 | *$7,347* |
| - Partners | $717 | $1,075 | $1,433 | $1,792 | $1,792 | $1,792 | $1,792 | *$10,393* |
| | | | | | | | | |
| **Materials Cost Savings** | | | | | | | | |
| *- CSREES* | $2 | $3 | $7 | $9 | $12 | $12 | $12 | *$57* |
| *- Partners* | $9 | $18 | $27 | $36 | $44 | $44 | $44 | *$222* |
| | | | | | | | | |
| **Total CSREES Savings** | $342 | $759 | $1,239 | $1,524 | $1,841 | $1,841 | $1,856 | *$9,402* |
| | | | | | | | | |
| **Total Partner Savings** | $726 | $1,105 | $1,478 | $1,858 | $1,876 | $1,876 | $1,876 | *$10,793* |
| | | | | | | | | |
| ***Overall Total*** | *$1,068* | *$1,864* | *$2,716* | *$3,381* | *$3,717* | *$3,717* | *$3,732* | *$20,195* |

*Methodology for Calculations:*

All benefits (and costs) are calculated based on a seven-year project lifecycle, to account both for development and for post-implementation system use.  Financial benefits calculated below include cost savings and cost avoidance attributable to the One Solution.  These benefits are calculated based on two major factors:

1. A **baseline amount**, which was based on estimates by the One Solution Task Force, as well as CSREES staff members; and

2. An **improvement percentage**, which was estimated based on the functionality of One Solution, savings seen from similar systems in other organizations, and estimates made by the One Solution Task Force and other CSREES staff members.

These benefits also include personnel time savings, based on the loaded payroll cost for hours saved. In effect, these time savings provide a "workforce multiplier," enabling the current number of staff to undertake additional value-added work or allow a smaller workforce to perform the same amount of work.

Assumptions used in calculating benefit/financial value amounts are included in Appendix A.

*5.2.1.1 Technical Benefits*

By more closely coordinating the roles of reporting-related information technology systems at the agency and by developing agency-wide features that eliminate the need for current and future program-specific systems, CSREES will be able to avoid significant technology costs. Further, the system and data standards developed through One Solution will enable partners to better plan development of reporting-related IT systems, allowing those systems to be used for longer periods of time and eliminating costs for configuration changes made in response to changes in CSREES systems.

**Benefits for CSREES**

CSREES will reduce its costs in the two following areas:

- **Avoidance of enhancements to major systems.** CSREES currently makes enhancements and other modifications to individual IT systems in response to user needs, Congressional requirements, and other factors. Because One Solution will significantly expand the capabilities of major reporting-related IT systems such as CRIS and REEIS and will coordinate future enhancements to focus on each system's core functions, the initiative will eliminate the need for many of these enhancements. Specifically, by providing an enterprise architecture for reporting systems, enhancements to each system will be focused on that system's core functions (such as data entry and management for CRIS or reporting and analysis for REEIS), and with each enhancement serving the needs of multiple systems (for example, improvements to REEIS' data analysis capabilities that support CRIS and all other reporting data entry/storage systems).

  Current average system costs incurred each year by CSREES are approximately $18,000 per enhancement, with an average of 70 enhancements completed annually (based on experience in previous years). It is estimated that by implementing One Solution, the agency will reduce the number of enhancements required by up to 25%. This will result in a total annual benefit up to $315,000.

- **Avoidance of program-specific system development and operations costs**. Several CSREES programs, particularly in extension, have developed their own individual reporting systems to collect and analyze program plans, accountability reports, and other information, as no existing agency-wide information has suited their needs (for example, the Performance Planning and Reporting System (PPRS) developed for pest management extension

programs). Because One Solution will provide individual programs with an agency-wide system to collect and analyze such information, many existing program-specific systems can be phased out and new systems can be avoided, eliminating both initial implementation expenses and ongoing operations costs. As the costs for program-specific systems are usually paid from program funds (not Federal administration funds), these savings will result in additional funding that can be directly used to support program goals.

The average cost to build a program-specific reporting system is estimated to be $125,000, as seen with such systems as the PPRS. By estimating that such a system would be built to serve an agency program approximately once each two years, and that such costs would be avoided under One Solution, CSREES will realize a biannual benefit of up to $125,000. Further, elimination of the $15,000 annual operations costs for each of these systems will result in an additional annual benefit of up to $90,000 in savings, for a total annual technology benefit of up to approximately $405,000.

### Table 5.2.1.1a: Annual Technology Benefits for CSREES

|   | Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|---|
| | (A) | Average number of enhancements per year | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| x | (B) | Cost of average enhancement | $18,000 | $18,000 | $18,000 | $18,000 | $18,000 | $18,000 | $18,000 |
| x | (C) | Percentage of enhancements reduced | 0% | 10% | 20% | 25% | 25% | 25% | 25% |
| = | (D) | Enhancement cost avoided | $0 | $126,000 | $252,000 | $315,000 | $315,000 | $315,000 | $315,000 |
| | | | | | | | | | |
| | (E) | Development cost of program-specific systems | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 | $125,000 |
| x | (F) | Number of systems avoided annually | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| = | (G) | New development cost avoided | $0 | $0 | $125,000 | $0 | $125,000 | $0 | $125,000 |
| | (H) | Baseline number of systems | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | (I) | Number of program specific systems for which cost is avoided/eliminated (= H + Sum of F) | 3 | 3 | 4 | 4 | 5 | 5 | 6 |
| x | (J) | Annual maintenance cost of each program-specific system | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 |
| x | (K) | Percent of maintenance cost eliminated | 0% | 0% | 100% | 100% | 100% | 100% | 100% |
| = | (L) | Maintenance cost saved/avoided | $0 | $0 | $60,000 | $60,000 | $75,000 | $75,000 | $90,000 |
| | | | | | | | | | |
| | (M) | Total annual savings (= D + L) | $0 | $126,000 | $312,000 | $375,000 | $390,000 | $390,000 | $405,000 |

## Benefits for Partners

Land-grant partners will also realize technology cost savings through **avoidance of development and modification costs for CSREES reporting interfaces and systems**. Many institutions have developed internal systems to coordinate their activities and provide management information for their use in delivering extension, education, and research programs; often, these systems contain data very similar to that required by CSREES data collections. To coordinate data provided to CSREES with internal data, a number of states have developed new systems that integrate with data from CRIS or other sources or that enable easier completion of CSREES-required reporting. However, modifications to the agency's reporting requirements in the future (such as the likely adoption of a standard, government-wide progress report for research), as well as other changes that may occur as CSREES' reporting and accountability requirements evolve,

would require these states to modify their own systems and may lead other states to develop new systems more quickly than planned. One Solution will develop a consistent set of data standards, including data element definition and format, XML schemas for data exchange, and a consistent taxonomy. These standards will enable states to more effectively plan future system designs and to use reporting systems for longer periods of time. Further, consistent standards will reduce the need for modifications to partners' systems when aspects of CSREES systems are modified.

The average cost to a university for building or modifying a reporting-related IT system is estimated to be $15,000. By estimating that up to 33% of these costs will be avoided for the approximately 8 institutions assumed to create or modify such a system each year, CSREES' partnership will realize a benefit of $39,600.

**Table 5.2.1.1b: Annual Technology Benefits for Partners**

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| (A) | Average number of institutions undertaking system enhancements | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| x (B) | Cost of average system development/modification | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 | $15,000 |
| x (C) | Percentage of enhancement or development cost reduced/avoided | 0% | 10% | 15% | 25% | 33% | 33% | 33% |
| = (D) | **System development cost avoided** | **$0** | **$12,000** | **$18,000** | **$30,000** | **$39,600** | **$39,600** | **$39,600** |

*5.2.1.2    Productivity and Time Savings Benefits*

By replacing less efficient paper-based and manual processes with automated, electronically-enabled ones, CSREES staff will realize significant time savings in areas ranging from report review and routing to creation of budget crosscuts and other accountability reports. Likewise, partners will save time through reduced reporting burdens, improved access to and navigation of Web-based reporting, and additional tools such as automated project classification.

**Benefits to CSREES**

One Solution will generate productivity benefits for CSREES staff in four major areas:

- **Reduced time spent circulating and routing reports**. Current processes for tracking and routing reports for approval are often cumbersome; many require a form received electronically to be printed, the appropriate recipient determined, the form physically routed to the recipient's desk, a paper signature obtained, and finally routing the form back to the office managing the data collection (such as the CRIS team or OEP). With so many manual steps, tracking the current status of reports can take many manual follow-ups and require locating misrouted or misplaced papers. One Solution will eliminate such hassles by enabling automated workflow processes, including report routing, notifications of action required, and one-click approval.

  CSREES' 135 NPLs, program specialists, and other staff managing reports are estimated to spend approximately 60 hours per year on report routing, tracking, and approval (based on a staff survey). By reducing this administrative burden on staff members by an annual factor of up to 33%, approximately 2,700 hours of staff time per year can now be spent on higher-

value tasks such as program leadership. Dividing this number of hours by the 1,776 productive hours worked by a full time employee each year, this benefit allows CSREES to gain the equivalent of up to 1.51 full time employees working on value-added tasks each year. This number of FTEs, at an annual loaded cost per employee of $125,044, is equivalent to an annual benefit of approximately $188,000 for the agency.

- **Reduced time spent reviewing and processing reports.** Reviewing reports is currently a manual and cumbersome process. NPLs are not notified when reports are submitted to CRIS for projects or programs they manage, requiring them to periodically check the system for updates. Further, reviews of other reports, particularly the Plan of Work and Annual Report of Accomplishments, are very time consuming, with each NPL required to review narrative submissions from multiple states, each often 100 or more pages in length, against a standard reviewer's guide. Thus even basic completeness checks for these documents can take days to complete for each NPL. A lack of standardized processes for many programs, particularly in extension, requires NPLs and other program staff to spend significant amounts of time developing reporting formats and manually reviewing paper-based progress report submissions. Finally, staff must manually send reminders to grantees when reports are required and follow up when they are overdue. One Solution will vastly reduce the amount of time spent on such tasks by automatically notifying reporting recipients of upcoming and overdue reports, notifying appropriate NPLs or other staff members of new reports received, automatically verifying submissions for completeness, and enabling a new Plan of Work that requires significantly less effort to review, among other features.

  CSREES' 135 NPLs, program specialists, and other staff managing reports are estimated to spend approximately 90 hours per year on report review and processing. By reducing this administrative burden on staff members by a factor of 25%, approximately 3,000 hours of staff time per year can be spent on higher-value tasks. Dividing this number of hours by the 1,776 productive staff hours worked by a full time employee each year, this benefit allows CSREES to gain the equivalent of up to 1.71 full time employees working on value-added tasks each year. This number of FTEs, at an annual loaded cost per employee of $125,044, is equivalent to a benefit of approximately $214,000 for the agency.

- **Reduced time spent on project and program administration.** Currently, NPLs and other staff members must manually search for CRIS reports and other data regarding projects or programs they manage, remind grantees to send required reports, respond to partners' e-mail or phone requests regarding approval status of reports (and program funding), navigate complex screens in C-REEMS to get the budget status of a program or project, and perform other time-consuming tasks. One Solution will include management views for NPLs, budget staff, and other personnel, providing easy access to key information regarding the projects and programs they manage. Reports requiring review, a list of projects associated with an NPL along with current status, automated report status notifications, and other such tools will enable NPLs to focus less on the administrative tasks associated with project and program management, instead concentrating on more mission-focused program leadership activities.

  CSREES' 115 NPLs, budget staff, and other personnel creating accountability reports are estimated to spend approximately 210 hours per year on the administrative tasks discussed above. By reducing this administrative burden on staff members by a factor of 15%, approximately 3,623 hours of staff time per year can now be spent on higher-value tasks.

Dividing this number of hours by the 1,776 productive hours worked by a full time employee each year, this benefit allows CSREES to gain the equivalent of up to 2.72 full time employees working on value added tasks each year. This number of FTEs, at an annual loaded cost per employee of $125,044, is equivalent to a benefit of approximately $340,000 for the agency.

- **Reduced time researching, compiling, and completing accountability reporting**. Currently, agency staff members must spend a great deal of time to research, compile, and complete accountability reports. In particular, conducting research and gathering data to complete these reports is cumbersome and time-consuming – often an NPL must collect previous report submissions, review and make corrections to documents, contact other NPLs or university faculty for additional data, and manually calculate or synthesize data from multiple sources. For example, many NPLs are responsible for assisting the budget office in the creation of one or more budget crosscuts each year, requiring manual review of hundreds of CRIS reports or contacts with dozens of extension faculty, as well as manual calculation of budget crosscut amounts. One Solution will include tools that allow NPLs to accomplish these tasks more easily. Standardization and integration of data across systems via the One Solution Data Repository will enable one-step creation of reports including all data for a project, or data across all agency programs in a Problem Area or meeting other criteria, eliminating the multiple steps that staff must currently use to collect and aggregate such data. Further, an ability to add keywords, categories, and other information to reports as they are received, as well as automated generation of common budget crosscuts, will allow staff to avoid many manual searches of progress reports and will result in more precise analyses.

CSREES' 125 NPLs, program specialists, and other personnel administering projects and programs are estimated to spend approximately 240 hours per year on report creation. By reducing this administrative burden on staff members by a factor of 33%, approximately 9,900 hours of staff time per year can now be spent on higher-value tasks. Dividing this number of hours by the 1,776 productive staff hours worked by a full time employee each year, this benefit allows CSREES to gain the equivalent of up to 5.57 full time employees working on value-added tasks each year. This number of FTEs, at an annual loaded cost per employee of $125,044, is equivalent to a benefit of approximately $697,000.

**Table 5.2.1.2a: Annual Productivity Benefits for CSREES**

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| **Reduced report routing effort** | | | | | | | | |
| (A) | Average number of NPLs and other staff routing reports | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| x (B) | Average hours per staff member spent on report routing, tracking, and circulation | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| x (C) | % reduction in routing time | 0% | 10% | 20% | 25% | 33% | 33% | 33% |
| ÷ (D) | Total hours saved annually | 0 | 810 | 1620 | 2025 | 2673 | 2673 | 2673 |
| = (E) | *CSREES FTE gained annually (D ÷ 1,776 hrs/yr)* | *0.00* | *0.46* | *0.91* | *1.14* | *1.51* | *1.51* | *1.51* |
| | | | | | | | | |
| **Reduced report processing and review effort** | | | | | | | | |
| (F) | Average number of NPLs and other staff processing reports | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| x (G) | Average hours per staff member spent processing reports | 90 | 90 | 90 | 90 | 90 | 90 | 90 |

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| x (H) | % reduction in processing time | 15% | 20% | 25% | 25% | 25% | 25% | 25% |
| ÷ (I) | Total hours saved annually | 1823 | 2430 | 3038 | 3038 | 3038 | 3038 | 3038 |
| = *(J)* | *CSREES FTE gained annually (I ÷ 1,776 hrs/yr)* | *1.03* | *1.37* | *1.71* | *1.71* | *1.71* | *1.71* | *1.71* |
| | | | | | | | | |
| **Streamlined project and program administration** | | | | | | | | |
| (K) | Average number of NPLs and other staff managing projects | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| x (L) | Average hours per staff member spent managing projects | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| x (M) | % reduction in management time | 0% | 5% | 10% | 15% | 20% | 20% | 20% |
| ÷ (N) | Total hours saved annually | 0 | 1208 | 2415 | 3623 | 4830 | 4830 | 4830 |
| = *(O)* | *CSREES FTE gained annually (N ÷ 1,776 hrs/yr)* | *0.00* | *0.68* | *1.36* | *2.04* | *2.72* | *2.72* | *2.72* |
| | | | | | | | | |
| **Reduced report research and creation time** | | | | | | | | |
| (P) | Average number of NPLs and other staff creating accountability reports | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| x (Q) | Average hours per staff member spent creating reporting | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| x (R) | % reduction in report creation time | 10% | 15% | 20% | 25% | 33% | 33% | 33% |
| ÷ (S) | Total hours saved annually | 3000 | 4500 | 6000 | 7500 | 9900 | 9900 | 9900 |
| = *(T)* | *CSREES FTE gained annually (S ÷ 1,776 hrs/yr)* | *1.69* | *2.53* | *3.38* | *4.22* | *5.57* | *5.57* | *5.57* |
| | | | | | | | | |
| (U) | Total FTE gained (= E + J + O + T) | 2.72 | 5.04 | 7.36 | 9.11 | 11.51 | 11.51 | 11.51 |
| x (V) | Average cost per FTE | $125,044 | $125,044 | $125,044 | $125,044 | $125,044 | $125,044 | $125,044 |
| **= (W)** | **Total Financial Value** | **$340,000** | **$630,000** | **$920,000** | **$1,140,000** | **$1,439,000** | **$1,439,000** | **$1,439,000** |

## Benefits for Partners:

Partners will receive productivity and time savings benefits through One Solution. Currently, grantees must complete multiple similar reports, requiring them to submit duplicative information via many disparate electronic reporting systems and paper-based processes. For example, institutions must submit research project information for their AREERA Annual Reports of Accomplishments that is also required in AD-421 reports for Hatch Act-funded research. Some land-grant staff and faculty have also complained that they often are "over-reporting" in order to compensate for a lack of clear reporting standards or requirements, and many institutions must manually copy and paste data stored in their internal project tracking systems into CRIS or the Plan of Work. One Solution will significantly reduce reporting burdens for partners by reducing the amount of duplicative information they must provide, establish a single point of access for all reporting, move toward a standard look-and-feel across all reporting systems, and develop an XML-based data transfer standard that enables the direct transfer of data from universities' internal systems to CSREES. Tools to assist with classification, a single user name and password, improved guidance, and other features will further enhance a user's experiences and reduce reporting burdens.

A stakeholder survey and other assessments of reporting burden determined that approximately 1200 hours per year is spent on CSREES-related reporting tasks at each land-grant institution. By reducing the burden on partners by a factor of up to 25%, approximately 37,500 hours of staff time per year can be saved across the partnership. This number of staff hours saved, at an annual staff salary of $48 per hour, is equivalent to an annual benefit of up to $1,792,000 to the land-grant partnership.

**Table 5.2.1.2b: Annual Productivity Benefits for Partners**

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| (A) | Number of institutions completing reporting | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| x (B) | Average hours spent on reporting per institution | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |
| x (C) | % reduction in time spent reporting | 10% | 15% | 20% | 25% | 25% | 25% | 25% |
| = (D) | Total hours saved | 15000 | 22500 | 30000 | 37500 | 37500 | 37500 | 37500 |
| x (E) | Value per hour (based on average salary) | $48 | $48 | $48 | $48 | $48 | $48 | $48 |
| = (F) | **Total financial value to partnership** | $717,000 | $1,075,000 | $1,433,000 | $1,792,000 | $1,792,000 | $1,792,000 | $1,792,000 |

*5.2.1.3    Materials Benefits*

By moving from paper-based reporting processes to electronic collection, storage, and analysis of reports, One Solution will reduce costs associated with managing paper for both CSREES and partners.

**Benefits for CSREES**

By moving to a more fully electronic reporting system, CSREES will realize **reduced printing costs**, **reduced mailing and distribution costs**, and **reduced paper storage costs**.  CSREES currently prints blank forms and other reports for distribution to stakeholders; more importantly, staff members print many electronically-received forms for distribution to other agency staff, review and approval, and other purposes.  Further, the agency pays to package and ship forms and reports to grantees.  Many forms (both electronically-received and paper-based) must be maintained as official records of awards or financial transactions, as current system security and records management procedures do not provide sufficient capabilities to allow fully electronic records storage.  One Solution will significantly reduce many of these paper-related costs by eliminating all paper-only reporting processes.  Additionally, improving electronic reporting systems to allow for automated routing and approval, electronic signatures, and electronic maintenance of official records will further reduce costs for printing, distributing, and storing paper documents.

Material cost savings for CSREES can be computed by adding individual cost savings for printing, mailing, and storage.  Current printing costs are approximately $2,500, current mailing costs are approximately $14,500, and current storage costs are approximately $15,750.  It is estimated that One Solution will reduce these costs by factors up to 25%, 25%, and 50%, respectively.  Therefore, One Solution could generate up to $625 in cost savings for printing, $3,625 in cost savings for distribution, and $7,900 in cost savings for storage, for an approximate annual total of up to $12,200 for all agency material cost savings.

**Table 5.2.1.3a: Annual Materials Cost Savings for CSREES**

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| x (A) | Annual printing costs | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 |
| x (B) | Percentage of printing cost saved | 5% | 10% | 15% | 20% | 25% | 25% | 25% |
| = (C) | *Annual printing cost savings* | $125 | $250 | $375 | $500 | $625 | $625 | $625 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (D) | Annual mailing and distribution costs | $14,500 | $14,500 | $14,500 | $14,500 | $14,500 | $14,500 | $14,500 |
| x (E) | Percentage of mailing and distribution costs saved annually | 5% | 10% | 15% | 20% | 25% | 25% | 25% |
| = (F) | *New development cost avoided* | $725 | $1,450 | $2,175 | $2,900 | $3,625 | $3,625 | $3,625 |
| | | | | | | | | |
| (G) | Annual report storage costs | $15,750 | $15,750 | $15,750 | $15,750 | $15,750 | $15,750 | $15,750 |
| x (H) | Percentage of report storage costs saved annually | 5% | 10% | 25% | 35% | 50% | 50% | 50% |
| = (I) | *Annual report storage cost savings* | $800 | $1,600 | $3,900 | $5,500 | $7,900 | $7,900 | $7,900 |
| | | | | | | | | |
| (J) | **Total annual savings (= C + F + I)** | **$1,700** | **$3,300** | **$6,500** | **$8,900** | **$12,200** | **$12,200** | **$12,200** |

**Benefits for Partners:**

CSREES' stakeholder institutions will also enjoy cost savings from **reduced printing costs**, **reduced mailing and distribution costs**, and **reduced storage costs**. Institutions must currently submit many forms, such as formula funds budgets and financial status reports, on paper, incurring both printing costs and mailing/distribution costs (often including expensive express-delivery or overnight courier costs). Further, institutions are required to store copies of many reports locally for audit purposes. By electronically-enabling these paper-based forms, One Solution will reduce printing and mailing costs; by providing electronic signatures and records storage capabilities, institutions will have access to legally-recognized official documents via One Solution, potentially eliminating the need to store paper copies of these documents.

Material cost savings for CSREES' stakeholders can be computed by adding individual cost savings for printing, mailing, and storage. Annual printing costs are $50, current mailing costs are $1,294, and current storage costs are $75. It is estimated that One Solution will reduce these costs by factors up to 25%, 25%, and 25%, respectively. Therefore, One Solution could generate up to $13 in cost savings for printing, $75 in cost savings for mailing, and $355 in cost savings for storage, for a total cost savings of approximately $355 for each individual CSREES' stakeholder, and approximately $44,300 in total annual cost savings across the partnership.

### Table 5.2.1.3b: Annual Materials Cost Savings for Partners

| Benefit | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|---|
| (A) | Number of partner institutions | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| | | | | | | | | |
| x (B) | Annual printing costs per institution | $50 | $50 | $50 | $50 | $50 | $50 | $50 |
| x (C) | Percentage of printing cost saved | 5% | 10% | 15% | 20% | 25% | 25% | 25% |
| = (D) | *Annual printing cost savings* | $3 | $5 | $8 | $10 | $13 | $13 | $13 |
| | | | | | | | | |
| (E) | Annual mailing and distribution costs per institution | $1,294 | $1,294 | $1,294 | $1,294 | $1,294 | $1,294 | $1,294 |
| x (F) | Percentage of mailing and distribution costs saved annually | 5% | 10% | 15% | 20% | 25% | 25% | 25% |
| = (G) | *Annual distribution cost savings* | $65 | $129 | $194 | $259 | $323 | $323 | $323 |
| | | | | | | | | |
| (H) | Annual report storage costs per institution | $75 | $75 | $75 | $75 | $75 | $75 | $75 |
| x (I) | Percentage of report storage costs saved annually | 5% | 10% | 15% | 20% | 25% | 25% | 25% |
| = (J) | *Annual report storage cost savings* | $4 | $8 | $11 | $15 | $19 | $19 | $19 |
| | | | | | | | | |
| (K) | Total annual savings per institution | $71 | $142 | $213 | $284 | $355 | $355 | $355 |

| Benefit | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|
| (= D + G + J) | | | | | | | |
| (L) Total savings to partnership (= A x K) | $8,900 | $17,700 | $26,600 | $35,500 | $44,300 | $44,300 | $44,300 |

*5.2.1.4    Qualitative Benefits*

In addition to the benefits quantified above, One Solution will also provide a number of additional benefits to employees, partners, and the public.  These benefits have not been quantified for the cost-benefit analysis, not because they are not as likely to be realized or are of less importance, but because calculating them is difficult or imprecise.
One Solution's qualitative benefits include:

- *Improved financial tracking.*  One Solution will enable both CSREES staff and partners to more closely monitor and actively manage project finances.  Easier access to up-to-date financial status for each project and program, such as amounts drawn down, carryover amounts, and fiscal year funds remaining, will allow grantees to plan and manage their work better.  Further, this data will assist NPLs in working with partners to ensure that funds are used appropriately and within required timeframes.  Alerts and notifications will further help both partners and staff to manage projects by reminding them when funding amounts are about to be depleted or expire or when there are any issues (such as outstanding or past due reports) preventing funding from being released.  Such tools, as well as the higher-quality data that One Solution will enable CSREES to collect, will enable improved use and tracking of funds and enhance compliance with legislative requirements.

- *Improved report quality.*  One Solution's tools will help both partners and staff to increase the quality of data submitted.  By providing partners with sample reports, clearer instructions and help, assistance modules for difficult tasks such as project classification, and improved report formatting, institutions will be able to submit higher-quality reports.  Through more active report reviews and better-defined report management responsibilities, NPLs and other CSREES staff will be able to further improve report quality.  With better data provided to CSREES, accountability, oversight, and budget reports created based upon this input will also improve.

- *More effective project management.*  In addition to the time savings related to project leadership and management quantified above, One Solution will enable staff to perform tasks that are not currently possible due to inefficient processes that would require too much effort.  For example, many NPLs have expressed an interest in contacting PDs for past projects to obtain updates on any new outcomes or impacts the project may have generated that were not included in previous reports; however, as this can be a time-consuming task, most NPLs have not been able to accomplish it. Even more basic tasks, such as tracking report submission deadlines to ensure that Project Directors submit required data on time, are often not completed due to a lack of tools to support them.  One Solution will help to automate many such tasks, enabling not only a reduction in time spent managing projects but an increase in the effectiveness and quality of project management and program leadership.

## 5.2.2  Implementation and Operations Costs

Estimates for the initial, four-year cost of implementing One Solution are provided in the table on the next page.

It is important to note that the cost figures for recommended Option 2 below do not represent entirely new costs that CSREES will incur above currently-planned IT expenditures.  Many of the above activities can leverage existing (or planned) budgets for IT systems such as CRIS and REEIS.  Further, many of the above costs represent government personnel time, which although included here as a resource used in developing One Solution may not represent an additional cost to CSREES (if existing staff time can be reallocated from other tasks to One Solution); these costs are described in more detail following the main cost table on the next page.

The costs in this business case assume that new system components are developed and maintained by CSREES.  Should the solution be based on USDA Enterprise Shared Services (such as the USDA Portal Service), costs may be reduced (particularly for software purchases).  Specific assumptions used to calculate the costs below are included in Appendix A.

## Table 5.2.2a: One Solution Implementation Cost Projections
(Recommended Option 2)

*(in thousands of dollars)*

| Category | Year 1 | Year 2 | Year 3 | Year 4 | 4 Year Total |
|---|---|---|---|---|---|
| **Management and Communications** | | | | | |
| One Solution Program Management | 180 | 180 | 180 | 180 | 720 |
| Project Management (Individual Components) | 67 | 186 | 90 | 50 | 393 |
| Governance and Strategy Development (Data Management, Reporting Governance) | 87 | 65 | 44 | 22 | 218 |
| Process Design and Standardization (Establish Standards, Data Dictionary, Taxonomy / Classification) | 19 | 37 | 19 | 19 | 94 |
| Training and Communications (Internal and External Promotion and Communication, including Documentation) | 48 | 158 | 51 | 28 | 285 |
| **Subtotal for Management and Communications** | **$401** | **$626** | **$384** | **$299** | **$1,710** |
| **Hardware/Software Infrastructure and Support** | | | | | |
| Physical Infrastructure (i.e., hardware) (servers, storage, network) | 40 | 40 | 25 | 15 | 120 |
| Server Applications (software) (database, OLAP tool, OS, security) | 200 | 200 | 150 | 150 | 700 |
| Warranties and Support (gold support, hardware warranties) | 20 | 30 | 40 | 40 | 130 |
| **Subtotal for Hardware/Software Infrastructure** | **$260** | **$270** | **$215** | **$205** | **$950** |
| **Design, Development and Integration Costs** | | | | | |
| New Application Development (Portal, Workflow, Notifications, Plan of Work, 3D, Financial Forms, XML, Support Modules) | 552 | 583 | 412 | 399 | 1946 |
| One Solution Data Repository Development (Database ETL, Batch Programs) | 50 | 252 | 120 | 0 | 422 |
| Current System Enhancement and Integration (CRIS, REEIS, C-REEMS) | 0 | 537 | 0 | 0 | 537 |
| External System Integration (NIMSS, iEdison, etc.) | 0 | 0 | 223 | 0 | 223 |
| Reporting / Analytical Capability Development (Standardized Reports, Ad Hoc Querying Capability, OLAP Integration) | 0 | 79 | 396 | 53 | 528 |
| Security (eAuthentication, Authorization) | 40 | 80 | 40 | 40 | 200 |
| **Subtotal for Design, Development and Integration** | **$642** | **$1,531** | **$1,191** | **$492** | **$3,856** |
| **Maintenance and Operations** | | | | | |
| Application and Database Hosting (Hosting and Service Charge) | 50 | 50 | 50 | 50 | 200 |
| Maintenance (Operations, Upgrades, Basic IT Help Desk) | 0 | 75 | 150 | 300 | 525 |
| **Subtotal for Maintenance and Operations** | **$50** | **$125** | **$200** | **$350** | **$725** |
| **Total Annual Cost** | **$1,353** | **$2,552** | **$1,990** | **$1,346** | |
| ***Total 4-Year Implementation Cost*** | | | | | ***$7,241*** |

**Direct Costs and Government FTE Costs:**

A portion of the costs described above will be costs directly occurred by the agency, while the remainder reflects the costs of government staff time. Although these FTE costs are included in the business case to account for the resources used to implement One Solution, they are not likely represent an additional cost to the agency (as staff time can be reallocated to contribute to One Solution). These costs, representing $1.76 million of the $7.24 million total 4-year implementation cost, are detailed in the table below.

**Table 5.5.2b: Government FTE and Direct Costs**

| Cost | Year 1 | Year 2 | Year 3 | Year 4 | Year 5+ |
|---|---|---|---|---|---|
| Government FTE Costs (Program Management, Government Labor, Government Share of Maintenance) | 346 | 563 | 452 | 401 | 120 |
| Direct Costs (Contractor Labor/Support Services, Hardware, Software, Contractor and NITC Maintenance | 1,007 | 1,989 | 1,537 | 945 | 180 |
| **Total Annual Cost ($000s)** | **1,353** | **2,552** | **1,989** | **1,346** | **300** |

**Post-Implementation Costs:**

After implementation, CSREES can expect to incur operations costs similar to those in Year 4 of implementation, or approximately $300,000 per year. Application hosting costs at the National Information Technology Center are assumed to remain at $50,000 per year and software warranties and maintenance contracts are estimated at $40,000 per year, for a total continuing expense of $390,000 annually.

**Partner Transition Costs:**

Because CSREES' land-grant university partners will also experience some cost in their transition to new reporting methods and systems, these costs have also been included in the One Solution cost-benefit analysis. Specifically, it has been estimated that for the first two years of the initiative, each of CSREES' 108 land-grant partners will incur an average of $10,000 transition costs (including both staff time for modifying processes and systems and potential contractor costs for making necessary system changes). This total of $1,080,000 has been split across the first two years of the initiative in the financial analysis.

## 5.2.3  Financial Analysis

Financial impact of a potential investment is generally measured through two metrics, net present value (NPV) and return on investment (ROI). NPV indicates the total net benefit of an investment, after adjusting for the time value of money. Any investment with a positive NPV is economically justified, as it will add to the net assets of the organization. ROI is calculated by dividing the NPV by the total time-adjusted costs and indicates how much benefit will be generated by each dollar invested. An ROI of zero indicates that the returns from an investment are equal to its costs, while a positive ROI indicates a positive return. ROI is especially useful in assessing a potential investment when resources are limited, since ROI indicates the return for each dollar invested and not just an overall return.

Based on the above cost and benefit estimates, the total financial return for One Solution (as measured by net present value) is $8.1 million. This indicates that investing in this initiative returns $8.1 million more in benefits than costs. Return on investment is 89%, meaning each dollar invested in the system recovers the initial investment and earns an additional $0.89 in financial returns. Returns can also be expressed through the Benefit Cost Ratio (BCR). The BCR, equivalent to the ROI plus 100%, and calculated as Total Discounted Benefit divided by the Total Discounted Costs, is 189%. This means that the benefits are 189% of the amount of costs. The BCR is more often expressed as a decimal amount, however, such as 1.89, and is reflected in this format in Table 5.2.3.

Because this project will generate a positive net present value and significant return on investment, it will add significant value to the agency and its partners and is an appropriate investment from a financial perspective.

### Table 5.2.3: One Solution Financial Analysis
*(amounts in thousands of dollars)*

| Factor | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|
| Discount Rate – Federal/'On-Budget' | 2.4% | | | | | | |
| | | | | | | | |
| A) Total Benefits (Federal) | $342 | $759 | $1,239 | $1,524 | $1,841 | $1,841 | $1,856 |
| B) Discount Factor (Federal/'On-Budget') | 1.0000 | 0.9766 | 0.9537 | 0.9313 | 0.9095 | 0.8882 | 0.8674 |
| C) Discounted Fed. Benefits (= A x B) | $342 | $742 | $1,181 | $1,419 | $1,675 | $1,635 | $1,610 |
| | | | | | | | |
| Discount Rate – Non-Federal/'Off-Budget' | | | | | | | |
| D) Total Benefits (Non-Federal) | $726 | $1,105 | $1,478 | $1,858 | $1,876 | $1,876 | $1,876 |
| E) Discount Factor (Non-Federal) | 1.0000 | 0.9346 | 0.8734 | 0.8163 | 0.7629 | 0.7130 | 0.6663 |
| F) Discounted Benefits (Non-Fed.) (= D x E) | $726 | $1,032 | $1,291 | $1,516 | $1,431 | $1,337 | $1,250 |
| | | | | | | | |
| G) Total Annual Disc. Benefits (= C + F) | $1,068 | $1,774 | $2,472 | $2,936 | $3,106 | $2,973 | $2,860 |
| | | | | | | | |
| H) Total Costs (Federal) | $1,353 | $2,552 | $1,990 | $1,346 | $390 | $390 | $390 |
| B) Discount Factor – Federal | 1.0000 | 0.9766 | 0.9537 | 0.9313 | 0.9095 | 0.8882 | 0.8674 |
| I) Discounted Cost (Federal) (= H x B) | $1,353 | $2,492 | $1,898 | $1,254 | $355 | $346 | $338 |
| | | | | | | | |
| J) Total Costs (Non-Federal) | $540 | $540 | $0 | $0 | $0 | $0 | $0 |
| E) Discount Factor (Non-Federal) | 1.0000 | 0.9346 | 0.8734 | 0.8163 | 0.7629 | 0.7130 | 0.6663 |
| K) Discounted Costs (Non-Federal) | $540 | $505 | $0 | $0 | $0 | $0 | $0 |
| | | | | | | | |
| L) Total Annual Disc. Costs (= I + K) | $1,893 | $2,997 | $1,898 | $1,254 | $355 | $346 | $338 |
| | | | | | | | |
| M) Annual Discounted Net Value ( = G – L) | -$825 | -$1,223 | $574 | $1,682 | $2,751 | $2,626 | $2,522 |
| N) Cumulative Discounted Net Value (Sum of L) | -$825 | -$2,048 | -$1,474 | $208 | $2,959 | $5,585 | $8,107 |
| | | | | | | | |

| Factor | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
|---|---|---|---|---|---|---|---|
| Net Present Value (NPV) | \$8.1 Million | | | | | | |
| Payback Period | 3 Years (FY2007, 4 years after year of initial investment) | | | | | | |
| Return on Investment (ROI) | 89% | | | | | | |
| Benefit Cost Ratio (BCR) | 1.89 | | | | | | |
| Internal Rate of Return (IRR) | 66% | | | | | | |
| Modified IRR | 23% | | | | | | |

# 6   Technical and Business Impacts

One Solution's broad scope will affect many of the agency's business processes and IT systems, and its successful implementation will require identification of and planning for the changes required to support the initiative.  As such, effects and required actions for three key areas—business process and policy, enterprise architecture, and security and telecommunications—are discussed below.

## 6.1   Business Process and Policy Changes

One Solution will have far-reaching effects on how reporting is conducted at CSREES.  Not only does the initiative propose to develop new technology capabilities to support reporting; it also proposes a thorough, integrated review of the current approach to reporting, and the development of new processes and policies to make sure that reporting is as effective and efficient as possible.

Some of these process improvements will support new capabilities such as workflow and notifications, while others will focus on more fundamental change, such as integrating program-specific collections into agency-wide processes and systems.  The Reporting and Post-Award Management Committee (described in Section 4.2 above) will develop the specific processes and procedures to be used under One Solution.  However, agency executives must guide key decisions regarding the agency's approach to reporting.

Such executive decisions focus on determining the agency's reporting priorities and direction, developing policies that enable the agency to pursue these priorities, and providing input on specific decisions related to One Solution's implementation.  Specifically, the major topics on which policy decisions will be required include:

- *Development of overall agency priorities and strategies for reporting*. One Solution will provide an opportunity for CSREES to examine how it collects, processes, and analyzes accountability data, both to clarify its reporting priorities and to determine which approaches best fulfill those priorities.  To make best use of One Solution, agency executives and staff must make key decisions in the following areas:
    - *Determination of overall reporting priorities (e.g., financial/budget, outcome/impact)*. The agency's reporting responsibilities include several types of reporting, including high-level budget and financial reporting (such as Congressional appropriation questions and budget crosscuts), as well as reporting on more specific project or program outcomes.  Although demands from OMB and Congress continue to rise across these areas, executives may be required to select a subset of reporting to initially prioritize.
    - *Determination of the appropriate amount of information to collect.*  At a basic level, the agency must balance its overall need for data with the burden on partners (focusing on its overall use and collection of data rather than evaluating burdens only for each individual data collection).
    - *Selection of a standard unit of reporting / analysis for extension activities.*  Although such a standard is proposed in the new Plan of Work (based on programs defined by

each institution that will remain constant throughout each 5-year Plan of Work reporting period), agency executives much approve such a policy and demonstrate their support to partners.

- *Determination of whether to collect data from local-level partners.* Collection of local-level data, and development of systems that support local- and state- level partners' missions in addition to data collection, can improve the quality of the data obtained by CSREES (particularly for extension programs). However, such practices greatly increase Federal involvement with local program administration and raise issues such as data ownership. CSREES executives must assess the considerations of developing local-level data collection processes or maintaining a focus on state-level data collection.

- *Determination of how to better tie financial data to programmatic data.* One of the reasons that the agency's current reporting systems are not adequate is their inability to sufficiently tie financial data with programmatic data. Creating parameters for financial reporting will be important to ensuring this problem can be addressed. The previous two Farm Bills have provided new flexibility to both CSREES and its grantees, as funds can now be "carried over" from one year to the next in multi-year initiatives, and "leftover" funds can be re-obligated. This flexibility, while providing several benefits across the partnership, has also created several new challenges regarding how financial data is associated with programmatic data. (e.g., comparing data from year-to-year, against original and "carried-over" funds, etc.) Consequently, it will be critical for CSREES executives to work closely with Financial Management staff in order to define the business process changes, changes to forms and data collections, and other actions needed to properly support the integrated analysis of financial and programmatic data.

- **Determination of a standardized reporting approach.** With key reporting strategies in place, the agency will be able to determine more specific approaches to standardizing reporting. These include:

  - *Inclusion of Smith-Lever 3(d) and other extension programs into an agency-standard reporting system/process.* Extension programs other than the Smith-Lever 3(b)/(c) are not currently supported by agency-wide reporting processes, relying on each program's staff to develop processes and maintain IT systems for reporting. As part of agency-wide standardization, CSREES must determine which aspects of these programs to include in agency wide processes, such as project/program classification, outcome reporting, or both. Further. the most appropriate IT system to support this reporting (the new extension/Plan of Work reporting system, the Research and Education Reporting component, or another option) must be identified.

  - *Assessment of other program-specific reports.* As each program-specific report is evaluated, agency staff and executives must determine whether a separate data collection is necessary to support the agency's reporting needs or whether integration into an agency-standard process is feasible.

  - *Development of policies to enforce new data management and activity classification standards.* Although One Solution includes the development of standards that will

enable agency-wide use of data and classification of all agency programs, policies must be developed to ensure their consistent application.

- *Inclusion of evaluation planning in RFAs and proposals.* Agency staff and executives must decide whether to require closer integration between the Request for Application development and proposal evaluation process and post-award reporting. For example, a policy could be developed to ensure OEP staff review each RFA to ensure agency-standard reporting processes are used whenever possible. Further, policies requiring funding applicants to propose specific outcome measures for their project—which would then be used to assess progress and outcomes after an award is made—could be established and integrated with progress reports.

- **Development of standardized reporting responsibilities across the agency.** Because reporting responsibilities are not currently well-defined or well-understood by staff, staff members' activities often vary widely. Enhanced reporting capabilities and processes will require an updated, clarified set of roles and responsibilities for agency staff, such as:
    - *Standardization of NPL (and other staff) reporting responsibilities and procedures.* Many procedures, such as review of incoming AD-421 reports, vary widely between NPLs; standard procedures can be established to ensure consistent management of reporting processes across the agency.
    - *Determination of roles and permissions for One Solution's data and resources.* One Solution will be available to all CSREES stakeholders, including staff, partners, and the public. However, some of the system's tools and data may only be appropriate for some system users to see. Thus CSREES must determine the resources to be available to each type of system user, taking into account both business needs and IT security considerations.

Although the Reporting and Post-Award Management Committee, Data Management Committee, and One Solution Task Force can provide recommendations for many of these policy decisions, it will be critical for the agency's leadership to determine the agency's approach to these areas and support the resulting policies.

## 6.2   Enterprise Architecture

One Solution has been designed to support and strengthen CSREES' information technology enterprise architecture (EA)[2]. Because the initiative will leverage and enhance existing components whenever possible, it will avoid development of duplicative systems. Further, by better defining the scope and role of each system in the agency's reporting environment, One Solution will strengthen reporting systems and achieve improved results from the agency's information technology investments. For example, an enhanced Research and Education Reporting component will be more focused on data entry and storage, while an expanded and

---

[2] An IT Enterprise Architecture defines the IT-related components used by an organization to support its mission. Much more than a list of IT systems, it defines a model the organization will use to map IT systems to business needs and to ensure that individual system components work together to support the organization's processes and mission.

enhanced REEIS will serve all analytical reporting needs at the agency (reducing the duplication of search and reporting features across these systems). Of note, enhancements separate from the One Solution initiative are currently being made to C-REEMS' Funds Management module and its interface with the official accounting system, FFIS. One Solution's holistic approach, integrating all reporting systems to provide an improved user experience and enable greatly increased functionality, will further enable the agency to make better use of its IT investments.

Further, the data management structures included in One Solution can serve as the foundation for the data layer of CSREES' enterprise architecture. In particular, the data dictionary created to provide standard structures for reporting data elements will enable significant standardization of data across IT systems and business processes; this structure can be expanded to other data, such as proposal/pre-award and award data, to provide a robust data layer for the agency's enterprise architecture.

## 6.3  Security and Data Privacy Impacts

Because One Solution will be Web-accessible and will support critical business processes for CSREES and its partners, security is an important component of system planning. To provide adequate security, the following considerations must be taken into account:

- Standard authentication and non-repudiation processes will be required, to ensure that only authorized users access the system and to allow for legally-recognized eSignatures for electronic transactions;
- Using configurable access control lists will be required to change, control, and manage access to multiple types system users;
- Protection from malicious code and virus attacks, including intrusion detection systems, will be required; and
- Physical security must be maintained to ensure that system hardware is not compromised.

One Solution will use USDA's eAuthentication service to provide user authentication and authorization. This will create a seamless user experience across One Solution's component systems (and with other USDA Web resources) and enable One Solution to use robust, modern access control tools quickly and at low cost. Further, One Solution will work with USDA's eAuthentication team to provide role-based access to staff, partners, and the public (either directly using eAuthentication or using a One Solution-specific support module); this will increase system security and simplify users' experience (as they will only see the resources relevant to them). Finally, eAuthentication allows CSREES and partners to conduct transactions using eSignatures that are legally equivalent to paper signatures.

One Solution will also include intrusion detection, Internet firewalls, and other measures to prevent unauthorized access and malicious use of its components. These features will be provided through USDA's National Information Technology Center (NITC), if the system is centrally hosted, or will be provided directly by CSREES if hosted at agency facilities. As the system will be accessed through USDA networks, it will both leverage all security features provided by the network and meet all requirements for systems accessible to the public.

The system will also include physical security controls such as keycards (and other access control methods). Such controls are currently provided both by NITC and CSREES hosting sites. Physical security controls, as well as system authorization and intrusion detection, will be supported by standard policies and procedures. In particular, NITC's data centers have state-of-the-art power redundancy, HVAC (Heating, Ventilation and Air-Conditioning) and fire suppression systems. A certification and authorization (C&A) compliant with USDA Cyber Security standards will be conducted for One Solution prior to the system's release to the public.

One Solution will include very little private information, as the majority of data collected is from institutions and nearly all is currently made available to the public. As such, data privacy impacts are expected to be limited. A privacy impact assessment is not expected to be required; however, one will be conducted if deemed necessary.

### 6.4    Telecommunications Network Impacts

One Solution's transaction volume is not expected to place a significant burden on CSREES or USDA data telecommunications networks. Specifically, because the system's user base is limited to CSREES grantees and interested members of the public, transactions are not generally expected to involve transfers of large amounts of data. Further, as many One Solution-related transactions are already being conducted over CSREES networks (such as user access to CRIS and REEIS), overall network traffic is not expected to increase significantly.

However, because of the cyclical nature of CSREES reporting (with many partners submitting data within a short period at the end of submission windows for the Plan of Work and other reports), there may be spikes in network traffic at certain times each month, quarter, or year. The One Solution PMO will plan for such spikes when possible and will coordinate with CSREES and USDA network staff to ensure sufficient bandwidth is available.

One Solution's portal front-end will be maintained outside the USDA Internet firewall to allow access to partners and members of the public; all other system components will be maintained behind the USDA firewall (as practicable) to maintain data security and meet USDA telecommunications guidelines. If components of One Solution are hosted at multiple locations, particularly with some databases hosted at CSREES and others at NITC, the system may require virtual private network (VPN) or other encrypted access methods to allow secure data exchange between components. Should VPN capabilities be required, CSREES will seek to use standard protocols such as PPTP (Point-to-Point Tunneling Protocol) or IPSec to minimize cost and maximize compatibility.

# Appendix A: Cost and Benefit Assumptions

This appendix details the assumptions used in the Cost-Benefit Analysis presented in Section 5.

## *General Cost-Benefit Analysis Assumptions*

- Benefits and costs are valid only if one alternative is developed. For example, implicit in the analysis of Alternative 1 is the assumption that Alternatives 2 and 3 will not be pursued.

- The real discount rate, drawn from OMB Circular A-94, is used for discounting of costs and benefits. For costs and benefits that relate only to the Federal government, a seven-year rate of 2.4% is used in analyzing this investment. For costs and benefits that impact external groups (partners and the public), a real discount rate of 7.0% is used.

- All costs and benefits are measured in constant FY2005 dollars.

- Federal personnel related to the One Solution initiative are assumed to on average be paid based on the GS-12, Step 5 rate from the General Schedule. Including fringe benefits of 32.85% (as directed in Section 300 of OMB Circulars A-11 and A-76) plus locality pay for the Washington DC metro area, this is equivalent to $60 per hour over FY2005-2008.

- Development and operation of systems is assumed to be completed by contractors at standard commercial rates, as provided in OMB Circular A-76, the General Services Administration, as well as by government personnel.

- System development is assumed to begin in FY2005.

- Data centers, operations infrastructure, and bandwidth are assumed to be available to support the desired level of performance for One Solution.

- Technology of existing systems is assumed not to significantly impede integration with One Solution.

- All systems will meet general commercial standards of reliability and performance, such as 99% system uptime.

## *Cost Assumptions (Alternative 2)*

- Government project resources are estimated at GS-12 step 5. Including 32.85% overhead factor (for taxes and benefits) and Washington DC locality pay, average annual cost for FY2005-FY2008 is approximately $120,000. Based on a standard 2000-hour work year, this is equivalent to $60 per hour.

- Contractor-provided integration services and labor estimates assume an average contractor rate of $110 per hour.

- Hardware costs do not reflect potential reuse of existing hardware.

- Hardware prices have been estimated at market value based on GSA Advantage prices.

- Hosting centers are assumed to have the necessary security and operations infrastructure in place to support the desired level of performance for the new application and database capabilities.

- Federal program management functions will be supported by 1.5 Federal FTEs over the course of the project lifecycle.

- Maintenance and operations cost estimates assume that at least some system components would be hosted at USDA's National Information Technology Center (NITC).

- Hardware and software cost estimates assume that One Solution would include 3 initial environments (development, test/pre-production, and production).

- Hardware costs are based on standard entry level dual processor servers such as IBM xSeries or Sun v20z or v40z. These costs may be somewhat reduced by leveraging existing hardware.

- Cost estimates assume that at least some commercially-licensed software will be used in development of One Solution; open source software may reduce acquisition cost but may also raise the cost of development and/or software maintenance contracts.

- Software costs are estimated using General Services Administration (GSA) Advantage rates for industry standard enterprise edition software, and assume that all packages must be purchased by CSREES (i.e., that they agency does not have an existing license or cannot use another USDA license). The table below includes examples of the types of software that have been used to estimate costs.

| Software Type | Package |
|---|---|
| Operating System | Sun Solaris, Red Hat Linux, Windows Server |
| Database Management System | Oracle, SQL Server |
| Web Application Server | Apache HTTP Server, Microsoft IIS |
| Portal Application | IBM WebSphere, BEA WebLogic, SharePoint Portal |
| OLAP Tool | Business Objects (with Crystal Reports), Cognos |
| Email Server Application | SuSE Linux Email Server, Microsoft Exchange |
| Development Tools | Microsoft Visual Studio.NET, JDeveloper, TOAD |

- Costs for each phase of implementation are based on the government/contractor work ratio below:

| Task | Contractor (% in hours) | Government (% in hours) |
|---|---|---|
| Governance and Strategy Development | 25 | 75 |
| Process Design and Standardization | 25 | 75 |
| Training and Communications | 80 | 20 |
| New Application Development | 80 | 20 |
| One Solution Data Repository Development | 80 | 20 |
| Current System Enhancement and Integration | 70 | 30 |
| External System Integration | 80 | 20 |
| Reporting / Analytical Capability Development | 80 | 20 |
| Security | 80 | 20 |
| Maintenance | 50 | 50 |

- Maintenance and Operations costs are estimated based on 0.5 FTEs and 1 FTEs for Year 2 and Year 3, with 2 FTEs from Year 4 on.

- Integration and labor costs are based on the following complexity and scope estimates:

| Object | Assumption |
|---|---|
| Tables | 10 core tables + 10 reference tables for each System |
| Procedures | 10 Stored Procedures in Database for each System |
| Forms | 5 Main forms with 3 Sub Forms for each System |
| External Interfaces | 2 for each System |
| Batch Programs | 2 for each System |
| Reports | 10 Analytical and 10 Transactional Reports in REEIS |
| XML Schemas | 4 Total |

## *Benefit Assumptions (Alternative 2)*

- All benefits are assumed to "ramp up" during system implementation, with cost reductions and benefit realization growing through Year 4 and stabilizing thereafter.

- Calculations related to NPL salaries assume that an average NPL is paid at the GS-14, Step 5 level and includes both Washington DC locality pay and a 32.85% cost supplement to cover overhead, taxes, and benefit costs.

- Calculations related to program specialist salaries assume that an average specialist is paid at the GS-12, Step 5 level and includes both Washington DC locality pay and a 32.85% cost supplement to cover overhead, taxes, and benefit costs.

- For calculations related to both NPLs and Program Specialists, a weighted-average payroll cost of $125,044 has been used (based upon the current roster of 91 NPLs and 24 program specialists).

- Calculations related to partner time and effort are based upon an average loaded payroll cost of $86,000 per year or $47.78 per hour, based on an institution salary survey.

- The average number of enhancements to CSREES systems per year is based upon an estimation of the number of CRIS, REEIS, and C-REEMS system enhancements performed in a given year.

- The cost of an average CSREES system enhancement is based upon the weighted average number of staff hours spent per enhancement across CRIS, REEIS, and C-REEMS.

- The development and maintenance costs of program-specific CSREES systems are based on an estimation of such costs for current systems in use, particularly PPRS.

- The average numbers of NPLs and other staff routing, processing, managing, and creating reports are based upon the current CSREES staff roster and estimates of the numbers of NPLs, program specialists, and other support staff who are participating in these activities. This includes a baseline of 91 NPLs and 24 program specialists, plus additional staff from ISTM, OEP, Planning & Accountability, and other units as appropriate for each type of task.

- The average hours per staff member spent routing, processing, managing, and creating reports are based upon estimates of time spent by a survey of agency staff.

- The percent reduction of staff time spent routing, processing, managing, and creating reports are all based upon estimates of time spent by a survey of agency staff.

- Each determination of CSREES FTEs gained annually is found by multiplying the average number of NPLs and other staff participating in specific tasks, the average hours spent on that specific task, and the percent reduction of time spent on that specific task. Dividing that number of hours gained by 1,776 annual hours per FTE will result in a determining of full time FTE gained. A figure of 1,776 hours is used to represent the productive hours worked by an employee each year, as specified in OMB Circular A-76. (This is different from the 2,080 hour basis per FTE used in budget and pay calculations and excludes time considered 'nonproductive', such as annual leave, holidays, and training).

- Printing cost reductions are determined for both CSREES and institutions by determining the number of sheets currently printed each year – 50,000 and 1,000 respectively – and multiplying that number by per-sheet printing costs of $.05 and an estimated 5 sheets per report.

- Mailing cost reductions are determined for both CSREES and the partnership by determining the number of reports currently mailed each year – 5,000 and 250 respectively. To find the cost for the portion sent by express mail, this number is multiplied by the percent of mail sent express and the USPS rate of $13.65 for each express package – 15% for CSREES and 33% for the partnership. To find the cost for reports sent via regular mail, the number is multiplied by the percent of mail shipped first class an estimated USPS rate of $1 for each – 85% for CSREES and 67% for the partnership. These amounts were added individually for CSREES and partners to determine their individual mailing costs.

- Paper storage cost reductions are determined for both CSREES and the partnership by determining the amount of individual sheets stored each year. For CSREES, approximately 15,000 new reports are assumed stored each year, with all reports maintained for 7 years to fulfill NARA requirements, resulting in a total of 105,000 reports being stored. This amount is multiplied by an estimated 5 sheets in each report, and a $.03 cost of storage per sheet (based on the National Archives and Records Administration, or NARA, estimates for agency storage costs) to obtain an average storage cost for CSREES. Partners' storage cost is determined by factoring the number reports estimated to be stored each year at an institution (500) by the cost of storing each report at $.03 per page for each 5 page report. Multiplying by the number of institutions to determine costs across the partnership.

- The overall number of partners is estimated at 125, based on the average number of institutions reporting in CRIS (including both land-grant and other universities).

- The average number of institutions undertaking system enhancements is determined by estimating the number of institutions each year that would create a new system or make modifications or enhancements to current systems. The average cost of system development is based upon a sample of institution systems.

- Average annual hours spent on reporting per institution has been estimated based on feedback received from institution staff members who participated in One Solution focus groups and completed a questionnaire, as well as from Paperwork Reduction Act burden estimates.

## *Alternatives 1 and 3 Calculation Assumptions*

*Alternative 1*

- As Alternative 1 will only provide capabilities related to the Plan of Work and a limited reporting home page, the system's benefits are estimated to be significantly less than Alternative 2. Specifically, Alternative 1 is estimated to provide:
    - o No technology cost savings benefits;
    - o A maximum of 5% savings in each of the materials benefit areas (in each year after Year 1); and
    - o Limited productivity benefits for CSREES staff and partners (10% reduction in staff report review effort, 3% reduction in staff program management effort, 5% reduction in staff report creation effort, and a 20% reduction in the 400 hours each partner institution spends annually developing Plans of Work and Annual Reports of Accomplishments).

- For Alternative 1, all benefits calculations assume 95 partner institutions (as only 1896 and 1890 land-grant institutions currently submit the Plan of Work).

- The scope of the tasks in Alternative 1 is similar to that of tasks in Year 1 of Alternative 2. The Alternative 2 Year 1 cost estimates are used as a baseline for Alternative 1 estimates with some modifications to reflect differences in scope and complexity.

- The following cost estimates for Alternative 1 assume development of the Plan of Work Web application and database, a static reporting home page, and limited modifications of REEIS to enable Plan of Work data to be imported into that system for basic querying:

| Category | Year 1 | Year 2 | Year 3 | Year 4 | 4 Year Total |
|---|---|---|---|---|---|
| Management and Communications | 401 | 0 | 0 | 0 | 401 |
| Hardware/Software Infrastructure & Support | 240 | 30 | 30 | 30 | 330 |
| Design, Development and Integration Costs | 692 | 0 | 0 | 0 | 692 |
| Maintenance and Operations | 35 | 185 | 185 | 185 | 590 |
| **Total Cost** | **$1,368** | **$215** | **$215** | **$215** | **$2,013** |

- Continuing costs after Year 4 include both $150,000 per year for 1 maintenance and operations FTE (assuming the same contractor-government split as for Alternative 2), $35,000 in hosting costs, and $30,000 in software maintenance contracts and warranties.

- Partner transition costs are estimated at approximately $1500 per institution, split evenly over Years 1 and 2.

*Alternative 3*

- As Alternative 3 will provide similar capabilities to Alternative 2, it has a similar level of benefits. Specifically, Alternative 3 will provide:

  o Increased technology cost savings (from increased avoidance of enhancements to current systems, with 80% of enhancements avoided);

  o Similar levels of productivity benefits to Alternative 2, although with benefits realized more slowly due to Alternative 3's longer implementation timeframe; and

  o Similar levels of materials savings to Alternative 2, again with benefits realized more slowly to due this scenario's timeframe.

- All productivity and materials benefits are assumed to be delayed by one year for Alternative 3 when compared with Alternative 2, to reflect the longer timeframe mentioned above.

- The following cost estimates for Alternative 1 assume development of new components to replace CRIS and REEIS, as well as all other One Solution components:

| Category | Year 1 | Year 2 | Year 3 | Year 4 | *4 Year Total* |
|---|---|---|---|---|---|
| **Management and Communications** | 597 | 1064 | 595 | 444 | *2700* |
| **Hardware/Software Infrastructure & Support** | 740 | 770 | 620 | 600 | *2730* |
| **Design, Development and Integration Costs** | 1254 | 1888 | 2042 | 929 | *6113* |
| **Maintenance and Operations** | 100 | 250 | 400 | 700 | *1450* |
| **Total Cost** | **$2,691** | **$3,972** | **$3,657** | **$2,673** | **$12,993** |

- To obtain the above costs, each cost component from Alternative 2 was multiplied by a complexity factor to account for the increased scope and effort of Alternative 3. These complexity factors are:

| Category | Complexity Factor | Category | Complexity Factor |
|---|---|---|---|
| One Solution Program Management | 1.25 | New Application Development | 2 |
| Project Management | 2 | External System Integration | 1.5 |
| Governance and Strategy Development | 1.2 | One Solution Repository Development | 2 |
| Process Design and Standardization | 2 | Current System Enhancement & Integration | 0 |
| Training & Communications | 2 | Reporting / Analytical Capability Development | 1.5 |
| Hardware | 2 | Security | 1.25 |
| Software | 3 | Application and Database Hosting | 2 |
| Warranties & Support | 3 | Maintenance & Operations | 2 |

- Continuing costs after Year 4 include both $185,000 per year in operations and $30,000 in software maintenance contracts and warranties.